

**Republic of India
Government of Nagaland
Department of Health and Family Welfare**

**Preparatory Survey on
Nagaland Medical College Hospital
Development Project**

**Final Report
(Advanced Version)**

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Japan International Cooperation Agency

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Executive Summary

1. Introduction

In the past few years, the Government of India (GoI) has placed health on top of its political agenda and made a commitment to make significant increases in public spending in health. The National Health Policy, 2017, calls for an increase in government health spending as a percentage of GDP by 2025, from 1.15% to 2.5%, and lays out an ambitious set of goals and targets to improve the population's health status and its access to quality health services in the public sector. A key goal is to attain "universal access to good quality healthcare services without anyone having to face financial hardship". These goals recognise the epidemiological and demographic shifts occurring in India, with the growing burden of non-communicable diseases (NCDs), such as heart disease, stroke, diabetes, and mental illness, as well as an ageing population, while poor birth outcomes, communicable and vector-borne diseases, and childhood malnutrition remain the major causes of morbidity and mortality [1].

Nagaland State introduced "Communitisation" in primary health services since 2002 to promote partnership between the government and the community to optimise limited resources to deliver health services [2]. The state government's Nagaland Vision 2030 (2016) states the importance of improving healthcare infrastructure and using information technology to enhance health services, based on the recognition that "health is wealth". It also addresses the issue of the financial burden as an obstacle to the utilization of health services.

However, in terms of specialised healthcare, Nagaland State is one of the least developed states in India, which experiences shortages of specialised medical doctors and tertiary medical services. As of 2022, Nagaland State is one of four state/union territories (Daman and Diu, Ladakh, Lakshadweep) without any medical college.

To fill such gap, the Government of Nagaland (GoN) laid the establishment of the Nagaland Medical College Kohima (NMCK)¹ in 2014. In August 2022, the application for the first Letter of Permission (LOP) was submitted to the National Medical Commission (NMC) to launch the first academic year in 2023/24. The first LOP was issued in April 2023 and the first admission process was conducted in late August 2023. Regarding the teaching hospital, the "Conceptual Project Report for Setting up of District Hospital Kohima as Teaching Hospital for the Upcoming 100 Seats Medical College" (hereinafter referred to as the Detailed Project Report (DPR)) was submitted in August 2020.

According to the DPR, the 400-bed teaching hospital was considered to be developed based on the existing Naga Hospital Authority Kohima (NHAK) or to construct a new building. Because of land limitation of NHAK and access to NMCK, constructing new buildings were considered. Then, GoN requested for funding assistance to the Japan International Cooperation Agency (JICA).

The outline and the scope of the Project is summarised in Table S1 and Table S2, accordingly. In April 2023, the medical college was named as Nagaland Institute of Medical Science and Research (NIMSR) Kohima and the hospital was named NIMSR Kohima Teaching Hospital².

¹ It seems to be renamed to the Nagaland Institute of Medical Science and Research (NIMSR) Kohima.

² Names of the medical college and the hospital used in this report are in line with the official application submitted to JICA.

Table S1 Summary of the Nagaland Medical College Hospital Development Project

Objective	The objective of the Project is to establish the tertiary level medical service delivery system in the state of Nagaland by developing a medical college hospital and enhancing the healthcare human resource development systems through clinical-based education, thereby contributing to UHC promotion in the region.
Components	i. Construction of new buildings and installation of medical equipment of Nagaland Medical College Hospital excluding the Maternal and Child Health Ward ii. Consulting services ((1) Bidding assistance, equipment procurement and work supervision, assistance with environmental and social considerations and other related activities, (2) Formulation of plans concerning capacity building of medical personnel and running of training programs, and (3) Formulation of plans to improve the management of healthcare services and running of training programs)
Target Area	Nagaland State, Republic of India
Concerned Agencies	Executing Agency: Department of Health and Family Welfare (DHFV), Government of Nagaland Relevant Agencies: Ministry of Health and Family Welfare, National Medical Council

Source: JICA Survey Team

Table S2 Scope of the Project

Facility	400-bed teaching hospital including medical equipment and IT system to be developed at Phriebagie, Kohima, Nagaland
Technical Assistance	Necessary technical assistance will be included such as: • Human resource deployment and development for the hospital; • Hospital management capacity; • Medical equipment management and maintenance; and • Medical human resource development.

Source: JICA Survey Team

2. Human Resource Development

The number of nurses, midwives, and pharmacists per 100,000 population in Nagaland is more than twice the all India average, and the number of all health human resources including doctors and nurses per 100,000 population is also higher. On the other hand, the number of doctors and dentists per 100,000 population, respectively, is only about half the Indian average. The World Health Organization (WHO) recommends the deployment of one doctor per 1,000 population, but the number in Nagaland is 0.33. In terms of specialist doctor, the Indian average is 27.55 per 100,000 people, while in Nagaland, the number is only 8.85. The shortage of doctors including specialist is considered to be a major challenge.

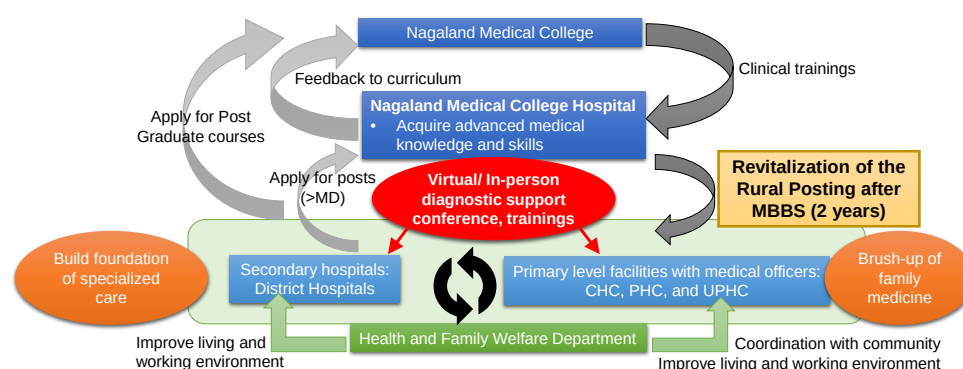
As of 2022, there are no medical colleges, either public or private, with Bachelor of Medicine, Bachelor of Surgery (MBBS) courses in Nagaland, with an annual intake of zero students. Nagaland is the only state among the other North Eastern Region (NER) states with a total of zero MBBS acceptances per year from both public and private institutions, and also has the lowest level of provisioning. The state also has the second lowest annual intake of postgraduates after Arunachal Pradesh among the NER states. Compared with other NER states, the provision of medical colleges and medical education in MBBS and postgraduate combined is lagging behind.

The Directorate of Medical Education of the Directorate of Health and Family Welfare (the Directorate) is responsible for medical education. To establish medical college and other institutes to undertake medical education, Nagaland Institute of Medical Science and Research (NIMSR) was established in 2022. NIMSR is headed by a director cum dean assisted by a deputy director, consultants (procurement and technical), and a hospital administrator, as of April 2023 (Figure 1-3). It is also responsible for the following:

- To establish hospitals to provide advanced and specialised medical care,
- To conduct and encourage medical research and training,
- To guide and assist the state government in planning and implementation of healthcare programmes and medical education, and
- To receive and coordinate external support [3].

The NMCH has been recruiting human resources in accordance with the NMC's regulations, and particularly faculty members have been selected through an open recruitment process, including professors, associate professors, and assistant professors in the Departments of Forensic Medicine, Pharmacology, Physiology, Anatomy, Community Medicine, and Biochemistry. For the other departments, interviews took place several times until July this year, and it seems that there are basically enough applications for each post to enable selection from the pool of applicants.

The NMCH could be expected to be the centre of excellence of medical human resource development in Nagaland. At the same time, to develop well-balanced medical human resources, it could be recommended to revitalise the rural posting system after MBBS and develop virtual and/or in-person diagnostic support between primary/ secondary health facilities and the medical college hospital as presented in Figure S1. Because the recruitment system of the medical college hospital is different from the primary and secondary health facilities, it is difficult to rotate the human resources from primary to tertiary. However, such exchange mechanism functions well, where medical human resources could accumulate balanced experiences from general to specialised medical care.



Source: JICA Survey Team

Figure S1 Proposed Human Resource Development Mechanism

3. Facility

The seven NER states including Nagaland is considered as one of the major earthquake-prone belts in the world. Nagaland lies in seismic zone V which falls under a very high damage risk zone. Also, landslide is a major disaster that keeps affecting Nagaland especially in the monsoon when heavy down pour is experienced all over Nagaland. To prevent and minimize negative impacts caused by such natural conditions and disasters, facility planning considered the measurements as summarised in Table S3.

Table S3 Facility Planning Considerations for Natural Disasters

Disasters	Considerations
Earthquake	Since the project site is located in an area with high seismic risk, the adoption of the seismic isolation structure will be considered. Seismic isolation structure reduces shaking during earthquakes, allowing for continuity of medical care in the event of a disaster. A seismic isolation structure is a structure that separates the building from the ground and incorporates a seismic isolation system consisting of rubber bearings and dampers that suppress the shaking of the building between the building and the ground. The seismic isolation rubber prevents seismic energy from being transmitted to the building, and also reduces acceleration and lengthens the period of shaking, resulting in a gentle shaking rather than a violent shaking. This reduces the damage to the building, minimizing damage to medical staff and patients, and also protects various equipment essential to medical operations from damage due to falls.
Landslide	Loose ground surface conditions are not suitable for spread foundation, therefore, pile foundations should be adopted. Adopting the earth anchor method during construction prevents the temporary retaining wall from collapsing due to large amounts of rainwater as the anchors are driven into the hard lock layer.
Flood	The project site is a mountain ridge area and will not be subject to flooding. The installation of a rainwater harvesting tank will be considered to take measures for stormwater drainage downstream.
Heavy rain/ Windstorm	During construction, it is desirable to set the timing of commencement avoiding the rainy season because earthwork in the early stages of construction is more susceptible to the effects of rain.

Source: JICA Survey Team

In order to achieve the objectives of the project, facilities will be developed to provide complete and comprehensive medical care within Nagaland State, and a centre for advanced research and medical human resource development will be established. The facility plan will be based on the following three concepts in order to develop a world-class hospital as well as to introduce advanced medical equipment.

1. One integrated and compact hospital
2. World-class hospitals
3. Patient-centred hospital

The facilities and the utilities to be planned are shown in Table S4 and Table S5, accordingly.

Table S4 Outline of the Building

Total Floor Area	Building Coverage Area	Structure	Story	Remarks
1) Main Hospital				
Approx.49,270 m ²	Approx.4,480 m ²	Reinforced concrete, Seismic isolation	Basement-3F /G + 10F, Penthouse-2	400 beds (General: 300 beds, Emergency: 30 beds, ICU: 20 beds, Private pay ward: 50 beds)
2) Evacuation Ramp				
Approx. 780 m ²	Approx. 260 m ²	Reinforced concrete	From GF to 2F	-
3) Connecting Bridge Corridor				
Approx. 80 m ²	Approx. 80 m ²	Steel	Connected at 2F	

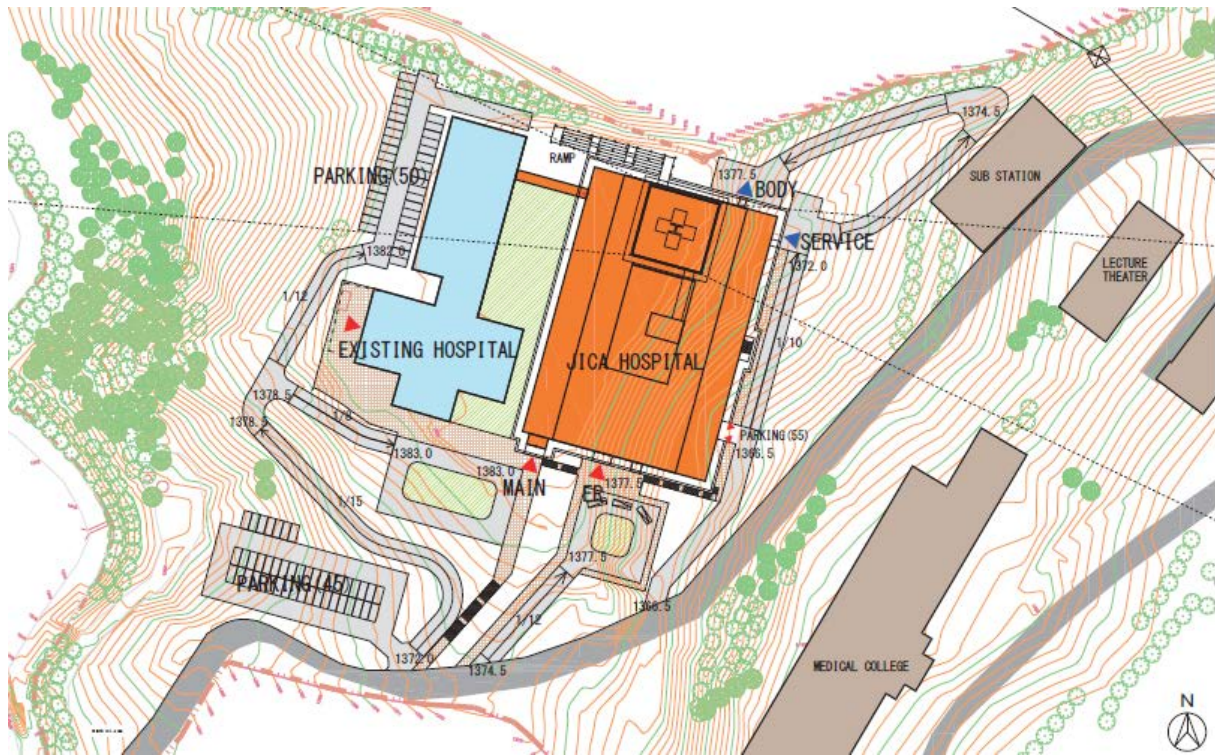
Source: JICA Survey Team

Table S5 Outline of Facility Utilities

Category	Contents
1) Electrical Facilities	Power substation, Generator, UPS, Lighting, Telephone, Local Area Network (LAN), Public address system, TV system, Intercom system, Nurse call system, Electric lock system, Security camera system, Fire alarm system, Lightning protection system
2) Air Conditioning Facilities	Cooling and heating system, Ventilation system, Air heat exchanging system, Central monitoring system
3) Water Supply, Drainage and Sanitary Facilities	Water reservoir, Hot water supply system, Medical gas system, Wastewater treatment plant, Kitchen equipment, Firefighting system
4) Transport Facilities	General Elevator×2 Basement-3 – Tenth Floor (21 persons) Medical Elevator×3 Basement-3 – Tenth Floor (21 persons), Basement-3 – Penthouse Floor-2 (26 persons), Basement-2 – Tenth Floor (21 persons) Basement-3 – Penthouse Floor-2, Basement-2 – Tenth Floor) Food Elevator×1 (Basement-2 – Tenth Floor) Service Elevator×1 (Basement-2 – Penthouse Floor-1) Fire Elevator×1 (Basement-3 – Tenth floor)

Source: JICA Survey Team

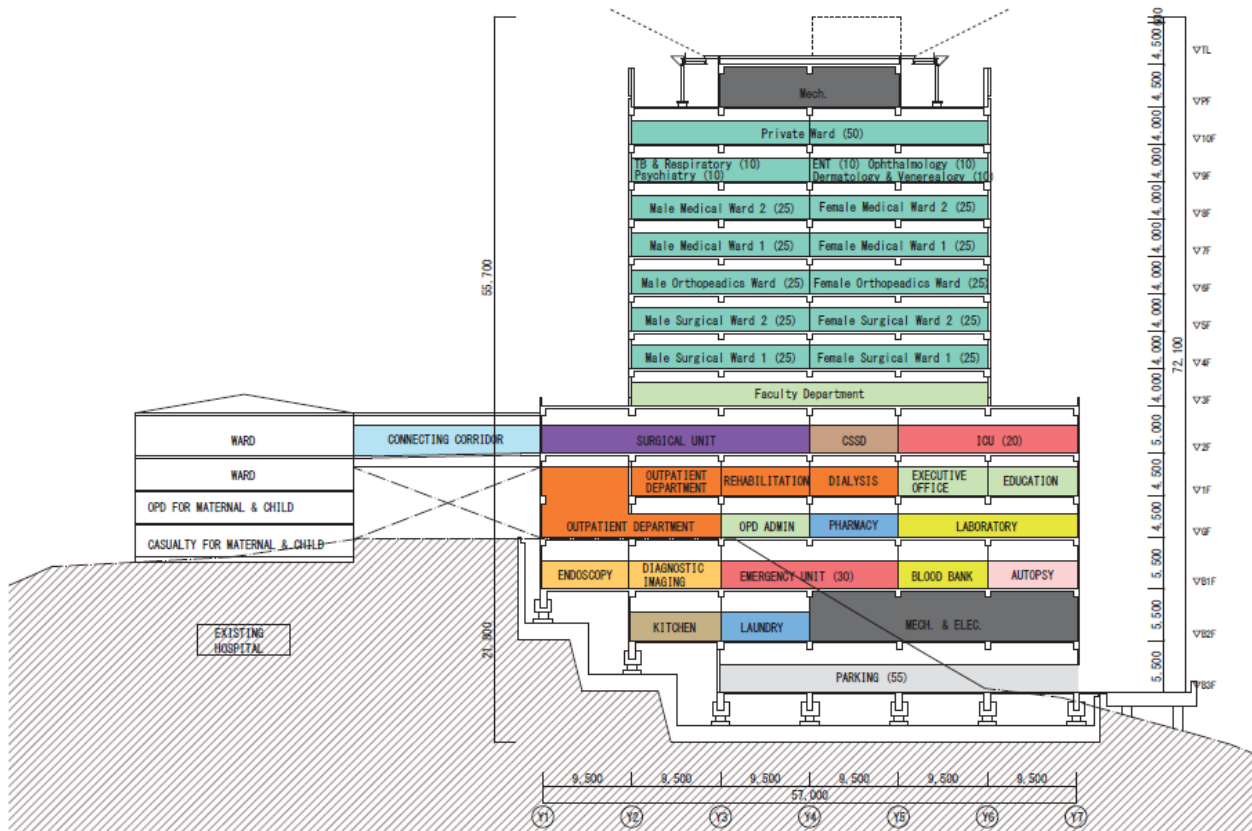
Based on the results of field surveys and discussions with stakeholders, the new hospital is planned to be located on the east side of the existing Maternal and Child Hospital (Figure S2). Since the area is flat, but not vast, the building will be high-rise in order to secure the necessary floor area while keeping the building coverage area compact.



Source: JICA Survey Team

Figure S2 Layout of the New Hospital

The building height from ground level (parapet level) is approximately 55.7 m from the higher ground level and 72.1 m from the lower ground level (Figure S3).



Source: JICA Survey Team

Figure S3 Proposed Section Zoning

4. Medical Equipment

The equipment list is planned to include equipment needed for the departments listed in Table S6. The bed capacity for NMCH and Maternal and Child Health Hospital (MCH) will be 400 and 100 beds, respectively.

Table S6 Department/Section Listed in the List of the Proposed Medical Equipment

	Department / Section	Major Equipment
	Equipment for NMCH	
1	Diagnostic Imaging	General X-ray, fluoroscopy, mobile X-ray, CT, MRI, X-ray protection gloves and aprons, etc.
2	Outpatient Consultation Internal Medicine, Surgery, ENT, Eye, Dental, Dermatology and Venerology, Psychiatric, Orthopaedics	Internal Medicine: Electrocardiogram (ECG), ultrasound, stress test system (treadmill, ECG, etc.), pulmonary functioning analyser, etc. Surgery: Instrument set, etc. Dermatology and Venerology: Equipment for outpatient clinics ENT: Examination unit and chair, etc. Eye: Examination unit and chair, etc. Dental: Dental unit and chair, autoclave, etc. Orthopaedics: Gypsum cutter, instrument set, etc. Psychiatric: Equipment for outpatient clinics
3	Outpatient Consultation Tuberculosis and Chest Department	Equipment for outpatient clinics
4	Operating Theatre - General Surgery-2 - ENT-1, - Eye-1, - Orthopaedics-1, - Septic-1	Operating light, operating table, anaesthesia machine, vital sign monitor, C-arm X-ray, operating microscope, etc.
5	Anaesthesia	Anaesthesia machine, laparoscope, ventilator, etc.
6	Surgical Instruments	Assorted operating instrument set
7	CSSD	Autoclave, ultrasonic cleaner, etc.
8	ICU	Vital sign monitor, ventilator, infusion pump, syringe pump, etc.
9	Dialysis Unit	Dialysis machine, bed, etc.
10	Endoscopy	Upper and lower gastrointestinal fiberscopes, etc.
11	Blood Bank	Refrigerated centrifuge, refrigerator, freezer, etc.
12	Laboratory (Biochemistry, Pathology, Microbiology, Immunology, etc.)	Haematology analyser, biochemistry analyser, immunology analyser, etc.
13	Physiotherapy	Short wave diathermy, electrotherapy machine, muscle stimulator, electronic traction device (cervical and lumbar spine), etc.
14	Post Mortem Room	Autopsy table, mortuary refrigerator, etc.
15	Emergency	Mobile X-ray, resuscitator, ventilator, defibrillator, ECG, etc.
16	Oxygen Supply	Oxygen plant
17	Others	Equipment for laundry, kitchen, patient wards, general offices, auditorium, etc.
	Equipment for MCH	
18	Obstetrics and Gynaecology Department	Cardiotocogram (CTG), infant incubator, infant warmer, gynaecological examination table, etc.
19	Labour Room	Bed, delivery bed, CTG, etc.
20	Operating Theatre (2 Rooms) for Obstetrics and Gynaecology	Operating light, operating table, anaesthesia machine, vital sign monitor, etc.
21	Paediatric	Equipment for outpatient clinics
22	Neonatal Intensive Care Unit (NICU)/ Special Newborn Care Unit (SNCU)	Infant incubator, infant warmer, ventilator, vital sign monitor, infusion pump, syringe pump, etc.
23	Immunisation Room	Equipment for outpatient clinics
24	Others	Equipment for laundry, kitchen, patient wards, general offices, auditorium, etc.

Source: DHFW, Nagaland

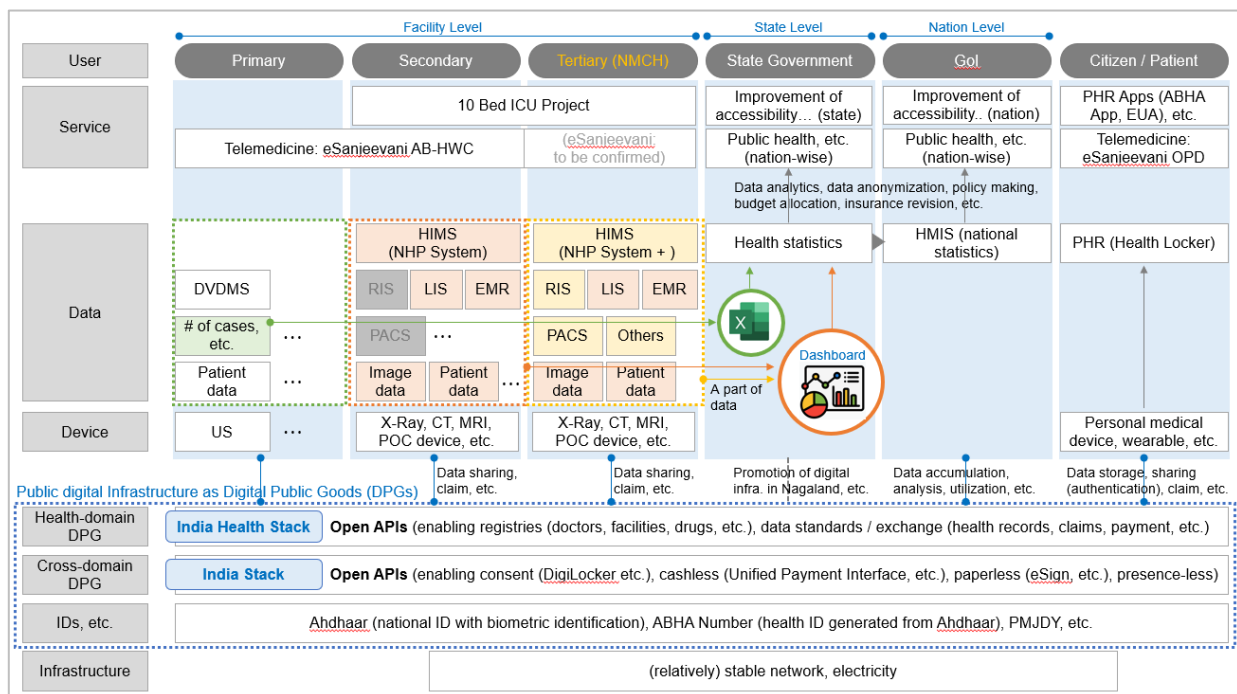
For the maintenance of medical equipment for the NMCH, outsourcing to a private company is an option, but in addition, collaboration with NIEIT could be considered. In-house maintenance of medical equipment

is considered difficult due to the large variety of medical equipment and the need to deal with precision management by licensed technicians and institutions. However, it is preliminarily considered by the DHFW to hire in-house maintenance engineers and technicians considering the issues of outsourcing and for sustainable maintenance.

To utilise the medical equipment properly and for a long period, daily maintenance at site by users and engineers/technicians is essential. Therefore, as technical assistance soft component for the medical equipment maintenance, which aims to improve the capacity of maintenance skills and to utilise the medical equipment for a long period by learning preventive maintenance shall be included. Maintenance of medical equipment shall be categorised into maintenance by the user, by the biomedical engineers/technicians and by the manufacturers/agents. Maintenance by the manufacturers/agents shall be covered by CMC/AMC mentioned above while by the users and biomedical engineers/technicians shall be covered under the soft component.

5. ICT

Based on the results of the survey, a digital architecture for Nagaland was proposed. It includes facility level with NMCH as the tertiary medical facility, state level, and national level, by adding NMCH to the current digital architecture in Nagaland as illustrated in Figure S4.



Source: JICA Survey Team based on material by JICA STI/DX Chamber

Figure S4 Digital Architecture toward Medical DX in Nagaland

For the facility level, it would be realistic and reasonable to follow the current NHP System in the Project and deploy the NHP System into NMCH. However, since the current module functions of the NHP System does not satisfy the requirement of the medical college hospital with 400-bed capacity, some additional modules (such as PACS) shall be added to the current NHP System (it can be called as the “NHP System+” to distinguish it from the one currently deployed into the District Hospitals). It would also be necessary to highlight that the deployment of the NHP System to NMCH is important in terms of the data linkage and compatibility among the medical facilities in Nagaland and in terms of scalability to state level and national level to follow GoI’s initiative to enhance digital health technologies and establish a digital health ecosystem in India. Telemedicine system, such as Doctor to Patient (D2P) solution, Doctor to Doctor (D2D) solution, or Tele-ICU, are also planned to be introduced to NMCH as a means of correcting disparities in access to medical care in Nagaland, where topographical and geographical factors are significant.

6. Hospital Management

Table S7 summarises outline of the survey results on the hospital management.

Table S7 Outline of the Hospital Management Survey Results

Hospital Operation and Management Points		Findings / Remarks
Improvement of the level of medical care at the medical college and hospital and in the community		
1.	Support for introduction of hospital clinical paths and referral system for each disease	Needs to introduce Japanese regional referral function and emergency medical function
2.	Support for building clinical trials and clinical research networks	Needs to introduce Japanese clinical training function
Human resource development		
3.	Support for clinical training and introduction of professional nurse system	Needs to introduce Japanese clinical training function
Department management		
4.	Operating room and central sterilisation room operation plan (operation method)	Referring to National Quality Assurance Standard (NQAS) and introducing draft of the departments' scope
5.	Support for planning of operation manual of emergency department, outpatient department, health check-up department, dialysis department, chemotherapy department, etc.	Referring to NQAS and introducing draft of the departments' scope
6.	Support for management of ward department and bed control operations	Referring to NQAS and introducing draft of the department's scope
7.	Support for planning of food service operation (Nutrition Support Team (NST) establishment, Hazard Analysis and Critical Control Point (HACCP) compliance, etc.)	Food services are not provided for patients in the public hospitals in Nagaland
8.	Support for medical equipment and medical material supply management (standardisation of drugs and medical supplies, inventory control, 5S improvement, etc.)	Referring to NQAS and introducing draft of department's scope
Overall hospital operation		
9.	Developing manuals of overall hospital operations	Referring to NQAS and introducing draft of selected department's scope
10.	Support for introduction of various guidelines (nosocomial infection, medical information management, medical safety, BCP, etc.)	Referring to NQAS. Nagaland State Disaster Management Authority had prepared Disaster Management Plan.
11.	Support for establishment of personnel and education systems	Found good example in Christian Institute of Health Science and Research (CIHSR)
12.	Support for improving patient services (hospital amenities, public relations, etc.)	Patient waiting time shall be considered, National Accreditation Board for Hospitals & Healthcare Providers (NABH) can be introduced.
13.	Support for formulating labour management manuals, organisation, committee, etc.	Found good example in CIHSR
14.	Consideration for introduction of outsourcing or partial PPP scheme	Lack of sufficient private medical service providers in Kohima and checking other examples in India

Source: JICA Survey Team

Based on the survey results, the following experiences and know-hows in Japan could be proposed to apply to maximize function of NMCH: (1) regional referral collaboration and coordination system; (2) regional emergency medical centre; (3) clinical training curriculum and mentoring system; (4) organization structure and committees of medical college hospitals; (5) management system per department; and (6) disaster-base hospitals and disaster preparedness response system.

7. Technical Assistance

The proposed soft component activities are listed in Table S8. The soft component aims to enhance the capacity of concerned institutions to the project including DHFW, NIMSR, NMCH, and Naga Hospital Authority Kohima (NHAK). The main objective is to establish readiness for the new teaching hospital.

Table S8 Outline of the Proposed Soft Component

Sub-components	Proposed Activities	Objectives
Medical Human Resource Development	Study visits on good practice	To learn from relevant experiences on effective clinical training, medical intern system, and distance technical support by specialist doctors
	Development of distance technical support system and contents among primary, secondary, and tertiary health facilities in collaboration with the 10 Bed ICU	To establish sustainable distance technical support system from specialist doctors in NIMSR and major District Hospitals to doctors working in remote areas and primary health facilities
	Development of clinical training curriculum for the medical college hospital including rural posting	- To establish attractive clinical training mechanism for under-/post- graduate medical students through utilising simulator and virtual programmes - To ensure implementation of rural posting to develop well-balanced carrier between general medicine, public health, and specialised care
Hospital Management	Study visits on good practice	To learn from relevant experiences on medical college hospital management including quality management and disaster preparedness
	Development of management structure and guidelines of the hospital/ each department, infectious prevention and control (IPD) manual, and disaster management manual of the medical college hospital, as well as training of trainers (TOT)	- To establish sustainable hospital management mechanism including preparedness for health emergency - To train new hospital managers as trainers on the developed mechanism and manuals - To develop induction training programme and material
	Induction training for new staff of NMCK Hospital	To facilitate the trainers to train hospital new staff
Medical Equipment Maintenance	Study visits on good practice	To learn from relevant experiences on preventive maintenance of major medical equipment
	Development of guidelines on preventive daily operation and maintenance for users of the major medical equipment and TOT	- To establish sustainable preventive maintenance mechanism for end-users - To train new hospital managers as trainers on the developed mechanism and manual
	Training on preventive maintenance and the developed guidelines	To facilitate the trainers to train end-users in the hospital
Hospital Information Management System (HMIS)	Study visits on good practice	- To learn from good practices and/or advanced efforts on digital health including HMIS, distance medicine, etc. - To observe advanced e-health, hospital management information system, and eSanjvani
	Capacity building on IT literacy/ security and HMIS utilisation, as well as TOT	- To develop IT Utilisation Manual including basic literacy - To train new hospital managers as trainers on the developed manual
	Training on HMIS	To facilitate the trainers to train new hospital staff

Source: JICA Survey Team

8. Project Implementation

Proposed project implementing structure is illustrated in Figure S5. As an executing agency, DHFW shall formulate a steering committee and a project management unit (PMU) involving concerned institutions including NIMSR, NHAK, and other concerned agencies. Then, a project management consultant (PMC) team will be hired to support the project management. The contractors for civil works, medical equipment, IT, and soft component (technical assistance), will contract with DHFW and supervised PMU.

Considering necessary period for JICA's concurrence as in the guideline, the overall project implementation schedule shall be devised based on the prerequisites in Table S8. Activities that are possible to be implemented in parallel shall be considered overlaps.

Table S8 Prerequisites of the Project Schedule

Project Milestone	
Loan Pledge:	December 2023
Signing of L/A:	January 2024
Selection of PMC (By the DHFW)	
Preparation of Terms of Reference (ToR), JICA concurrence:	4.0 months
Releasing the request for proposal, preparation of proposal by prospective consultant:	2.0 months
Evaluation of submitted proposals (QCBS), JICA concurrence:	4.0 months
Negotiations, JICA concurrence, and consulting agreement:	2.0 months
Design Stage (By the PMC)	
Basic design:	6.0 months
Detailed design	6.0 months
Bidding Procedure (By the PMC)	
Preparation of P/Q document and JICA concurrence:	2.0 months
Releasing P/Q, preparation of P/Q by applicant:	1.5 months
Evaluating submitted P/Qs and JICA concurrence	1.5 months
Preparation of bidding document and JICA concurrence:	4.0 months
Releasing bidding document and preparation of bid by prospective bidder	3.0 months
Evaluating submitted bids and JICA concurrence:	5.0 months
Negotiations, JICA concurrence and awarding contract:	3.0 months
JICA concurrence and conclusion of contract:	1.0 month

Source: JICA Survey Team

9. Environmental and Social Considerations

Table S9 summarises results of the environmental and social consideration survey.

Regarding medical waste, all the wastes from hospitals are collected, segregated, and transported to authorised third party or in their own internal incinerator. The certified private companies are regulated by the state government to locate every 75 km radius to avoid unnecessary price competition that could cause poor quality service.

Table S9 Prerequisites of the Project Schedule

Item	Results
Air Quality	• All parameters are within the national standards.
Noise	• Noise level at all points were within permissible limit.
Water Quality	• For ground water, alkalinity and total hardness exceeded acceptable limit, but those were within permissible limits. • All other parameters were within national standards for water quality set by CPCB for ground water and Bureau of Indian Standards for surface water.
Flora and Fauna	• The entire area has terrestrial vegetation and agricultural land nearby growing paddy. Core zone doesn't have any rare, endangered, extinct and threatened species. No migratory corridors or breeding grounds for faunal species, nor faunal species were confirmed. • Avi fauna- There are lot of sighting of Sparrows found in the Project Site. Few sightings of Bulbul, Warbler, Cuckoo, Asian Koel were seen near the Project Site.

Source: JICA Survey Team

10. Financial and Economic Analysis

The financial internal rate of return (FIRR) of the project is 6.4%, which is higher than 1.1% (Weighted Average Cost of Capital (WACC) of yen loan). The benefit cost ratio (BCR) is higher than 1.0 and the net present value (NPV) is plus. Therefore, the project is financially viable.

The economic internal rate of return (EIRR) of the project is 24.9% which is higher than 10% (the social discount rate). The BCR is higher than 1.0 and the economic net present value (ENPV) is plus. Therefore, the project is economically viable.

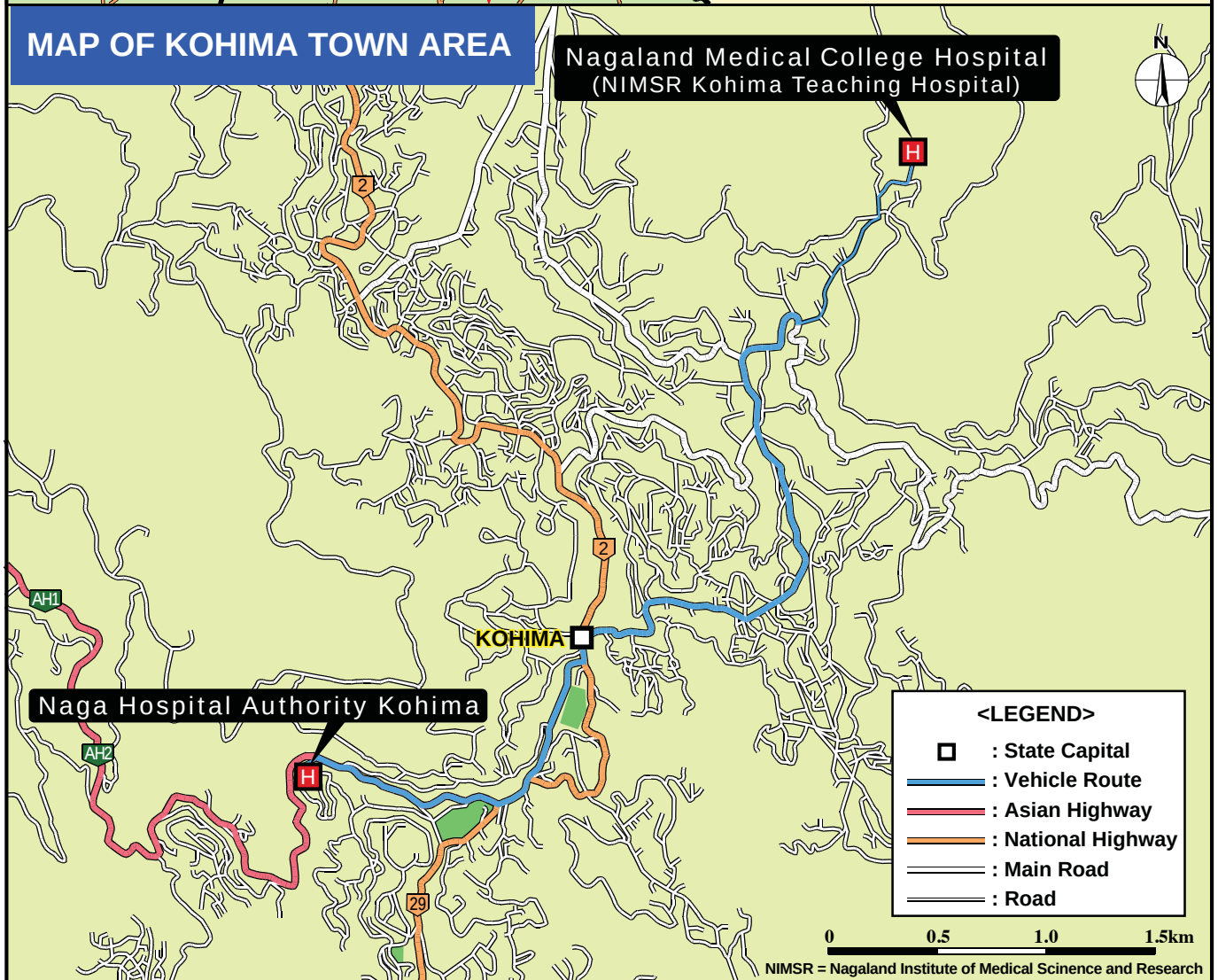
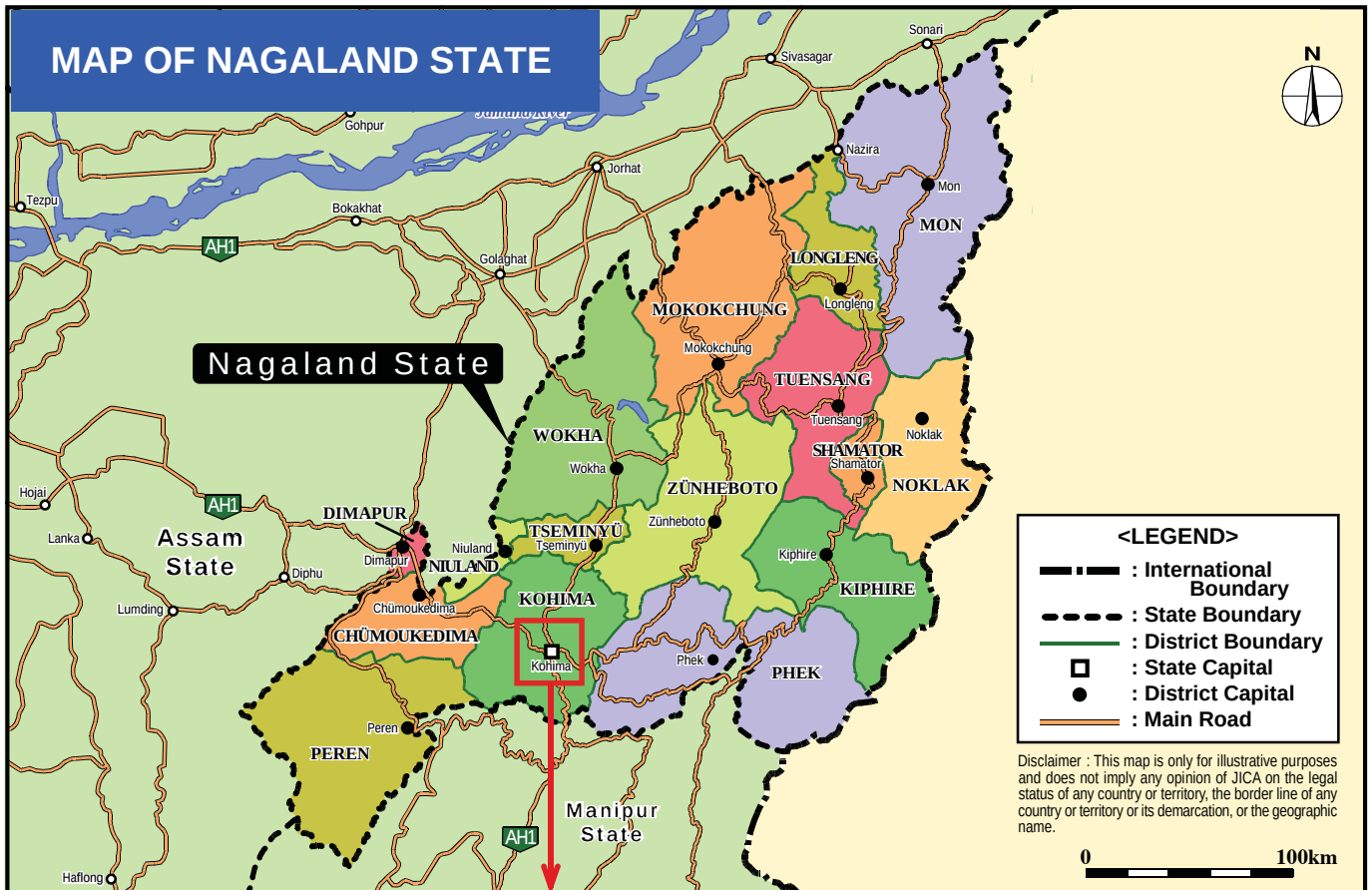
11. Project Evaluation

Table S11 shows the operation and effect indicators proposed for the Project. Regarding number of specialist doctors per 100,000 population, this indicator was set to measure the effects of the tertiary medical service.

Table S11 Operation and Effect Indicators

Indicators	Unit	Baseline	Target (2033)
EIRR	%	-	24.9
Number of inpatients, outpatients	people/year	-	Inpatient: 109,500 Outpatient: 323,025
Bed occupancy rate	%	-	75%
Number of students of clinical training	people/year	-	100
OOP of OPD at public hospitals	INR/patient	1,275 (2017-2018)	1,375
Number of referrals from district hospitals to hospitals outside Nagaland State	people/year	269 (2022)	81
Number of doctors, per 1,000 population	people/year	0.33 (2021)	0.42
Number of specialist doctors per 100,000 population	people/year	8.85 (2021)	16.22
Number of Business Continuity Plan (BCP) for disaster medical care	number	-	1
Hospital facility with considering gender is constructed and used	Status	-	1
Number of eSanjeevani HWC conducted	Number/year	-	960
Number of ICT training participants	people/year	-	932

Source: JICA Survey Team



Project Location Map

Facility Image



Abbreviations and Acronyms

5S	Sort, Set, Shine, Standardize, Sustain
AAC	Access, Assessment and Continuity of Care
AAQ	Applied Air Quality
AAS	Atomic Absorption Spectroscopy
AB	Ayushman Bharat
ABDM	Ayushman Bharat Digital Mission
ABHA	Ayushman Bharat Health Account
AB-PMJAY	Ayushman Baharat-Pradham Mantri Jan Arogya Yojana
AHERF	Fellowship in Clinical Oncology
AI	Artificial Intelligence
AIDS	acquired immunodeficiency syndrome
AIIMS	All India Institute of Medical Science
AMC	Annual Maintenance Contract
ANM	Auxiliary Nurse Midwife
ANS	Assistant Nursing Superintendent
API	Application Programming Interfaces
ART	Antiretroviral Therapy
ASHA	Accredited Social Health Activist
AYUSH	Ayurveda, Yoga and Naturopathy, Unani, Siddha, and Homeopathy
BCP	Business Continuity Plan
BCR	Benefit Cost Ratio
BEMMP	Biomedical Equipment Management and Maintenance Program
CCEBDM	Certificate Course in Evidence-based Management of Diabetes Mellitus
CCU	Cardiac Care Unit
C-DAC	Centre for Development of Advanced Computing, India
CEX	Clinical Evaluation Exercise
CFC	Chlorofluorocarbon
CGHS	Central Government Health Scheme
CHC	Community Health Centre
CHO	Community Health Officer
CIHSR	Christian Institute of Health Science and Research
CMC	Comprehensive Maintenance Contract
CMHIS	Chief Minister's Health Insurance Scheme
COP	Care of Patients
COVID	Coronavirus disease
CP	Construction Phase
CP	Construction Phase
CPC	Clinical Pathology Review Committee
CPCB	Central Pollution Control Board
CPS	College of Physicians and Surgeons
CSSD	Central Sterile Supply Department
CT	Computed Tomography
CTG	Cardiotocogram
D2D	Doctor-to-Doctor
D2P	Doctor-to-Patient
DEIC	Divisional Early Detection Centre
DFR	Draft Final Report
DH	Divisional Hospital
DHFW	Department of Health and Family Welfare
Directorate, the	Directorate of Health and Family Welfare (which is responsible for administration and policy implementation under Health and Family Welfare Department.)
DMAT	Disaster Medical Assistance Team
DNB	Diplomate of National Board
DNS	Deputy Nursing Superintendent
DPR	Detailed Project Report/ Conceptual Project Report for Setting up of District Hospital Kohima as Teaching Hospital for the Upcoming 100 Seats Medical College

DrNB	Doctorate National Board
DSP	Development Studies Program
DVDMS	Drug and Vaccination Database Management System
DWH	Data Warehouse
DX	Digital Transformation
EC	Environmental Clearance
ECG	Electrocardiogram
EEG	Electroencephalography
EHS	Environmental, Health, and Sanitation
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
ELISA	Enzyme-Linked Immunosorbent Assay
EMIS	Emergency Medical Information System
EMMS	Equipment Maintenance Management System
EmOC	Emergency Obstetric Care
EMP	Environmental Management Plan
EMR	Electric Medical Record
ENPV	Economic Net Present Value
ENT	Ear, Nose and Throat/otorhinolaryngology
eSanjeevani AB- HWC	eSanjeevani Ayushman Bharat-Health and Welfare Centre
ESC	Environmental and Social Considerations
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ETP	Effluent Treatment Plant
EUA	End User Application
FHW	Female Health Worker
FIRR	Financial Internal Rate of Return
FMS	Facilities Management and Safety
FNB	Fellowship of National Board
FR	Final Report
FY	Fiscal Year
GDP	Gross Domestic Product
GeM	Government e-Marketplace
GF	Ground Floor
GFR	General Financial Regulation
GHGs	Greenhouse Gases
GIS	Geographic Information System
GL	Ground Level
GNM	General Nurse and Midwife
GoI	Government of India
GoN	Government of Nagaland
GPS	Global Positioning System
GSDP	Gross State Domestic Product
GST	Goods and Service Tax
GWP	Greenhouse Warming Potential
HACCP	Hazard Analysis and Critical Control Points
HBP	Health Benefits Package
HDU	High Dependency Unit
HEAJ	Healthcare Engineering Association of Japan
HIC	Hospital Infection Control
HIMS	Hospital Information Management System
HIP	Health Information Provider
HIU	Health Information User
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HRM	Human Resource Management
HVAC	Heating, Ventilation, and Air-conditioning
HWC	Health and Wellness Centre

ICB	International Competitive Bidding
ICCR	Intensive Cognitive-Communication Rehabilitation
ICCU	Intensive Cardiac Care Unit
ICD	International Classification of Diseases
ICT	Information and Communication Technologies
ICU	Intensive Care Unit
ID	Identification
IGST	Integrated Goods and Service Tax
IMS	Information Management System
INR	Indian Rupees
IPD	Inpatient Department
IPHS	Indian Public Health Standards
IRS	Incident Response System
IT	Information Technology
IT/R	Interim Report
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
KCCP	Knowledge Co-creation Programme (JICA)
LCB	Local Competitive Bidding
LDA	Low Division Assistant
LDR	Labour Delivery Recovery
LHV	Lady Health Visitor
LOP	Letter of Permission
M.Ch	Master of Chirurgiae (Surgery)
MBBS	Bachelor of Medicine and Bachelor of Surgery
M.Ch	Master of Chirurgiae (general surgery)
MCH	Maternal and Child Hospital
MCI	Medical Council of India
MD	Doctor of Medicine
MEP	Mechanical, Electrical and Plumbin
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MGPS	Medical Gas Pipeline System
MHO	Medical Officer
MMU	Mobile Medical Units
MoEF	Ministry of Environment, Forest and Climate Change
MoHFW	Ministry of Health and Family Welfare
MOM	Management of Medication
MOU	Memorandum of Understanding
MPH	Master of Public Health
MRI	Magnetic Resonance Imaging
MS	Master of Surgery
MSc	Master of Science
NA	Not applicable
NAAQS	National Ambient Air Quality Standards
NABH	National Accreditation Board for Hospitals and Health Care Providers
NABL	National Accreditation Board for Test and Calibration Laboratories
NASTEC	Nagaland Science & Technology Council
NBC	National Building Code
NBE	National Board of Examinations
NBEMS	National Board of Examination of Medical Sciences
NCD	Non-communicable Disease
NDHM	National Digital Health Mission
NEET	National Eligibility cum Entrance Test
NER	North Eastern Region
NEXT	National Exit Test
NFSA	National Food Security Act
NGO	Non-governmental Organization
NH	National Highway
NHAK	Naga Hospital Authority Kohima

NHM	National Health Mission
NHP	Nagaland Health Project
NHSRC	National Health System Resource Centre
NIC	National Informatics Centre
NICU	Neonatal Intensive Care Unit
NIDA	Nagaland Inservice Doctor's Association
NIEIT	National Institute of Electronics and Information Technology
NIMSR	Nagaland Institute of Medical Science and Research
NLEP	National Leprosy Eradication Programme
NMC	National Medical Commission
NMCH	Nagaland Medical College Hospital (the building with 400 beds which will be developed under the Project) (from April 2023, NIMSR Kohima Teaching Hospital)
NMCK	Nagaland Medical College Kohima (from April 2023, NIMSR Kohima)
NPCB	Nagaland Pollution Control Board
NPSP	National Polio Surveillance Project
NPV	Net Present Value
NQAS	National Quality Assurance Standard
NRHM	National Rural Health Mission
NSDMA	Nagaland State Disaster Management Authority
NSDP	Net State Domestic Product
NST	Nutrition Support Team
NVBDCP	National Vector Borne Disease Control Programme
OB-GYN	Obstetrics and Gynecology
OCEMS	Online Continuous Effluent Monitoring System
ODA	Official Development Assistance
OOP	Out-of-Pocket
OP	Operation Phase
OPD	Outpatient Department
OT	Operation Theatre
PABX	Private Automatic Branch Exchange
PACS	Picture Archiving and Communication System
PC	Personal Computer
PHC	Primary Health Centre
PHED	Public Health Engineering Department
PICU	Paediatric Intensive Care Unit
PIP	Program Implementation Plan
PMC	Project Management Consultant
PM-JAY	Pradhan Mantri Jan Arogya Yojana
PMSSY	Pradhan Mantri Swasthya Suraksha Yojana
PMU	Project Management Unit
PPP	Public-Private Partnership
PRE	Patient Rights and Education
PSA	Pressure Swing Adsorption
PSQ	Patient Safety and Quality Improvement
PVC	polyvinyl chloride
QCBS	Quality- and Cost-based Selection
RCC	Reinforced Cement Concrete
RIS	Radiology Information System
RMNCH	Reproductive, Maternal, Newborn, and Child Health
RMNCH+A	Reproductive, Maternal, Newborn, Child, and Adolescent Health
RNTCP	Revised National Tuberculosis Control Programme
ROM	Responsibilities of Management
ROP	Record of Procurement
RRC	Reagent Rental Contract
SBD	Standard Bidding Documents
SC	Sub-centre
SC	Steering Committee
SCU	Stroke Care Units
SDGs	Sustainable Development Goals

SDH	Sub-district Hospital
SEAC	State Expert Appraisal Committee
SEIAA	State Level Environment Impact Assessment Authority
SGST	State Goods and Services Tax
SNCU	Special Newborn Care Unit
SPCB	State-level Pollution Control Board
SPD	Supply Processing Distribution
SpO2	Saturation of Percutaneous Oxygen
SPT	Standard Penetration Test
STEP	Systematic Tracking of Exchanges in Procurement
STP	Sewage Treatment Plant
TB	Tuberculosis
TCCC	Tertiary Cancer Care Centre
ToR	Terms of Reference
TOT	Training of Trainers
UDA	Upper Division Assistant
UHC	Universal Health Coverage
UHI	Unified Health Interface
UK	United Kingdom
UN	United Nations
UPHC	Urban Primary Health Centre
UPS	Uninterruptible Power System
USAID	United States Agency for International Development
USD	United States Dollar
UT	Union Territories
UTPCC	Union Territory Pollution Control Committee
WACC	Weighted Average Cost of Capital
WHO	World Health Organization

Preparatory Survey on Nagaland Medical College Hospital Development Project

Final Report (Advanced Version)

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Chapter 1 Introduction

India has had an impressive record of economic growth in the past two decades. Poverty rates were cut by more than half in less than 20 years – from 45% in 1994 to 22% in 2012 – lifting 133 million people out of poverty [4]. At the same time, India’s middle class has grown rapidly and now makes up an estimated 3.267 million people – where 20% of the population India has also made considerable gains in health in the past two decades. In addition, the country has significantly reduced infant, child, and maternal mortality rates through programmes such as the National Rural Health Mission (NRHM)³, created in 2005 to improve maternal and child health services, through which a workforce of 900,000 community health workers, also called Accredited Social Health Activists (ASHAs), were created and 178,000 health workers were added to the public health sector.

Despite these gains, public spending on health has remained flat, which is at around 1% of the gross domestic product (GDP) since the mid-1980s. Owing to the low rate of public investment in health, an estimated 70% of the population in rural areas and 80% in urban areas seek healthcare in the private sector, resulting in varying quality of care, rising rates of out-of-pocket health expenditures paid by families, and lack of access for those who cannot afford to pay.

In the past few years, the Government of India (GoI) has placed health on top of its political agenda and made a commitment to make significant increases in public spending in health. The National Health Policy, 2017, calls for an increase in government health spending as a percentage of GDP by 2025, from 1.15% to 2.5%, and lays out an ambitious set of goals and targets to improve the population’s health status and its access to quality health services in the public sector. A key goal is to attain “universal access to good quality healthcare services without anyone having to face financial hardship”. These goals recognise the epidemiological and demographic shifts occurring in India, with the growing burden of non-communicable diseases (NCDs), such as heart disease, stroke, diabetes, and mental illness, as well as an ageing population, while poor birth outcomes, communicable and vector-borne diseases, and childhood malnutrition remain the major causes of morbidity and mortality [1].

Nagaland State introduced “Communitisation” in primary health services since 2002 to promote partnership between the government and the community to optimise limited resources to deliver health services [2]. However, in terms of specialised healthcare, Nagaland State is one of the least developed states in India, which experiences shortages of specialised medical doctors and tertiary medical services. As of 2022, Nagaland State is one of four state/union territories (Daman and Diu, Ladakh, Lakshadweep) without any medical college.

To fill such gap, the Government of Nagaland (GoN) laid the establishment of the Nagaland Medical College Kohima (NMCK)⁴ in 2014. In August 2022, the application for the first Letter of Permission (LOP) was submitted to the National Medical Commission (NMC) to launch the first academic year in 2023/24. The first LOP was issued in April 2023 and the first admission process was conducted in late August 2023. In September 2023, the first batch of 100 students enrolled [5]. Regarding the teaching hospital, the “Conceptual Project Report for Setting up of District Hospital Kohima as Teaching Hospital for the Upcoming 100 Seats Medical College” (hereinafter referred to as the Detailed Project Report (DPR)) was submitted in August 2020.

According to the DPR, the 400-bed teaching hospital was considered to be developed based on the existing Naga Hospital Authority Kohima (NHAK) or to construct a new building. Because of land limitation of NHAK and access to NMCK, constructing new buildings were considered. Then, GoN requested for funding assistance to the Japan International Cooperation Agency (JICA).

The Preparatory Survey on Nagaland Medical College Hospital (NMCH) Development Project (hereinafter referred to as “the Survey”) is conducted aiming to:

- Collect necessary data and information for appraisal of Japanese Yen Loan; and

³ NRHM was incorporated to form the National Health Mission by the National Urban Health Mission in 2013.

⁴ It seems to be renamed to the Nagaland Institute of Medical Science and Research (NIMSR) Kohima.

- Prepare basic design of facility and equipment development of the Nagaland Medical College Hospital (NMCH) and propose relevant technical assistance for human resource development to enhance health service and ensure equity in access to health services.

1.1 Background and Rationale of the Project

Located in the North Eastern Region (NER), Nagaland is one of the smaller states in India, with a population of approximately 1.98 million and an area of 16,579 km² [5]. Since NER lags behind other regions in terms of economic and social development, GoI has been making continuous efforts to reduce the regional disparity by classifying the NER states as a Special Category State that is granted preferential fiscal treatment. The region, however, still faces a number of challenges in accessing basic social services such as education and healthcare due to its topography of mountainous and hilly terrain, coupled with lack of roads and other transportation infrastructure.

The gross state domestic product (GSDP) (2019-20) of Nagaland was at Indian Rupee (INR) 181 billion and accounted for 0.1% of the GDP of India, and 4.6% of GSDP of NER. The service sector in gross state value added by economic activity of Nagaland has the primary share (60%), the agriculture sector (15%), and the industry sector (13%) follow as shown in Table 1-1. The per capita net state domestic product (2019-20) was lower than average of NER. In addition, the literacy rate in Nagaland was at 79.6%, which was higher than the average of India and NER. The unemployment rates in the urban area and rural area (2018-19) were 7.7% and 7.0%, respectively. That of the urban area was at 2.7%, which is higher and that of the rural area, which was lower than the national average. The poverty rate (2011-12) was at 3.0%, lower than the national level, which was at 21.9% of the total state population (Table 1-1).

Table 1-1 Social and Economic Indicators

Indicators	Whole India	NER	Nagaland State
Gross State Domestic Product at Constant Price (INR in million, 2019-20)	147,844,901	3,976,850	181,208
Gross State Value Added by Economic Activity at Constant Price (INR in million, 2019-20)			
- Services	69,555,879	1,722,393	110,094
- Industry	43,375,470	1,256,036	24,553
- Construction	10,586,452	318,151	14,426
- Agriculture	11,725,604	432,133	27,759
- Banking and Insurance	8,016,012	110,537	5,156
- Manufacturing	25,204,902	460,932	2,838
Per Capita Net State Domestic Product at constant price (INR, 2019-20)	n.a.	103,279	71,247
Literacy Rate (2011)	73.0%	78.6 %	79.6%
Unemployment Rate (Rural, 2018-19)	5.0%	9.2%	7.7%
Unemployment Rate (Urban, 2018-19)	7.7%	12.1%	7.0%
Poverty Rate (2011-12)	21.9%	22.1 %	18.9 %

Source: National Statistical Office, Ministry of Statistics and Programme Implementation, Government of India. (2021) "HANDBOOK OF STATISTICS ON INDIAN STATES"

1.1.1 Overview of the Health Sector in Nagaland

(1) Health Status and Disease Burden

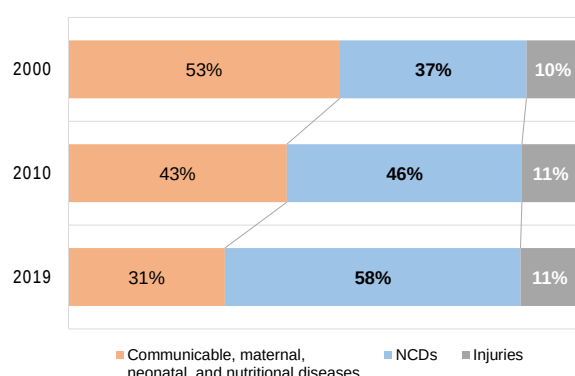
The major demographic and health indicators for Nagaland and India are shown in Table 1-2. Nagaland has made progress in health outcomes where life expectancy for men and women is longer than the national average and both infant mortality and under-five mortality rates in Nagaland are lower than the national figures. However, inequality between urban and rural areas still exists.

Table 1-2 Major Demographic and Health Indicators for Nagaland and India

Indicator	Nagaland		India		Year
Population total	1,978,502		1,210,854,977		2011
Population ages 0-14 (% of total)	34.3%		30.8%		2011
Population ages 60 and above (% of total)	5.2%		8.6%		2011
Population growth rate (from 2001 to 2011)	-0.58%		17.64%		2011
Rural population (% of total)	71.14%		68.85%		2011
Total literacy rate	76.10%		72.99%		2011
Crude death rate	3.5		6.0		2019
Crude birth rate	12.7		19.7		2019
Total fertility rate (children per woman)	1.7		2.0		2019-20
Life expectancy at birth (years)	Male 69.1 Female 74.5		Male 66.9 Female 70.3		2016
Infant mortality rate (per 1,000 live births)	Total	23.4	Total	35.2	2019-20
	Urban	17.0	Urban	26.6	
	Rural	25.8	Rural	38.4	
Under-five mortality rate (per 1,000 live births)	Total	33.0	Total	41.9	2019-20
	Urban	22.5	Urban	31.5	
	Rural	36.8	Rural	45.7	

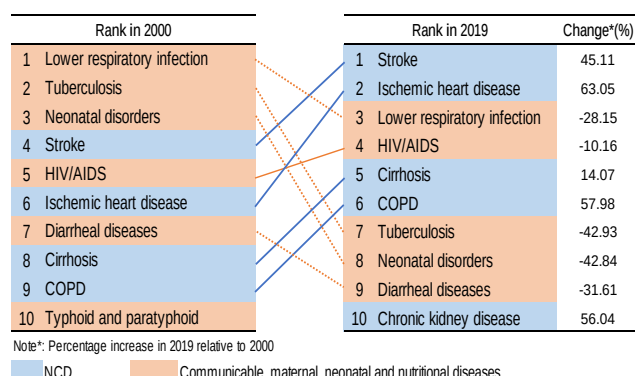
Source: [6], [7], [8], [9]

In terms of disease trends in the state, as shown in Figure 1-1 and Figure 1-2, the burden of maternal and nutrition-related diseases (e.g., neonatal disorders) and infectious diseases (e.g., human immunodeficiency virus (HIV), lower respiratory infections) remains high but is decreasing, while the burden of NCDs such as stroke and ischemic heart disease is increasing, indicating the development of a double burden of disease [10]. In order to respond to this situation, it is necessary to develop and strengthen healthcare systems at all levels, from primary, secondary, to tertiary levels, and establish a well-coordinated healthcare system to prevent, detect, and treat diseases in their early stages.



Source: Developed by JICA Survey Team with reference to [10]

Figure 1-1 Shift in Disease Burden (Cause of Death) in Nagaland from 2000 to 2019



Source: [10]

Figure 1-2 Top 10 Ten Causes of Total Number of Deaths in Nagaland in 2000 and 2019

(2) Health Policy and Related Initiatives and Programs

The GoI, through its National Health Policy, 2017, aims to achieve universal health coverage (UHC) and deliver quality healthcare services to all at affordable costs. There is a renewed commitment in India to accelerate the achievement of Sustainable Development Goals (SDGs), including Goal 3, relating to ensuring healthy lives and promoting well-being for all at all ages.

Ayushman Bharat, announced in 2018, involves both the public and private sectors to improve the quality of healthcare through a comprehensive approach to health promotion, disease prevention, primary, secondary, and tertiary care, and to ensure that citizens receive quality healthcare. Ayushman Bharat consists of two components: (1) strengthening primary healthcare through the establishment of Health and

Wellness Centres (HWCs) and (2) providing health protection cover to the poor and vulnerable families for secondary and tertiary care through the establishment of Pradhan Mantri Jan Arogya Yojana (PM-JAY) [11] [12].

PM-JAY is an initiative to achieve UHC. It covers about 107.4 million poor households (about 500 million people) and provides up to Rs. 500,000 per household per year for medical expenses, including three days of pre-hospitalization care and 15 days of post-hospitalization care and drugs, when a person is hospitalized to a registered public hospital or private hospital.

In addition, the Government of India formulated the Strategy for New India @75 in 2018 and set development goals for 2022-23. In the health sector, the government has prioritized the steady implementation of Ayushman Bharat, strengthening of human resources for health, provision of comprehensive primary healthcare services, implementation of PM-JAY to achieve UHC, strengthening of public healthcare facilities, and involvement of the private sector and among others.

In Nagaland, the state government's Nagaland Vision 2030 (2016) states the importance of improving healthcare infrastructure and using information technology to enhance health services, based on the recognition that "health is wealth". It also addresses the issue of the financial burden as an obstacle to the utilization of health services.

In the same vein, the Department of Health and Family Welfare (DHFV), Nagaland, which oversees the health sector in the state, set out a vision and mission as below:

The vision is to have a state with quality health care, affordable and acceptable to all. Our mission is prevention, control and management of communicable, non-communicable and lifestyle diseases, disaster management, healthy pollution free environment, nurturing a mindset among the public to identify health needs and utilize health services by implementing various national health care approach based on the principles of equity, cross-sectoral coordination and community participation [13].

In order to achieve its vision and mission, DHFV has been undertaking various initiatives and programs, as listed in Table 1-3.

Table 1-3 Programs of DHFV, Nagaland

1	National Health Mission	12	National Tobacco Control Program
2	National Urban Health Mission	13	Nagaland State AIDS Control Society
3	Reproductive Child Health	14	National Mental Health Program
4	Universal Immunization Program	15	Nagaland Health Project (NHP)
5	Integrated Diseases Surveillance Project	16	Ayushman Baharat-Pradhan Mantri Jan Arogya Yojana (AB-PMJAY)
6	National Tuberculosis Elimination Program	17	Information, Education & Communication
7	National Vector Borne Disease Control Program	18	Food Safety Authority
8	National Leprosy Eradication Program	19	Drugs Control
9	National Program for Control of Blindness	20	National Oral Health Program
10	National Iodine Deficiency Diseases Control Program	21	Health Intelligence Bureau
11	National Program for Prevention & Control of Cancer, Diabetes, Cardiovascular Diseases & Stroke	22	AYUSH (Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homeopathy)

Source: [14]

As a new initiative in Nagaland, the Chief Minister's Health Insurance Scheme (CMHIS) was launched in October 2022. CMHIS is implemented in convergence with the PM-JAY (see Chapter 12 for details).

(3) Policy Implementation Structure

The concerned policies and programmes are administered by the Directorate of Health and Family Welfare (the Directorate) under the DHFV (Figure 1-3). The Directorate is headed by a principal director and assisted by 4 directors (health services, family welfare, medical education, and dental), 5 additional directors, 13 joint directors, 20 deputy directors, an executive engineer, and other concerned officers.

The Directorate is responsible for the provision of health infrastructure, human resources and logistics, control of communicable and noncommunicable diseases, medical education and training, disease

surveillance and epidemic control, regulation of private sector health/medical establishments, drug safety and control, and social mobilisation [15].

Regarding the Project, a joint director (planning), a director (medical education) a deputy director (medical equivalent and IT), and an executive engineer with team of junior engineers are in charge among DHFW. In addition, the Nagaland Institute of Medical Science and Research (NIMSR) Society was established in 2022 as an umbrella organization for medical education in Nagaland. As of April 2023, the Nagaland Medical College was renamed to NIMSR Kohima and the NMCH was called as the Teaching Hospital of NIMSR Kohima. NIMSR is responsible for the followings;

- To establish hospitals to provide advanced and specialised medical care,
- To conduct and encourage medical research and training,
- To guide and assist the State Government in planning and implementation of healthcare programmes and medical education, and
- To receive and coordinate external support [3].

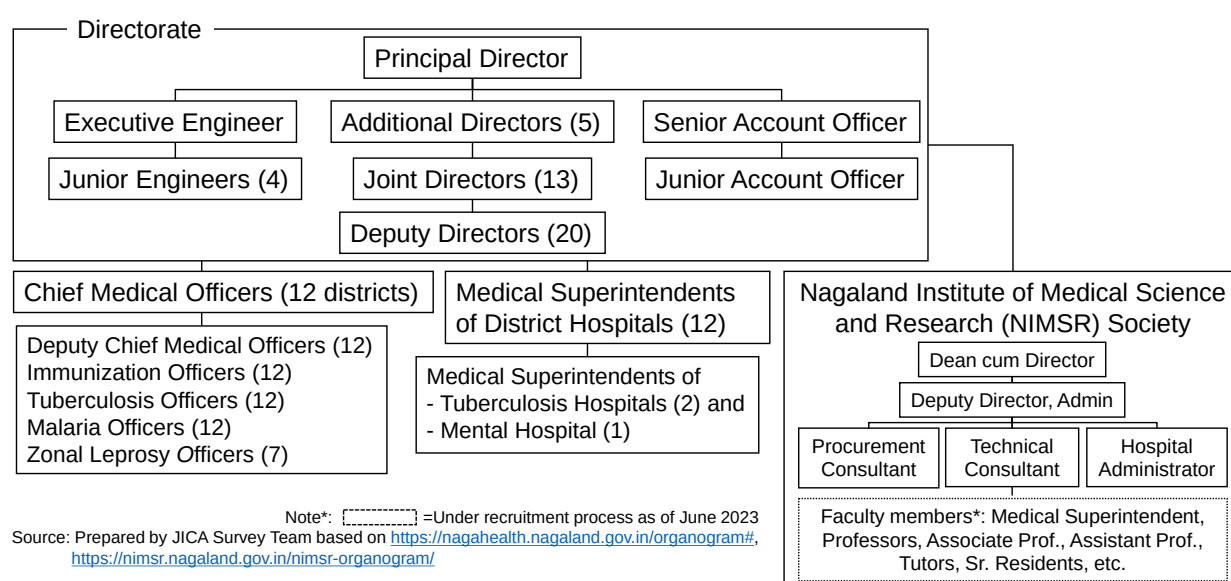


Figure 1-3 Organization Structure of DHFW

DHFW has been implementing two medical college development projects; the Nagaland Medical College in Kohima (NIMSR Kohima), and NIMSR Mon. Although overall progress of NIMSR Kohima had delayed due to land acquisition and COVID-19, it seemed to be catching up as of August 2023 to start the first academic year in September 2023. NIMSR Mon was initiated in 2020. DHFW has selected a contractor as of April 2023. Regarding operation and maintenance of the health facilities under the state government, the team of executive engineer is engaged.

(4) Health Service Delivery and Utilization

Although utilization of health services is one determinant of a population's health outcomes, health service utilization in Nagaland lags behind other states. As shown in Table 1-4, many key indicators, such as the four or more antenatal care rate of 20.7%, the complete immunization rate for children of 57.9%, and the institutional delivery rate of 45.7%, are below the national average [8]. Thus, the state has one of the lowest healthcare standards in India, ranking 25th out of 28 states for SDG Goal 3 (health and well-being) [16]. It also ranks last among the eight smaller states in the National Health Index, which assesses the health status of each state and the performance of its health system [17].

Table 1-4 Major Health Service Indicators for Nagaland and India

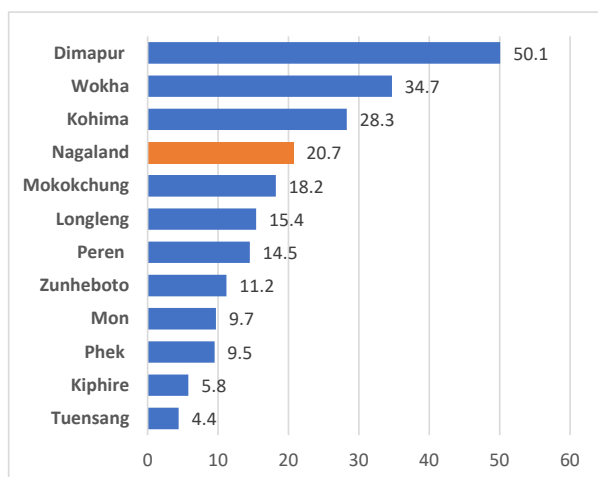
Indicator	Nagaland	India	Year
Mothers who had at least 4 antenatal care visits	20.7%	58.1%	2019-2020
Average out-of-pocket expenditure per delivery in a public health facility (INR)	5,778	2,916	2019-2020
Institutional births	45.7%	88.6%	2019-2020
Births attended by skilled health personnel*	55.3%	89.4%	2019-2020
Children aged 12-23 months fully vaccinated	57.9%	76.4%	2019-2020
Children with fever or symptoms of acute respiratory infection taken to a health facility or health provider	30.9%	69.0%	2019-2020

Note: * Doctor/nurse/lady health visitor/auxiliary nurse midwife/other health personnel.

Source: [8]

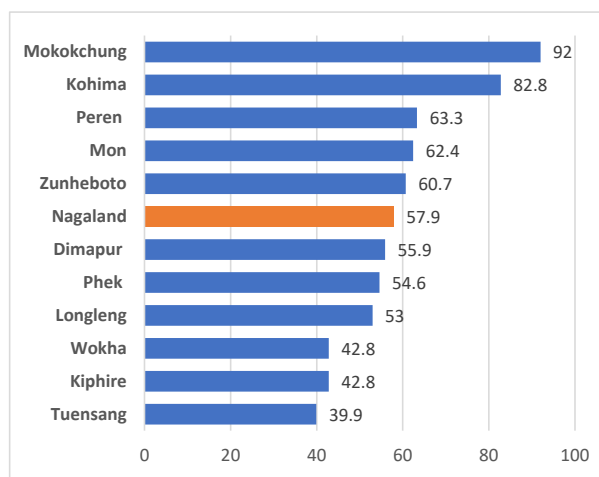
Looking at the service indicators by district, there are significant differences among the districts. For instance, regarding the percentage of mothers who had at least four antenatal care visits, Tuensang has the lowest percentage at 4.4%, and Dimapur has the highest percentage at 50.1% (Figure 1-4). Likewise, the percentage of children who received basic vaccinations varies widely across districts, with Mokokchung having the highest percentage at 92% and Tuensang having the lowest percentage at 39.9% (Figure 1-5).

Many factors are involved in the low utilization of health services, especially in rural areas, including limitations in government health service delivery due to the shortage of health infrastructure and human resources for health coupled with poor transport infrastructure and the limited presence of the private sector, as described below.



Source: Developed by the JICA Survey Team with reference to [8]

Figure 1-4 Percentage of Mothers who had at least 4 Antenatal Care Visits by District, Nagaland (2019-2020)



Source: Developed by the JICA Survey Team with reference to [8]

Figure 1-5 Percentage of Children Aged 12-23 Months Fully Vaccinated by District, Nagaland (2019-2020)

In India, under the Constitution, the Ministry of Health and Family Welfare (MoHFW) of the central government is responsible for formulating health policies and regulations and is not directly involved in the provision of health services. The state government's DHFW is responsible for health service delivery [18].

A unique initiative in Nagaland is the improvement of service delivery and utilization at the primary level through the State Government's Communitisation of Public Institutions and Services Act in 2002, which transferred responsibility and resources for the management of local services to community-level committees. In the health sector, under the Act, the community takes ownership and manages health centres and services at the community level.

In terms of health service delivery and utilization, one of the most critical challenges facing Nagaland is the shortage of health infrastructure. Generally, public sector health services in India are organized as a three-tier hierarchical system, comprising primary (Sub Centres, Primary Health Centres, Community

Health Centres), secondary (District Hospitals) and tertiary (medical colleges hospitals) healthcare facilities. The GoN established primary and secondary health facilities, as shown in Table 1-5 and Table 1-6, to provide healthcare services to its population. However, there is no tertiary health facility in Nagaland, and patients requiring advanced diagnosis and treatment must be referred to and transported to health facilities outside the state (for example, the nearest tertiary hospital, Diphu Medical College and Hospital in Assam, is about 130 km from Kohima and takes about four hours by road⁵). In particular, with the increasing number of NCDs, the development of tertiary health facilities in the state is urgently needed to establish a functional referral system and ensure a continuum of care.

Table 1-5 Type and Number of Public Health Facilities in Nagaland (2022)

Tertiary	Medical College Hospital	0
Secondary	District Hospital	12
Primary	Community Health Centre (CHC)	34
	Primary Health Centre (PHC)	142
	Urban Primary Health Centre (UPHC)	7
	Sub Centre (SC) (of which, SC converted to Health and Wellness Centre (HWC))	577 (291)

Source: [19], [13]

Table 1-6 District-wise Public Health Facilities in Nagaland (2022)

	District	District Hospital	Community Health Centre (CHC)	Primary Health Centre (PHC)	Sub Centre (SC) (incl. HWC)	SC converted to (HWC)	Urban Primary Health Centre (UPHC)
1	Dimapur	1	3	10	87	39	2
2	Kiphire	1	2	4	31	16	0
3	Kohima	1	4	17	45	27	2
4	Longleng	1	2	5	17	9	0
5	Mokokchung	1	4	19	60	31	1
6	Mon	1	4	15	73	33	0
7	Noklak	1	0	6	23	12	0
8	Peren	1	3	7	30	14	0
9	Phek	1	4	22	52	33	0
10	Tuensang	1	2	11	46	23	1
11	Wokha	1	2	14	49	25	1
12	Zunheboto	1	4	12	64	29	0
Total		12	34	142	577	291	7

Source: [19], [13]

As for private health facilities, although a total of 53 private hospitals and clinics exist as shown in Table 1-7, more than 80% of private health facilities are concentrated in Dimapur and Kohima.

Table 1-7 Private Hospitals and Clinics in Nagaland (2022)

District	Hospital	% of Total	Clinic	% of Total
Dimapur	11	69%	21	57%
Kohima	3	19%	11	30%
Mokokchung	2	13%	4	11%
Wokha	0	0%	1	3%
Total	16	100%	37	100%

Source: [19]

Since the healthcare costs of private facilities are higher than those of public facilities (e.g., about 3.6 times higher per hospitalisation than those of public facilities), 73.4% of the state's residents use public health facilities, especially in rural areas, where 83.6% of the population uses them [20]. Given the above, the

⁵ Depending on their needs and situation, patients travel not only to Assam but also to Tamil Nadu (Chennai, etc.), West Bengal (Kolkata), Delhi metropolitan area and other places for medical services.

development and expansion of public health infrastructure is a crucial effort toward achieving UHC in the state.

In addition, poor accessibility due to geographic and topographical factors is another critical challenge. Almost all of the state is mountainous [21], with 44% of the health facilities located in hilly areas and 28% accessible only by roads in poor conditions with frequent landslides. Also, most health facilities are not served by a public transportation network; thus, patients have to use private taxis or private vehicles, which requires them to bear the indirect and direct transportation costs (labour time and transportation costs) [22]. As stated above, since physical and financial access to health services is impeded, the digitisation of healthcare, including the introduction of telemedicine to reduce these barriers, is essential to enhance health services in the state and achieving UHC.

Furthermore, there is a severe shortage of doctors (see Chapter 2 for details). The state has the lowest total number of doctors, nurses, and midwives per 10,000 population in the country at 1 (India's national average is 37) [16]. Particularly, there is a lack of specialists in most of the districts. Except for Dimapur and Kohima, all districts lack specialists in critical areas such as cardiology [22], making it challenging to provide advanced medical care. One of the main reasons for the shortage of doctors is that there are no medical colleges and medical college hospitals in the state, and the state has been dependent on medical colleges outside the state for the education and training of doctors.

(5) Development Partners

1) The World Bank

The Nagaland Health Project (NHP) has been implemented with support from the World Bank. The total project cost is USD 60.00 million, and the duration is six years (2017-2023). NHP aims to improve the management and delivery of health services and increase their utilisation by the communities in targeted locations in Nagaland without duplicating existing government programs. The project will accomplish these objectives by implementing two components: 1) community action for health and nutrition and 2) health system development [23] [24].

The first component, Component 1 (community action for health and nutrition), is designed to empower communities to oversee, manage, and improve health, nutrition, and population services and their utilization. A results-based financing scheme is used whereby funding is provided to communities based on progress on defined indicators of improved health and nutrition-related services and practices. In turn, communities use the incentives for activities and investments that are important to them and have potential impacts on health and nutrition. Component 1 has a major focus on knowledge and skill-building of Village Health Committees and other stakeholders at the community level [23]. During the landscaping stage, it was found that in most of the intervention sites (90%), the health committees were either defunct or dormant. The NHP, therefore, has activated and reconstituted health committees in accordance with the Communitisation Act, 2002 [24]. The project, since its inception, has invested in targeted 509 health facilities and villages [25].

The second component, Component 2 (health system development), supports improvements in the management and delivery of health services, including both facility-specific and system-wide investments. NHP finances investments to improve conditions for staff and patients in targeted health facilities by providing a reliable and uninterrupted power supply, improving water supply, sanitation, biomedical waste management and others at District Hospitals, CHCs, PHCs and SCs. In addition, the construction of the library and theatre block of NMCK was supported by NHP. Also, NHP has improved the management and effectiveness of government health services in Nagaland in various areas, such as the improvement of the supply chain management system and information and communication technology (ICT) system as well as the strengthening of pre-service education in nursing and para medical [25]. The strengthening of pre-service nursing and para medical education was implemented through infrastructure development and capacity building and training. Training topics included project management, leadership, pedagogy, accounting and finance, infection prevention and medical waste management, and others. Furthermore, as part of the COVID-19 emergency response, NHP constructed oxygen generation plant houses at the eight District Hospitals and installed oxygen pipelines in various health facilities [26].

2) United States Agency for International Development (USAID)

The United States Agency for International Development (USAID) is another international partner to Nagaland. The USAID-funded NISHTHA project (2019-2024)⁶, implemented by Jhpiego, aims to transform, redesign, and re-engineer primary healthcare in India for the provision of equitable, comprehensive and client-centred primary healthcare that contributes to improved health outcomes for marginalised and vulnerable populations. NISHTHA's goal is to create a strong, responsive, accessible, sustainable, and affordable primary healthcare system that ensures the effective delivery of reproductive, maternal, new-born, child and adolescent health services, and integrates the provision of quality services for the control of tuberculosis. The NISHTHA project has been implemented in 12 states including Nagaland [27].

In Nagaland, the key areas of NISHTHA's assistance are: a) strategic planning and operationalisation of HWCs through comprehensive primary health care; b) technical assistance in rolling out and implementation of the Integrated Health Information Platform under the Integrated Disease Control Program; c) technical assistance in rolling out of telemedicine services; d) technical assistance to roll out social behaviour change communication project through water, sanitation, and hygiene; and e) technical assistance to tuberculosis elimination program. Regarding c) telemedicine services, NISHTHA supported the state by setting up a telemedicine platform, Naga Telehealth, at HWCs during the pandemic. Naga Telehealth was transitioned to the GoI telemedicine platform, eSanjeevani. NISHTHA has supported the rolling out of eSanjeevani in Nagaland in August 2022 with one active hub at the Christian Institute of Health Sciences and Research (CIHSR) and 377 spokes across all 12 districts with 27 empanelled doctors providing four specialty services such as general medicine, obstetrics and gynaecology, general surgery and dermatology. As of March 2, 2023, 320 consultations have been facilitated through eSanjeevani at HWCs [28].

3) The 10 Bed ICU Project

The 10 Bed ICU project was started in March 2021 in the wake of the coronavirus disease 2019 (COVID-19) delta wave spike in India in order to create a critical care intensive care unit (ICU) infrastructure in rural and smaller government hospitals. The project has created over 200 10 Bed ICUs in government hospitals in eight states, including Nagaland. The project is implemented in the form of a public-private partnership (PPP), where the 10 Bed ICU group finances the capital expenditure of the project by providing the ICU medical equipment, software system, technology infrastructure, training, and community participation support. The state government signs a memorandum of understanding with the 10 Bed ICU and provides the hospital space and site readiness for ICU installation, the doctors and nursing medical staff, medical supplies, and utilities (electricity, water, internet, etc.). The operating expenditure is borne by the state [29].

The project consists of the following five components:

- a) Provision and installation of state-of-the-art ICU medical equipment at *taluka*-level government hospitals.
- b) Deployment of CARE software, a cloud-based open-source patient management tool, for delivering improved healthcare outcomes.
- c) Deployment of the Tele-ICU system in a hub and spoke model, with Tele-ICU Hubs in government medical colleges connecting specialists to the remote 10 Bed ICU hospitals.
- d) Basic and advanced critical care training and standardising ICU protocols.
- e) Community participation to maximise the impact and sustainability of the project.

In Nagaland, 10 Bed ICU wards were created in all 12 District Hospitals connected to a Tele-ICU Hub at NHAK. The HDFC Bank Parivartan funded the 10 Bed ICU ward in Dimapur District Hospital, while Vinod Khosla supported the 10 Bed ICU wards in all the other districts. Vinod Khosla also funded the Tele-ICU Hub. Karuna Trust and Nagaland Gandhi Ashram are the field NGO partners of the project in Nagaland. Hamilton Medical Switzerland also donated one ventilator for every two ventilators procured [30].

⁶ The total budget envelope is USD 13 million for 12 states. It is unable to calculate the amount of assistance specifically to Nagaland [26].

1.1.2 Overview of Gender Situation in Nagaland

(1) Gender Situation in Nagaland

Regarding SDG 5 “Achieve gender equality and empower all women and girls,” Nagaland’s progress is about the same or slightly behind all India average generally (Table 1-8).

The number of crimes against women and the incidence of domestic violence are low and good compared with all India average and other NER states. On the other hand, there are no elected women representatives in the current state legislature, and the number of women managers per thousand of population is low compared with other states.

Table 1-8 Nagaland State and Other NER State’s Performance on SDG 5

States	Sex Ratio at Birth (Females per 1,000 Males)	Ratio of Female to Male Average Wage Earnings Received among Regular Waged Employees (Female Wage with Male Wage as 1)	Rate of Crimes against Women per 100,000 Female Population	Per 100,000 Women who Have Experienced Physical Violence by Husband or His Relatives During the Year	% of Elected Women Over Total Seats in the State Legislative Assembly
Arunachal Pradesh	Null	0.56	43.3	7.40	5.00
Assam	925	0.53	177.8	70.73	6.35
Manipur	Null	0.76	17.2	0.97	3.33
Meghalaya	Null	0.73	34.6	1.43	5.08
Mizoram	Null	0.91	28.7	1.02	0
Nagaland	Null	0.86	4.1	0	0
Sikkim	Null	0.88	39.8	0.32	9.38
Tripura	Null	0.72	54.5	22.94	5.00
India	899	0.74	62.4	19.54	8.46
	Ratio of Female to Male Labour Force Participation Rate (15-59 years) (Female Labour Force with Male as 1)	Proportion of Women in Managerial Positions including Women in Board of Directors, in Listed Companies (per 1,000 persons)	% of Currently Married Women aged 15-49 years who Have Their Demand for Family Planning Satisfied by Modern Methods	Operational Land Holding Gender Wise (% of Female Operated Operational Holdings)	SDG 5 Index Score
Arunachal Pradesh	0.26	Null	50.0	12.07	37
Assam	0.17	221	55.6	1.67	25
Manipur	0.36	Null	23.6	6.80	41
Meghalaya	0.69	111	48.1	34.32	51
Mizoram	0.42	Null	63.8	11.78	54
Nagaland	0.31	167	43.5	9.85	48
Sikkim	0.68	Null	67.1	6.29	58
Tripura	0.23	Null	57.2	12.30	39
India	0.33	190	72.0	13.96	48

Source: [31]

As shown in Table 1-9, Nagaland has never elected a woman to the State Legislative Assembly since its establishment, as indicated by the indicator on SDG 5, where percentage (%) of Elected Women Over Total Seats in the State Legislative Assembly is zero. However, the number of woman candidates has been increasing in each election, with five women having made their candidacy in the 2018 elections. Meanwhile, in terms of voter turnout, in 2018, it was 82.4% for women and 86.0% for men, while in 2019 91.3% for women and 89.0% for men, which indicates the turnout of women is similar to that of men, with more than 80% of women voting. [32] The election situation in Nagaland Assembly is shown in Table 1-9.

Table 1-9 Number of Persons Contested and Elected for State Legislative Assembly in Nagaland

General Election	Year	Total No. of Seats	No. of Contestants		No. of Elected	
			Female	Male	Female	Male
1st	1964	40	0	73	0	40
2nd	1969	40	2	142	0	40
3rd	1974	60	0	219	0	60
4th	1977	60	0	204	0	60
5th	1982	60	1	244	0	60
6th	1987	60	3	211	0	60
7th	1989	60	0	140	0	60
8th	1993	60	1	177	0	60
9th	1998	60	0	80	0	60
10th	2003	60	3	222	0	60
11th	2008	60	4	214	0	60
12th	2013	60	2	187	0	60
13th	2018	59	5	190	0	60

Source: [32]

The female labour force participation rates shown in Table 1-10 are only one third of the male and less than all India average. Meanwhile, the proportion of females in the health workforce is above the all-India average for all occupational categories.

Table 1-10 Proportion of Female Health Workers

Cadres	Nagaland State	India
Allopathic Doctors	18.8%	16.8%
Nurses and Midwives	88.2%	83.4%
Co-medical Staff	28.8%	27.3%

Source: JICA Survey Team based on [33]

(2) Health Status and Care-seeking Behaviour by Gender

According to the sample survey conducted by the Directorate of Economics & Statistics of the Government of Nagaland, health status and care-seeking behaviour showed a difference by gender, especially in rural area. As presented in Table 1-11, women in rural area seems to suffer more from infection, psychiatric, neurological, and muscular-skeletal diseases. Gender difference on gastro-intestinal and muscular-skeletal diseases showed opposite numbers in rural and urban areas.

Table 1-11 Number of Disease Cases for the Last 15 Days per 1,000 People by Gender in Nagaland (2017-2018)

Category	Rural			Urban		
	Male	Female	All	Male	Female	All
• Infection	38	59	48	29	30	29.5
• Blood Disease	0	0	0	0.2	1.0	0.5
• Psychiatric and Neurological	0	1.2	0.5	0	0.6	0.2
• Eye	0	0	0	0	0.9	0.4
• Ear	0.2	0	0.1	0.7	1.0	0.8
• Respiratory	1.8	0	1.0	6.1	6.4	6.3
• Gastro-intestinal	5.7	0.2	3.2	0.5	5.8	2.9
• Skin	0.7	0.2	0.5	2.5	0	1.3
• Muscular-skeletal	0.07	5.6	2.6	8.7	0.04	4.7
• Genital-urinary	0	0	0	0	0.2	0.09
• Injuries	0	0	0	0.03	0	0.02
• Others	0	0	0	1.2	0.7	1.0
All	47	67	56	49	47	48

Source: [34]

Care-seeking behaviour by gender for outpatient and inpatient are presented in Table 1-12 and Table 1-13, respectively. In general, people in Nagaland tend to seek outpatient care to government/public hospitals, and when they need inpatient care, around 20% of people in the rural area and 30% of people in the urban area seek inpatient care to private hospital. Women in the rural area tend to seek outpatient care in government/public hospitals, while men go to charitable/trust/NGO hospitals. In the urban area, those tendencies are opposite.

Table 1-12 Patients' Health Seeking Behaviour for the Last 15 Days by Gender in Nagaland (Outpatient)

Health Institution	Rural (%)			Urban (%)		
	Male	Female	All	Male	Female	All
Govt./Public hospital	69.9	93.2	83.4	75.5	54.6	66.4
Private hospital	0	0	0	0	0.5	0.2
Charitable/Trust/NGO hospital	29.3	6.8	16.2	8.9	43.2	23.9
Private doctor/ Clinic	0.9	0	0.4	15.6	1.7	9.5

Source: [34]

Table 1-13 Patients' Health Seeking Behaviour for the Last One Year by Gender in Nagaland (Inpatient)

Health Institution	Rural (%)			Urban (%)		
	Male	Female	All	Male	Female	All
Govt./Public hospital	81.9	79.2	80.8	72.4	68.8	70.6
Private hospital	18.1	20.8	19.2	27.1	31	29.1
Charitable/Trust/NGO hospital	0	0	0	0.5	0.2	0.3

Source: [34]

Regarding the policy related to gender consideration, the Nagaland State Government has achieved the following points until now: 1) Enacted and concurred the implementation of 33% reservation for women in the municipal councils and police force, 2) Established a separate department for women development, 3) Constituted a Women Commission, 4) Raised a Mahila Indian Reserve Battalion, 5) Set up women cell in police stations and recently opened full-fledged all women police stations in Dimapur and Kohima, and 6) Set up a one-stop centre for women in distress [35].

As a policy direction for the way forward, gender mainstreaming is raised as one of the themes in the Nagaland Vision 2030, and recommendations are made as shown in Table 1-14 in this area.

Table 1-14 Recommendations for Gender Mainstreaming in Nagaland Vision 2030

• Increase female representation in Village Development Boards • Utilisation of female effectively in each respective committee • Land title certificates in the names of both the husband and wife should be encouraged by modifying the clauses in the land registration laws • Address gender bias in wage structures especially in the agriculture field • Collection of gender disaggregated data in all capacity building programmes and schemes • Include gender consideration points of view for all infrastructure development plan • Develop a gender specific policy framework and strategic initiative targeting the marginalised section of women • Expansion of all women police stations to all districts • Capacity building and skill development programme for school drop-outs, single mothers, widows, etc. • Formulation of a Nagaland State Policy for Women with comprehensive guiding framework • Necessity of mechanisms to increase women representation across political bodies • Encouragement for educational institutions to conduct programmes on women's rights and empowerment
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Source: JICA Survey Team based on [35]

1.2 Outline of the Project

To improve the above situation on medical service providing system, GoN has planned the development of the first medical college hospital as a tertiary level with 500 beds in Kohima. Then, GoN requested JICA for financial and technical assistance to develop a part of the hospital. Then, the Nagaland Medical College

Hospital Development Project (the Project) will be formulated under Japanese Yen Loan scheme. The outline of the Project is summarised in Table 1-15. In April 2023, the medical college was named as Nagaland Institute of Medical Science and Research (NIMSR) Kohima and the hospital was named NIMSR Kohima Teaching Hospital⁷.

Table 1-15 Summary of the Nagaland Medical College Hospital Development Project

Objective	The objective of the Project is to establish the tertiary level medical service delivery system in the state of Nagaland by developing a medical college hospital and enhancing the healthcare human resource development systems through clinical-based education, thereby contributing to UHC promotion in the region.
Components	i. Construction of new buildings and installation of medical equipment of Nagaland Medical College Hospital excluding the Maternal and Child Health Ward ii. Consulting services ((1) Bidding assistance, equipment procurement and work supervision, assistance with environmental and social considerations and other related activities, (2) Formulation of plans concerning capacity building of medical personnel and running of training programs, and (3) Formulation of plans to improve the management of healthcare services and running of training programs)
Target Area	Nagaland State, Republic of India
Concerned Agencies	Executing Agency: Department of Health and Family Welfare (DHFV), Government of Nagaland Relevant Agencies: Ministry of Health and Family Welfare, National Medical Council

Source: JICA Survey Team

1.3 Scope of the Project

As a result of initial discussions with DHFW, the scope of the Project was confirmed as shown in Table 1-16.

Table 1-16 Scope of the Project

Facility	400-bed teaching hospital including medical equipment and IT system to be developed at Phriebagie, Kohima, Nagaland
Technical Assistance	Necessary technical assistance will be included such as: • Human resource deployment and development for the hospital; • Hospital management capacity; • Medical equipment management and maintenance; and • Medical human resource development.

Source: JICA Survey Team

According to DHFW, the initial three years of NMCK, NHAK functions as a teaching hospital. Then, the teaching function will be transferred to the new hospital.

1.4 Outline of the Field Survey

The Survey was commenced on 31 August 2022 and the inception report was submitted on 16 October 2023. Table 1-17 summarises field surveys. Proceedings of major meetings and the technical seminar are presented in Appendix 1.

⁷ Names of the medical college and the hospital used in this report are in line with the official application submitted to JICA.

Table 1-17 Outline of the Field Surveys

Date	Activities
The First Field Survey	
19 September 2022	(1) Arrived in Kohima/ (2) (Team in Delhi) Courtesy call to JICA India
20 September	Meetings with stakeholders of DHFW, project site visit
21 September	Courtesy call to Health Minister Visit to NHAK, private health facilities (Bethel Medical Centre, Putuonuo Nursing Home), Meeting with Nagaland Health Project and National Health Mission
22, 23 September	Visit to Community Health Centre, Primary Health Centre, Urban Primary Health Centre (UPHC)
23 September	Nagaland National Health Mission (information collection)
25 – 28 September	Case study in Assam State (DHFW, Medical College, Assam Cancer Care Foundation) Visit to Dimapur Hospital, private hospital (Cristian Institute of Health Science and Research), State Pollution Control Board
29 September	Kick-off meeting, mini technical seminar on IT
30 September	Project site investigation
2 – 12 October	Meetings with Nagaland University, medical equipment manufacturers/ agents, private hospital, National Institute of Electronics and Information Technology, UPHC, etc.
31 October – 8 November	Facility planning, follow-up of the first and second batch, etc.
The Second Field Survey	
12 January 2023	Arrived in Kohima
13 – 18 January	Additional information collection
16 – 18 January	Exchange visit to Assam (Fakhruddin Ali Ahmed Medical College, Barpeta, Assam Health and Family Welfare Department, Assam Health Infrastructure Development & Management Society)
19 January	Meeting on the Interim Report
20 January	Technical Seminar
The Third Field Survey	
24 April	Arrived in Kohima
25-26 April	Discussion on the Draft Final Report/ Site Visit

Source: JICA Survey Team

Chapter 2 Human Resource for Health

2.1 Current Situation

2.1.1 Overview of Human Resource for Health

(1) Status of Health Personnel Deployment

The number of health human resources in Nagaland and per 100,000 population, respectively, are shown in Table 2-1 and Table 2-2.

The number of nurses, midwives, and pharmacists per 100,000 population in Nagaland is more than twice the all India average, and the number of all health human resources including doctors and nurses per 100,000 population is also higher. On the other hand, the number of doctors and dentists per 100,000 population, respectively, is only about half the Indian average. The World Health Organization (WHO) recommends the deployment of one doctor per 1,000 population, but the number in Nagaland is 0.33. In terms of specialist doctor, the Indian average is 27.55 per 100,000 people, while in Nagaland, the number is only 8.85 (Table 2-3). The shortage of doctors including specialist is considered to be a major challenge.

Table 2-1 Number of Medical Personnel in Nagaland State (2020-21)

Medical Personnel	Doctors (General)	Doctors (Specialist)	Dental Doctors	Ayush Doctors	Pharmacist
Number	330	175	29	52	384
Medical Personnel	Lab technician	Nurse Sister	Staff Nurse	ANM/ FHW	LHV
Number	106	99	572	845	59

Note: ANM=Auxiliary Nurse Midwife, FHW=Female Health Worker, LHV=Lead Health Visitor

Source : JICA Survey Team based on [36]

Table 2-2 Health Worker Density per 100,000 People in Nagaland State, Other North Eastern Region (NER) States and India

State	Doctors	AYUSH Doctors, Traditional and Faith Healer	Nurses and Midwives	Ancillary Health	Dental Practitioners	Pharmacists	All Health Workers
Meghalaya	23.8	4.6	80.0	28.6	1.6	14.3	153.0
Arunachal Pradesh	29.7	2.9	110.7	100.2	2.1	24.8	270.3
Nagaland	33.4	2.2	143.2	46.1	1.2	46.7	272.7
Assam	28.2	15.1	56.0	25.1	0.7	23.3	148.5
Mizoram	44.8	2.8	118.7	403.6	6.4	11.9	588.2
Sikkim	46.0	2.8	141.8	263.1	3.1	8.7	465.6
Tripura	31.5	23.8	47.9	52.3	1.6	23.5	180.6
Manipur	49.3	5.9	104.9	62.6	1.9	33.8	258.5
All India	61.5	19.4	61.3	34.1	2.4	22.5	201.2

Source: JICA Survey Team based on [33]

Table 2-3 Number of Specialist Doctors per 100,000 Population

Nagaland	All India
8.85	27.55

Source: JICA Survey Team based on [37] [36] [38]

(2) Human Resources in Naga Hospital Authority Kohima

The current human resource status of Naga Hospital Authority Kohima (NHAK), the predecessor institution of Nagaland Medical College Kohima (NMCK) or Nagaland Institute of Medicine and Science Research (NIMSR) Kohima, is shown in Table 2-4 by type of employment. As of October 2022, a total of 550 employees are working in NHAK, including all occupations and types of employment. The 37 doctors include obstetricians and gynaecologists, otolaryngologists, surgeons, paediatricians, paediatric surgeons,

oncologists, anaesthesiologists, urologists, pathologists, dermatologists, internal physicians, ophthalmologists, respiratory specialists, and other specialists. However, there are no specialist doctors who can handle advanced surgery, such as neurosurgeons or cardiac surgeons, were identified.

Table 2-4 Human Resource Status of Naga Hospital Authority Kohima

Designation	Regular	State Contract	NHAK Contract	NHM Contract	Total
Doctor	37	4	1	13	55
Nurse	102		19	27	148
Medical Physicist	2				2
Head Pharmacist	1				1
Pharmacist	7				7
Lab. Technician	7		10	5	22
Health Assistant	1				1
Dental Mechanic	1				1
ECG Technician	1				1
X-Ray Technician	1				1
O.T. Technician	1	1			2
Physiotherapist	2		4	2	8
Chief Radiographer	1				1
Vaccinator		2			2
Radiographer			4	2	6
Counsellor				4	4
Psychiatric Social Worker				2	2
Sterilisation Technician			1		1
Dialysis Technician			1		1
Ophthalmology Assistant	2				2
Medical Attendant	26	4	30	2	62
Dresser	2		1		3
O.T. Assistant	3				3
Lab. Attendant	4		1		5
Dialysis Assistant			2		2
Audiometric Assistant				1	1
Case Registry Assistant				1	1
Pharmacy Assistant			1		1
Lab. Assistant	3				3
District Early Intervention Centre (DEIC) Manager				1	1
Psychologist (DEIC)				3	3
Optometrist (DEIC)				1	1
Audiologist (DEIC)				2	2
Dental Technician (DEIC)				1	1
Lower Division Assistant (LDA)/ Computer Assistant	13				13
Imagine Technical Officer	1				1
Data Entry Operator		1	1	3	5
Computer Programmer			1		1
Computer Assistant			11		11
Carpenter	1				1
Electrician	1			1	2
Handyman	2		1		3
Site Engineer			2		2
Plumber			3		3
Assistant Electrician					0
Assistant Technician		1			1
Biomedical Engineer				1	1
Medical Equipment Technician				2	2

Designation	Regular	State Contract	NHAK Contract	NHM Contract	Total
Administrative Officer			1		1
Office Supervisor			1		1
MRD Superintendent	1				1
Upper Division Assistant (UDA)	2				2
LDA	4	1			5
Ayah	12				12
Ward Attendant				1	1
PABX Operator	6				6
Driver	12	1	6		19
Cook	16			1	17
Mali	5		3		8
Sweeper	19		14		33
Peon	6	1			7
Chowkidar	7		3		10
GDW	4				4
Office Assistant			4		4
Salesman (Pharmacy)			5		5
Parking in Charge			1		1
Liftman (operator)			1		1
Gatekeeper			2		2
Parking Assistant			3		3
Store-in-Charge			1		1
Storekeeper	1				1
Tallor	1				1
Personal Secretary to MD		1			1
Total					550

Note: Regular: Regular state government employees, State contract: Contractual / Ad hoc staff employed the state government, NHAK contract: Staff employed by the Naga Hospital Authority, Kohima on contractual basis with fix pay, NHM contract: Staff employed under National Health Mission programme on contract

Source: DHFW

(3) Gender Situation at NHAK and NMCK

The proportion of female health care workforce at NHAK, which is designated as a teaching hospital in Kohima until the NMCH is launched, is 45% male and 55% female. In particular, the ratio of female doctors is considerably higher at 41% in the hospital compared with the Indian average of 16.8% and the Nagaland average of 18.8% (Table 2-5).

Table 2-5 Ratio of Male and Female Health Care Workforce of NHAK

Profession	Male	Female
Doctor	59%	41%
Nurse	4%	96%
Technician	37%	63%
Administration staff	32%	68%
Pharmacist	0%	100%
Support staff	73%	27%
Total	45%	55%

Source: JICA Survey Team based on NHAK information

Regarding the current situation of women's participation in decision-making at NHAK, the Hospital Management Committee, which determines the management policies, is composed of 11 members, currently five out of them and a chairperson are female. Although the NMCH is currently in the process of recruiting human resources, the dean of the medical college is also a female. According to a female doctor at NHAK, being a woman is not a disadvantage in terms of promotion, salary, or training opportunities.

In terms of patients, NHAK has a patient satisfaction and feedback form, where patients can provide feedback on information availability, courtesy of the staff, cleanliness of the hospital, timely issues of

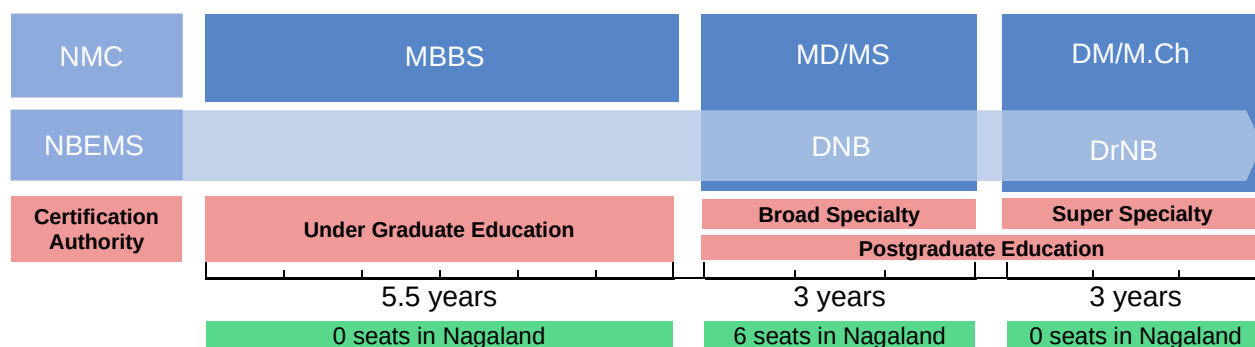
reports, cost, etc., on a scale of one to five. Furthermore, it allows patients to write their opinions. A lot of feedback has been received, but common comments are about long waiting times, so far, it has not received any requests related to gender consideration or any comments from female patients pointing out the inconvenience of the facilities.⁸

(4) Status of Human Resource Development

Figure 2-1 shows the system of medical education in India. The Bachelor of Medicine and Bachelor of Surgery (MBBS) course at the undergraduate level is designed to last five and a half years, including a mandatory one-year internship. The four and a half-year duration (nine semesters, six months each) other than the internship is divided into three phases: pre-clinical, para-clinical, and clinical. Each semester is set at eight hours each per day, and approximately 120 days. The subjects offered on the MBBS course are listed in Table 2-6. [39]

After completing the MBBS, students can progress to postgraduate courses to further develop their specialisation, which are divided into broad specialty courses (Doctor of Medicine (MD), Master of Surgery (MS), Diplomate of National Board (DNB)) and super specialty courses (Doctor of Medicine (DM), Master Chirurgiae (Surgery) (M.Ch), Doctorate National Board (DrNB)). Those who have obtained a DM, M.Ch, or DrNB in the super specialty course can become a super-specialist. After being qualified as a super-specialist, some continue to deepen their specialisation in the Fellowship of National Board (FNB) course.

The National Medical Commission (NMC) and the National Board of Examination of Medical Sciences (NBEMS) are the two accrediting bodies for medical courses in India, and the qualifications accredited by both of them are that MD/MS and DNB are equivalent and DM/M.Ch is equivalent to DrNB as stipulated in the Gazette of India, as shown in Table 2-6. [40]



Note: MBBS=Bachelor of Medicine and Bachelor of Surgery, MD=Doctor of Medicine, MS=Master of Surgery, DNB=Diplomate of National Board, DrNB=Doctorate National Board, MSc=Master of Science, DM=Doctor of Medicine, M.Ch=Master Chirurgiae (Surgery)

Source: JICA Survey Team based on [41] [40] [42]

Figure 2-1 Medical Education System in India

⁸ Hearing form NHAK (12th January, 2023)

Table 2-6 Subjects Included in the MBBS Course

Study Phase	Subject	
Pre-clinical	• Anatomy • Bio-chemistry	• Physiology • Introduction to Humanities and Community Medicine
Para-clinical	• Pathology • Microbiology • Pharmacology	• Forensic Medicine including Toxicology • Community Medicine
Clinical	• General Medicine • Paediatrics • Tuberculosis and Respiratory Diseases • Psychiatry • Dermatology and Sexually Transmitted Diseases • Anaesthesiology • Surgery • Orthopaedics • Radio-Diagnosis and Imaging	• Radiotherapy • Oto-Rhino-Laryngology • Ophthalmology • Obstetrics and Gynaecology • General Guidelines for Training • Family Planning • Community Medicine • Emergency Medicine • Dentistry

Source: JICA Survey Team based on [43]

Table 2-7 shows the requirements for taking up a professorship in a medical college, with the example of General Medicine department. According to the NMC regulations, all professorships in medical colleges (except tutors, residents, registrars, and demonstrators) must have a postgraduate qualification in the relevant medical department. The NMC sets out the requirements for professorship for each of the 45 specialised departments, including General Medicine, Anatomy and Physiology, etc. Although required degrees and specialty fields differ, the basic requirements for becoming professor are: three years of teaching experience as a resident or tutor, four years as an assistant professor, three years as an associate professor, plus publication of a research paper after obtaining a postgraduate degree.

Table 2-7 Main Requirements for Each Professorship (e.g., General Medicine)

Professorship	Main Requirements
Professor	• MD (Medicine) or MD (General Medicine) • As an associate professor in general medicine/ medicine for three years in a recognised medical college. • Minimum of four research publications in indexed/ national journals.
Associate Professor	• MD (Medicine) or MD (General Medicine) • As an assistant professor in general medicine/ medicine for four years in a recognised medical college. • Minimum of two research publications in indexed/national journals.
Assistant Professor	• MD (Medicine) or MD (General Medicine) • Requisite recognised postgraduate qualification in the subject. • Three years teaching experience in the subject in a recognised medical college as resident/ registrar/ demonstrator/ tutor.

Source: JICA Survey Team based on [44]

Table 2-8 shows the number of medical colleges and students accepted per academic year in Nagaland and neighbouring states. As of 2022, there are no medical colleges, either public or private, with MBBS courses in Nagaland, with an annual intake of zero students. Nagaland is the only state among the other North Eastern Region (NER) states with a total of zero MBBS acceptances per year from both public and private institutions, and also has the lowest level of provisioning. The state also has the second lowest annual intake of postgraduates after Arunachal Pradesh among the NER states. Compared with other NER states, the provision of medical colleges and medical education in MBBS and postgraduate combined is lagging behind.

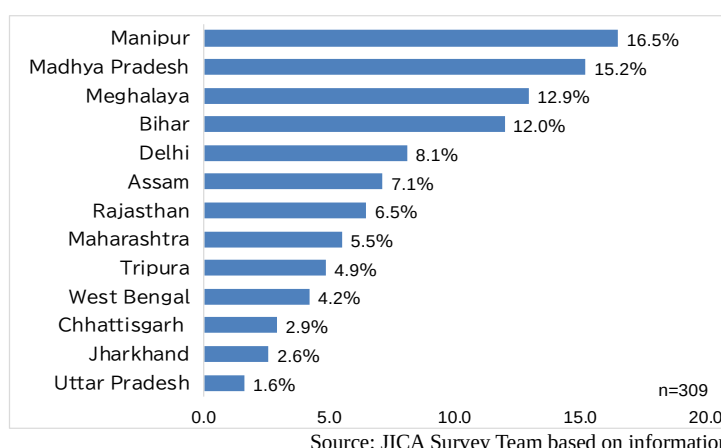
The Christian Institute of Health Sciences and Research (CIHSR), Dimapur, Nagaland, offers the DNB course, which is a postgraduate course. The institute accepts six students per year, including two in family medicine, two in internal medicine, and two in general surgery. Other than the institute, no other institution offers either MBBS or postgraduate courses.

Table 2-8 Number of Medical Colleges and Number of Seats in NER States

State	Undergraduate				Postgraduate			
	No. of Colleges		MBBS Seats		MD/MS/M.Ch/DM/ Diploma		DNB/FNB Seats	CPS Seats
	Govt.	Private	Govt.	Private	Govt.	Private		
Assam	6	0	1,000	0	675	0	62	0
Arunachal Pradesh	1	0	50	0	0	0	0	0
Manipur	2	0	225	0	209	0	18	0
Meghalaya	1	0	50	0	29	0	13	0
Mizoram	1	0	100	0	0	0	16	0
Nagaland	0	0	0	0	0	0	6	0
Sikkim	1	1	0	50	0	22	5	0
Tripura	1	1	125	100	79	5	0	6

Source: JICA Survey Team based on [45]

Although Nagaland has never had a medical college, this does not mean that there are no students from Nagaland who have studied in medicine, and the state has been producing about 60 MBBS students every year with counting students enrolled in public medical colleges only. Figure 2-2 shows the states where MBBS students have been enrolled over the past five years. Although there is no information on the destinations of MBBS graduates for further studies or employment, and they do not necessarily stay in the same state after completing MBBS, it may be worth considering states with a large number of these MBBS graduates as a source state of human resources for NMCH.



Source: JICA Survey Team based on information from DHFW

Figure 2-2 MBBS Enrolment States of Students from Nagaland 2018- 2022

Samples of career paths of doctors working in and around Nagaland State are shown in Table 2-9. The sample career paths collected show that there are many cases that doctors often work outside Nagaland, and they move in and out of the state in order to pursue their career, as well as there are many cases of them returning to the state where their MBBS school is located, considered as their home state, as the final destination of their careers. In addition, doctors who have completed up to MBBS courses usually work in primary health facilities such as Community Health Centres (CHCs) and Primary Health Centres (PHCs), while those who have completed postgraduate courses and are qualified as specialists or above have never worked in primary health facilities, and all have experience as resident in secondary or higher-level hospitals.

Table 2-9 Career Paths of Doctors Working Around Nagaland State

1. Doctor, PHC Khonuma, Nagaland	
<u>Education:</u> • MBBS, Regional Institute of Medical Science, <u>Imphal</u> • MD in Pharmacology	<u>Working Experience:</u> • Worked at NHAK, Nagaland • Worked at Zhakama PHC for nine years • Doctor at PHC Khonuma, Nagaland
2. Doctor, UPHC Seikhazou, Nagaland	
<u>Education:</u> • MBBS, Medical College, <u>Jaipur</u> , 2016	<u>Working Experience:</u> • Christian Institute of Health Science & Research • Doctor at UPHC Seikhazou, Nagaland since 2021
3. Doctor, UPHC Seikhazou, Nagaland	
<u>Education:</u> MBBS, Medical College, <u>Karnataka</u> , 1996	<u>Working Experience:</u> • Worked at the Oncology and General Surgery Department in a private hospital <u>outside Nagaland</u> • Christian Hospital, 2000 • Doctor at UPHC Seikhazou, Nagaland since 2017
4. Ophthalmology Super Specialist Doctor, District Hospital Dimapur, Nagaland	
<u>Education:</u> • Completing MBBS at <u>Jharkhand</u> State • Postgraduate course at Regional Institute of Medical Sciences, <u>Imphal</u>	<u>Working Experience:</u> • Fellowship at a private hospital <u>outside Nagaland</u> • Ophthalmology Super Specialist Doctor, District Hospital Dimapur
5. Blood Bank Pathologist, District Hospital Dimapur, Nagaland	
<u>Education:</u> • Completing MBBS at Medical College in <u>Uttar Pradesh</u>	<u>Working Experience:</u> • Worked at rural PHC, <u>dispensary and CHC</u> for 8.5 years. • Blood Bank Pathologist at District Hospital Dimapur
6. Internal Medicine Doctor, District Hospital Dimapur, Nagaland	
<u>Education:</u> • MBBS, Regional Institute of Medical Sciences, <u>Imphal</u>	<u>Working Experience:</u> • Worked at <u>CHC</u> • Internal Medicine Doctor at District Hospital Dimapur
7. Biochemist (Laboratory Medicine), District Hospital Dimapur, Nagaland	
<u>Education:</u> • MBBS, Regional Institute of Medical Sciences, <u>Imphal</u> • Postgraduate course in Biochemistry/ Laboratory Medicine	<u>Working Experience:</u> • Worked mostly at primary health institutions (more than ten years) for 26 years as a doctor • Biochemist (Laboratory Medicine) at the District Hospital Dimapur
8. Oncology Pathologist, State Cancer Institute, Guwahati, Assam	
<u>Education:</u> • MBBS, Graduation from Assam Medical College, Dibrugarh, Assam, 2009 • Postgraduate diploma from Guwahati Medical College, Guwahati, Assam • Postgraduate degree (Diplomate of National Board) from Indo American Cancer Hospital and Research Institute, Hyderabad, <u>Telangana</u>	<u>Working Experience:</u> • Worked as a Senior Resident in Indo American Cancer Hospital and Research Institute, <u>Telangana</u> • Worked as a consultant in J W Global Hospital and Research Centre, Mount Abu, <u>Rajasthan</u> • Worked as in charge blood bank services in RMM Global Hospital and Trauma Centre, Abu Road, <u>Rajasthan</u> • Oncology Pathologist at the State Cancer Institute, Guwahati
9. Deputy General Manager and Head, Cancer Care Program and Research, Assam Cancer Care Foundation, Assam	
<u>Education:</u> • MBBS, Silchar Medical College and Hospital, Assam, India, 2006 • Master of Public Health (MPH), University of Wolverhampton, United Kingdom (UK), 2009 • Postgraduate Diploma in Management of Reproductive and Child Health Programmes, Indian Institute of Public Health, Delhi, India, 2014 • Ph.D. in Public Health, University of Central Nicaragua	<u>Working Experience:</u> • Resident Medical Officer, Mediland Hospital and Research Centre, Assam, India, 2007 • Surveillance Medical Officer, Bihar/ <u>West Bengal</u> WHO Country Office for India-NPSP, 2016 • State Consultant-RI and Child Health, Lucknow, UP UNICEF/IPE Global Ltd., 2017 • Head- Clinical Domain, Northeast India, Piramal Swasthya Management and Research Institute, Guwahati, India, 2020 • Program Manager, Preventive Cancer Program, Assam Cancer Care Foundation, Tata Trusts, India, 2021

- Deputy General Manager and Head, Cancer Care Program and Research, Assam Cancer Care Foundation, Tata Trusts, India - Additional charge: Medical Superintendent of Kokrajhar Cancer Centre, Major Duties/Responsibilities: to Present	
10. Registrar, Medical Oncology and Laboratory In-charge, Multidisciplinary Laboratory, State Cancer Institute, Assam	
Education: - MBBS, Assam Medical College Hospital, Dibrugarh Bachelor of Medicine and Surgery, 2010 - Gauhati Medical College Hospital, Guwahati Doctor of Medicine (M.D.), 2016 - Certificate Course in Evidence-based Management of Diabetes Mellitus (CCEBDM) accredited by International Diabetic Federation and SAFES, 2018 - Trained in Molecular Oncology (CMC, Vellore), 2018 - Fellowship in Clinical Oncology (AHERF), 2021	Working Experience: - Medical Officer (NRHM), Boat Clinic, Sonitpur, 2012 - Casualty Medical Officer, Department of Emergency Medicine and Trauma Centre, Gauhati Medical College Hospital, Guwahati, 2013 - Senior Resident, Gauhati Medical College Hospital, Guwahati, 2017 - Medical Officer (MHO-1), Department of Medical Oncology, State Cancer Institute, Guwahati, 2018 - Registrar, Medical Oncology and Laboratory In-charge, Multidisciplinary Laboratory, State Cancer Institute, Guwahati.
11. Associate Professor of Internal Medicine, Emergency Medicine, Gauhati Medical College, Assam	
Education: - Completed undergraduate in 1995 - Postgraduate course in Internal Medicine, Gauhati Medical College Hospital	Working Experience: - Registrar in the Department of Tuberculosis and Chest Diseases, Gauhati Medical College Hospital - Assistant Professor of Internal Medicine, General Medicine Department, 2018 - Associate Professor of Internal Medicine, Emergency Medicine in Gauhati Medical College

Source: Hearing by the JICA Survey Team

2.1.2 Relevant Policies and Strategies

(1) Medical Education Reform of Ministry of Health and Family Welfare of Government of India

In order to increase transparency, professionalism, accountability, availability, distribution, merit-based admission, affordability, and quality of medical education, the Ministry of Health and Family Welfare (MoHFW) of the Government of India (GoI) has been introducing various reforms as shown in Table 2-10.

Table 2-10 Summary of Governance Reforms in Medical Education in Recent Years

Areas of Reforms	Major Initiatives
Institutional Reform: National Medical Commission (NMC)	Establishment of the National Medical Commission (NMC) and overhaul of the National Medical Council (NMC)
Ensuring Availability of Doctors and Specialists: Increase in Number of Medical Colleges	- A Centrally Sponsored Scheme was introduced in 2014 to provide funding support for opening new medical colleges. - Pradhan Mantri Swasthya Suraksha Yojana (PMSSY) aims to correct regional imbalances in the availability of affordable and reliable tertiary healthcare services and augment facilities for quality medical education in the under-served states.
Reform in Regulations	Many regulatory reforms were undertaken, including the following: - Norms for setting up a medical college relaxed (including land requirement standard) - Consortium allowed to establish a medical college - Allowing permission for a lesser number of seats, if criteria for a higher number of seats are not met - Teacher: Student ratio has been relaxed in the postgraduate regulation
National Board of Examinations (NBE)	NBE is an autonomous body of MoHFW for examination and accreditation. NBE accredits the hospitals (mainly private hospitals) for broad specialty and super specialty courses.
Access in Rural and Peripheral Areas	District Residency Scheme: A scheme for three months training for the

Areas of Reforms	Major Initiatives
	second/third year postgraduate medical students at District Hospitals as an essential component of the postgraduate medical training curriculum has been introduced.
Meritocracy: One Country, One Exam	• National Eligibility cum Entrance Test (NEET): In 2016, NEET was introduced. • National Exit Test (NEXT): NEXT will be a common final year MBBS exam which would not only serve as a licentiate exam for the practice, but also serve as an entrance exam for admission to postgraduate in broad specialty medical courses.
Affordability	• Regulation of Fee: The NMC Act has the provision to regulate fee and all other charges in 50% of the seats in private medical colleges and deemed universities.
Quality: Promoting High Standards	• Skill Lab: The new standards for opening of medical colleges envisages a skill laboratory in every medical institution. • New Competency-based Curriculum: “Competency-based Undergraduate Curriculum for the Indian Medical Graduate” has been introduced. • Emergency Medicine Department: All medical colleges will have an emergency medicine department by 2022.

Source: JICA Survey Team based on [46]

As a result of these reforms, there has been a significant increase in the number of medical colleges and the number of seats at both undergraduate and postgraduate levels. Against 381 medical colleges in 2014, there were 562 colleges in 2020, an increase of 48% in six years. Also, the number of undergraduate seats has increased by 56%, and the number of postgraduate seats has increased by 80% as compared with 2014 [46].

(2) Strengthening of Medical Colleges Across India

This section describes detailed plans for the strengthening of medical colleges across India, which were briefly included in the medical education reforms mentioned in the above section. The MoHFW of the GoI is pursuing a plan to strengthen medical colleges across the country with the ultimate aim of improving access to tertiary care in underserved areas by increasing the number of doctors and specialists through improving and strengthening the country’s medical education. The plan is divided into two parts: one relating to undergraduate medical education and the other to postgraduate medical education, as follows and shown in Table 2-11.

Establishment of new medical colleges by upgrading district/referral hospitals:

With regard to strengthening undergraduate medical education, there are plans to establish a new medical college attached to an existing district or referral hospital, utilising the existing infrastructure. This aims to increase undergraduate MBBS enrolment quotas in a cost-effective manner. The scheme is being implemented in three phases as shown in Table 2-11. The contribution of the central government and state governments to the costs is 90:10 in the NER states and the special states, and 60:40 in the other states. The plan is divided into first to third phases.

Based on information from the detailed project report (DPR), the establishment of NMCK, which was approved by the central government in 2014, can be considered to be part of the first phase of this plan.

Strengthening and Upgrading State Government Medical Colleges for Increase in Postgraduate Seats:

With regard to strengthening medical postgraduate education, there is a plan to increase the capacity of postgraduate courses by strengthening and upgrading existing public medical colleges. The plan is divided into first to second phases.

Table 2-11 Plans for the Strengthening of Medical Colleges across India

Undergraduate Medical Education	Postgraduate Medical Education
Establishing New Medical Colleges	Strengthening / Upgrading State Government Medical Colleges for Increase in Postgraduate Seats
First Phase: Plans to establish 58 medical colleges (with a capacity to intake 100 students per year) across the country. The existing infrastructure of District Hospitals will be utilised to save on financial costs. The cost of establishing medical colleges under this scheme is INR 1.89 billion.	First Phase: A total of 4,058 capacity upgrades were approved for 72 medical colleges in 21 states with the aim of strengthening and upgrading public medical colleges to increase capacity in postgraduate courses.
Second Phase: With a target of establishing one medical college in every three parliamentary constituencies and at least one medical college in every state, 24 medical colleges are required to be established in eight states. The cost of establishing a medical college under the scheme is INR 2.5 billion.	Second Phase: A phase to further increase capacity by 4,000 postgraduate courses started in February 2018. The upper ceiling cost is INR 12 million per admission.
Third Phase: In September 2019, the Union Cabinet approved the construction of a medical college attached to 75 new district and referral hospitals. The cost of establishing a medical college under this scheme is INR 3.25 billion.	

Source: JICA Survey Team based on [47]

(3) Standard and Recommended Staffing Guidelines of the Central Government

“The Minimum Standard Requirement for the Medical College” published by the NMC serves as a guideline for facilities and human resource allocation for medical colleges hospitals. The guidelines stipulate a minimum human resource requirement for medical colleges hospitals with an admission quota of 100 students per year, with a total of at least 405 doctors and co-medical workers (excluding nurses). For nurses, one nurse is required for every three general beds, one nurse for every bed in ICUs, etc., and the number of nurses for outpatients is also stipulated in relation to the number of patients. The minimum human resource allocation for medical colleges regulated by the NMC is shown in Table 2-12. The NMC also specifies the required number of placements especially for professors, associate professors, assistant professors, and tutors/residents per stage of LOP1 to LOP5 and recognition (Table 2-13).

The NMC regulations also stipulate that the deployment of nurses should be in accordance with the Indian Nursing Council regulations. Recommendation of nursing staff norm by Indian Nursing Council is shown in Table 2-14.

Table 2-12 Minimum Standard Requirement for Medical College

Position	No.	Position	No.	Position	No.
I. NON-CLINICAL DEPARTMENT		10. Urban Training Health Centre		19. Ophthalmology	
1. Anatomy		Medical Officer of Health	1	Professor	1
Professor	1	Lady Medical Officer	1	Assoc. Professor	1
Assoc. Professor	1	Medical Social Workers	2	Asst. Professor	1
Asst. Professor	2	Public Health Nurse	1	Sr. Resident	1
Tutor/Demonstrator/Sr. Res	3	Health Inspector	2	Jr. Resident	1
Technician	1	Health Educator	1	Optometrist	1
Dissection Hall Attendant	4	Technical Asst./Technician	2	Technical Asst./Technician	1
Store Keeper/ Clerk/ Computer Op.	1	Store Keeper/ Record Clerk	1	Lab. Attendant	1
Sweeper	2	Sub-total	144	Stenotypist	1
2. Physiology		II. CLINICAL DEPARTMENT		Store Keeper	1
Professor	1	11. General Medicine		Record Clerk	1
Assoc. Professor	1	Professor	1	Refractionist	1

Position	No.
Asst. Professor	2
Tutor/Demonstrator/Sr. Res	3
Technician	1
Store Keeper/ Clerk/ Computer Op.	1
Sweeper	2
3. Biochemistry	
Professor	1
Assoc. Professor	1
Asst. Professor	2
Tutor/Demonstrator/Sr. Res	3
Technical Asst./Technician	2
Store Keeper/ Clerk/ Computer Op.	1
Sweeper	2
Lab. Attendant	1
4. Pathology	
Professor	1
Assoc. Professor	1
Asst. Professor	2
Tutor/Demonstrator/Sr. Res	3
Technical Asst./Technician	2
Lab. Attendant	2
Stenographers/ Computer Op.	1
Store Keeper/ Record Clerk	1
Sweeper	2
5. Microbiology	
Professor	1
Assoc. Professor	1
Asst. Professor	1
Tutor/Demonstrator/Sr. Res	3
Technical Asst./Technician	7
Lab. Attendant	2
Store Keeper/ Record Clerk	1
Stenographer/ Computer Op.	1
Sweeper	2
6. Pharmacology	
Professor	1
Assoc. Professor	1
Asst. Professor	1
Tutor/Demonstrator/Sr. Res	2
Lab. Attendant	2
Store Keeper/ Clerk/ Computer Op.	1
Sweeper	2
7. Forensic Medicine	
Professor	1
Assoc. Professor	1
Asst. Professor	1
Tutor/Demonstrator/Sr. Res	2
Technical Asst./Technician	2
Lab. Attendant	2
Stenotypist	1
Store Keeper/ Clerk/ Computer Op.	1
Sweeper	4
8. Community Medicine	
Professor	1

Position	No.
Assoc. Professor	3
Asst. Professor	4
Tutors/ Registrar/ Sr. Resident	4
Jr. Resident	8
12. Respiratory Medicine	
Assoc. Prof.	1
Asst. Professor	1
Tutors/ Registrar/ Sr. Resident	1
Jr. Resident	1
13. Dermatology	
Assoc. Professor	1
Asst. Professor	1
Tutors/ Registrar/ Sr. Resident	1
Jr. Resident	1
14. Psychiatry	
Assoc. Prof.	1
Asst. Prof.	1
Sr. Resident	1
Jr. Resident	1
E.C.G. Technician	1
Technical Asst./Technician	3
Lab. Attendant	4
Store Keeper	1
Stenotypist	1
Record Clerk	2
Psychiatric Social Worker	2
Tuberculosis and Chest Diseases Health Visitor	2
15. Paediatrics	
Professor	1
Assoc. Professor	1
Asst. Professor	2
Sr. Resident	2
Jr. Resident	4
Clinical Psychologist	1
Child Psychologist	1
Health Educator	1
Technical Asst./Technician	1
Lab. Attendant	1
Store Keeper	1
Record Clerk	1
Social Worker	1
16. General Surgery	
Professor	1
Assoc. Professor	3
Asst. Professor	4
Sr. Resident	4
Jr. Resident	8
Technical Asst./Technician	3
Lab. Attendant	4
Store Keeper	1
Steno Typist	1
Record Clerk	2
17. Orthopaedics	
Professor	1

Position	No.
20. Obstetrics & Gynaecology	
Professor	1
Assoc. Professor	1
Asst. Professor	2
Sr. Resident	2
Jr. Resident	4
Social Worker	2
Technical Asst./Technician	2
Lab. Attendant	2
Stenotypist	1
Record Clerk	1
Store Keeper	1
21. Radiodiagnosis	
Professor	1
Assoc. Professor	1
Asst. Professor	1
Sr. Resident	2
Radiographic Technicians	8
Dark Room Asst.	4
Stenotypist	1
Store Keeper	1
Record Clerk	1
22. Anaesthesiology	
Professor	1
Assoc. Professor	2
Asst. Professor	4
Sr. Resident	3
Jr. Resident	4
Technical Asst./Technician	8
Stenotypist	1
Record Clerk	1
Store Keeper	1
23. Physical Medicine & Rehabilitation	
Professor	1
Assoc. Professor	1
Asst. Professor	1
Sr. Resident	2
Physiotherapists	2
Occupational Therapists	2
Speech Therapists	1
Prosthetic and Orthotic Technicians	2
Workshop Workers	6
Clinical Psychologist	1
Medical Social Worker	1
Counsellor	1
Multi-rehabilitation Therapist	4
Stenotypist	1
Record Clerk	1
Store Keeper	1
Class IV Workers	4
24. Dentistry	
Professor	1
Assoc. Professor	1
Asst. Professor	1

Position	No.	Position	No.	Position	No.
Assoc. Professor	2	Assoc. Professor	1	Sr. Resident	1
Asst. Professor	2	Asst. Professor	2	Jr. Resident	1
Statistician (Tutor/Asst. Prof)	1	Sr. Resident	2	Dental Technician	4
Tutor/Demonstrator/Sr. Res	1	Jr. Resident	4	Store Keeper/Clerk	1
Epidemiologist/ Asst. Professor	3	Technical Asst./Technician	1	25. Emergency Medicine	
Medical Social Worker	1	Lab. Attendant	1	Professor	1
Technical Asst./Technician	1	Store Keeper	1	Assoc. Prof.	1
Stenotypist	1	Stenotypist	1	Asst. Prof.	1
Record Keeper/ Clerk/ Computer Op.	1	Record Clerk	1	Sr. Resident	9
Store Keeper	1	18. Oto-Rhino-Laryngology		Sub-total	241
Sweeper	1	Professor	1	III. ANCILLARY SERVICE	
9. Rural Training Health Centre		Assoc. Prof.	1	27. Medical Education Unit	
Medical Officer of Health	1	Asst. Prof.	1	Officer In-charge (Principal/Dean)	1
Lady Medical Officer	1	Sr. Resident	1	Coordinator	1
Medical Social Workers	2	Jr. Resident	1	Supportive Staff	1
Public Health Nurse	1	Technical Asst./Technician	1	Stenotypist	1
Health Asst.	1	Lab. Attendant	1	Computer Op.	1
Health Educator	1	Store Keeper	1	Technicians in Audio-visual Aids, Photography and Artist	2
Technical Asst./Technician	1	Stenotypist	1	26. Central Library	
Store Keeper/ Record Clerk	1	Record Clerk	1	Librarian	1
		Audiometry Technician		Assistant Librarian	2
		Speech Therapist	1	Library Assistants	4
				Documentalist	1
				Cataloguer	1
				Duftery	2
				Peon	2
				Sub-total	20
				TOTAL	405

Abbreviation: Asst.: Assistant Assoc.: Associate Steno: Stenographer Sr.: Senior Jr. Junior Req.: Required Op.: Operator
Source: JICA Survey Team based on [48] and [49]

Table 2-13 Requirements of Professorship to be Fulfilled by Medical College by Application Stage

Department	Designation	LOP1	LOP2	LOP3	LOP4	LOP5	Recognition
Anatomy	Professor	1	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst. Prof.	2	2	2	2	2	2
	Tutor/Demonstrator/Sr. Res	3	3	3	3	3	3
Physiology	Professor	1	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst. Prof.	2	2	2	2	2	2
	Tutor/Demonstrator/Sr. Res	3	3	3	3	3	3
Biochemistry	Professor	1	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst. Prof.	2	2	2	2	2	2
	Tutor/Demonstrator/Sr. Res	3	3	3	3	3	3
Pathology	Professor	0	1	1	1	1	1
	Assoc. Prof.	1	2	2	2	2	2
	Asst. Prof.	1	3	3	3	3	3
	Tutor/Demonstrator/Sr. Res	1	4	4	4	4	4
Microbiology	Professor	0	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst. Prof.	0	2	2	2	2	2
	Tutor/Demonstrator/Sr. Res	1	4	4	4	4	4
Pharmacology	Professor	0	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1

Department	Designation	LOP1	LOP2	LOP3	LOP4	LOP5	Recognition
	Asst. Prof.	0	2	2	2	2	2
	Tutor/Demonstrator/Sr. Res	1	3	3	3	3	3
Forensic Medicine	Professor	0	1	1	1	1	1
	Assoc. Prof.	0	1	1	1	1	1
	Asst. Prof.	1	1	1	1	1	1
	Tutor/Demonstrator/Sr. Res	1	2	2	2	2	2
	Professor	0	1	1	1	1	1
Community Medicine	Assoc. Prof.	0	2	2	2	2	2
	Asst. Prof.	1	3	3	3	3	3
	Statistician (Tutor/Asst. Prof)	0	1	1	1	1	1
	Tutor/Demonstrator/Sr. Res	1	3	3	3	3	3
	Professor	1	1	1	1	1	1
General Medicine	Assoc. Prof.	2	2	2	3	3	3
	Asst. Prof.	3	3	3	4	4	4
	Sr. Resident	3	3	3	4	4	4
	Assoc. Prof.	1	1	1	1	1	1
Respiratory Medicine	Asst. Prof.	0	1	1	1	1	1
	Sr. Resident	1	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
Dermatology	Asst. Prof.	0	1	1	1	1	1
	Sr. Resident	1	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
Psychiatry	Asst. Prof.	0	1	1	1	1	1
	Sr. Resident	1	1	1	1	1	1
	Professor	0	1	1	1	1	1
Paediatrics	Assoc. Prof.	1	1	1	1	1	1
	Asst. Prof.	0	1	1	2	2	2
	Sr. Res	1	1	1	2	2	2
	Professor	1	1	1	1	1	1
General Surgery	Assoc. Prof.	2	2	2	3	3	3
	Asst. Prof.	3	3	3	4	4	4
	Sr. Res	3	3	3	4	4	4
	Professor	0	1	1	1	1	1
Orthopaedics	Assoc. Prof.	1	1	1	1	1	1
	Asst. Prof.	0	1	1	2	2	2
	Sr. Resident	1	1	1	2	2	2
	Professor	0	0	0	1	1	1
Oto-rhino-laryngology	Assoc. Prof.	0	0	1	1	1	1
	Asst. Prof.	1	1	1	1	1	1
	Sr. Res	1	1	1	1	1	1
	Professor	0	0	0	1	1	1
Ophthalmology	Assoc. Prof.	0	0	1	1	1	1
	Asst. Prof.	1	1	1	1	1	1
	Sr. Resident	1	1	1	1	1	1
	Professor	1	1	1	1	1	1
Obstetrics and Gynaecology	Assoc. Prof.	1	1	1	1	1	1
	Asst. Prof.	2	2	2	2	2	2
	Sr. Resident	2	2	2	2	2	2
	Professor	0	0	1	1	1	1
Radiodiagnosis	Assoc. Prof.	1	1	1	1	1	1
	Asst. Prof.	1	1	1	1	1	1
	Sr. Resident	2	2	2	2	2	2
	Professor	0	0	0	1	1	1
Anaesthesiology	Assoc. Prof.	2	2	2	2	2	2
	Asst. Prof.	2	2	3	4	4	4
	Sr. Resident	1	1	2	3	3	3
	Professor	0	0	0	0	0	0
Dentistry	Assoc. Prof.	0	0	1	1	1	1
	Asst. Prof.	1	1	1	1	1	1
	Sr. Res	0	1	1	1	1	1
	Professor	0	0	1	1	1	1

Department	Designation	LOP1	LOP2	LOP3	LOP4	LOP5	Recognition
Emergency Medicine	Assoc. Prof.	1	1	1	1	1	1
	Asst. Prof.	1	1	1	1	1	1
	Sr. Resident	6	6	9	9	9	9

Table 2-14 Recommended Norms for Medical College Nursing Service

1.	Normal Wards	1 staff nurse/nursing sister for every 6 beds
2.	Special Wards	1 staff nurse/nursing sister for every 4 beds
	I) Paediatrics	
	II) Burns/Burns Plastic	
	III) Neuro Surgery	
	IV) Cardiac Thoracic	
	V) Neuro Medicine	
	VI) Nursing Home	
	VII) Tetanus	
	VIII) Spinal Injury	
	IX) Emergency Wards Attached to Casual	
3.	Nursery	1 staff nurse/nursing sister for every 2 beds
4.	ICU/CCU/ICCR Nephrology (AK Dialysis)	1 staff nurse/nursing sister for every bed
5.	Labour Room	1 staff nurse/nursing sister for every labour table
6.	O.T.	2 staff nurses/nursing sister for every functional operation table including recovery room
	I) Major	
	II) Minor	1 staff nurse/nursing sister for every functional operation table
7.	Casualty	
	a) Casualty (Main) Attendance up to 100 patient per day	3 staff nurses/nursing sister for 24 hours, i.e., 1 per shift
	Thereafter for every additional attendance of 35 patients per day	1 staff nurse/nursing sister
	b) Burns Attendance up to 15 patients per day	3 staff nurses/nursing sister for 24 hours, i.e., 1 per shift
	Thereafter for every additional attendance of 10 patients per day	1 staff nurse/nursing sister
	c) Orthopaedics Attendance up to 45 patients per day	3 staff nurses/nursing sister for 24 hours, i.e., 1 per shift
	Thereafter for every additional attendance of 15 patients per day	1 staff nurse/nursing sister
	d) Gynae/Obstetrics Attendance up to 40 patients per day	For every additional attendance of 15 patients per day
	Thereafter for every additional attendance of 15 patients per day	1 staff nurse/ nursing sister
8.	O.P.D. (Injection Room) Attendance up to 100 patients per day Attendance up to 120-220 patients per day Attendance up to 221-320 patients per day Attendance up to 321-420 patients per day	1 staff nurse 2 staff nurses 3 staff nurses 4 staff nurses
9.	<u>Name of Department</u> O.P.D. Blood Bank Paediatric Immunisation work Eye ENT	<u>No. of Staff/Nursing Sister</u> 1 2 2 1 1

Pre-anaesthetic	1
Cardiac Lab.	1
Bronchoscopy Lab	1
Vaccination Anti-rabies	1
Family Planning	2
Medical	1
Surgical	1
Dental	1
Central Sample Collection Centre	1
Orthopaedic	2
Gynae	2
Obstetric	3
Skin	2
V.D. Centre	2
Chemotherapy	2
Neurology	1
Microbiology Infection Control	2
Psychiatry	1
Burns	2

Note: *In addition to the 10% reserve as per existent rules, 45% posts may be added for offs also where services are provided for 365 days in a year.

Source: JICA Survey Team based on [48]

(4) Implementing Structure of Medical Education in Nagaland

The Directorate of Medical Education of the Directorate of Health and Family Welfare (the Directorate) is responsible for medical education. To establish medical college and other institutes to undertake medical education, Nagaland Institute of Medical Science and Research (NIMSR) was established in 2022. NIMSR is headed by a director cum dean assisted by a deputy director, consultants (procurement and technical), and a hospital administrator, as of April 2023 (Figure 1-3). It is also responsible for the following:

- To establish hospitals to provide advanced and specialised medical care,
- To conduct and encourage medical research and training,
- To guide and assist the state government in planning and implementation of healthcare programmes and medical education, and
- To receive and coordinate external support [3].

2.1.3 Good Practices of Other Countries and States

(1) Examples of Clinical Clerkship in Japan

In interviews with medical professionals in Nagaland, there were comments that, even if they have specialist qualifications, some doctors are unable to perform even operations that are considered relatively less difficult, such as operation for appendicitis. Though MoHFW of GoI has been strengthening medical colleges with the aim of increasing the number of doctors and specialists, there is a tendency that emphasis has been placed on classroom learning in order to obtain qualifications or conduct research, thus, disregarding the clinical practice training. To avoid such situation, measures to enhance clinical training are required. Some samples of initiatives taken in Japan in order to improve the effectiveness of clinical training are to be introduced as shown below.

A committee organised by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of the Government of Japan has developed the "Model Core Curriculum for Medical Education in Japan", which sets out the attainment targets for medical and dental students at graduation, and the "Guideline for the Implementation of Clinical Clerkship", which refers to domestic and international methods of clinical practice evaluation. In their guidelines, they set out tools and evaluation methods to improve the effectiveness of clinical training.

Referential initiatives are listed in Table 2-15. Based on the guidelines, clinical training of medical universities in Japan has introduced (1) the accumulation of learning portfolios using the booklet called

"Record of Learning and Evaluation", which aims to promote a cycle of practical experience and reflection during the clinical training period, (2) a mini-Clinical Evaluation Exercise (mini-CEX), which is a simplified clinical competence evaluation method, and (3) a 360-degree evaluation of clinical training students. To contribute to the increase in the number of doctors who can perform clinical work in India, these initiatives could be used as a reference for enhancing the quality of clinical training.

Three hundred sixty-degree evaluations have also been adopted by the Christian Institute of Health Sciences and Research (CIHSR) in Nagaland State to assess the knowledge, output, and attitude of staff and to improve individual staff and the team.

Table 2-15 Initiatives Taken in Clinical Training in Japan

(1) Accumulation of Learning Portfolios	The aim is to promote a cycle of practical experience and reflection, and students are required to proactively accumulate records in the booklet called "Record of Learning and Evaluation". Students proactively set learning objectives, compile summaries of clinical cases they have been assigned on, receive multi-disciplinary evaluations from their supervisors and other professionals, and review themselves. The record consists of a section that is to be recorded throughout the entire duration of the clinical training, and a section that is to be recorded during the training in each clinical department. It does not only serve as a record of the learning in the student's clinical practice but is also used in part for the evaluation of the student's clinical practice. The "Record of Learning and Evaluation" booklet contains the following contents: the image of the doctor as a goal, educational philosophy, qualities required of a doctor, attainment goals for clinical training, items to be checked before training, learning history up to training start, setting of learning goals in each clinical department, training logbook, pathological summary of inpatient cases in charge, list of outpatient cases in charge, mini-CEX evaluation chart, evaluation chart regarding the clinical case in charge, 360-degree evaluation, patient feedback, review at the end of each medical department, evaluation by supervisors, self-evaluation by students, etc.
(2) Mini Clinical Evaluation Exercise (Mini-CEX)	This is a simplified clinical competence evaluation method using an evaluation form. The supervising teacher or other staff member observes the student's interaction with the patient for about 20 minutes and evaluates the student with an evaluation form that includes the following seven items. The results of the evaluation are used as reference for the overall evaluation in each clinical department. 【Evaluation Item】 1. Medical history: In the case of an initial outpatient visit, whether the student heard what is required to ask, whether accurate and sufficient information was obtained. For inpatients, whether the student asked the information required at the time of admission, etc. 2. Physical examination: Whether the item was checked in order to determine the diagnosis, whether the student explained the procedure to the patient and took into account patient's discomfort and reticence. 3. Communication: Whether the student listened to the patient in a way that made patient easy to talk, whether the student checked the patient's level of understanding. 4. Clinical judgement: Whether diagnostic examinations were appropriately selected, directed and performed. Whether likely diseases or diseases that should not be overlooked were considered. 5. Professionalism: Whether the student showed respect, compassion and sympathy towards the patient and established a trustful relationship with the patient. Whether care was taken regarding patient discomfort, reticence, confidentiality, personal information. 6. Management: Whether the appropriate treatment method has been chosen. Whether the patient has been advised what to be careful of, what steps to take next, etc. 7. Overall:

	Whether the order of priorities was properly set. Whether the process was quick and smooth. Whether the patient and the assessor agreed and reached and satisfied with diagnosis. Could the student have examined the patient on his own without an assessor.
(3) 360-degree Evaluation	Evaluation of students by multiple professions including chief nurses, nurses and other health professionals, as well as by patients (including simulated patients). The evaluation items include free-form descriptions of the good point about the students' performance during the clinical practice period and the point that could be improved.

Source: JICA Survey Team based on [50]

2.2 Human Resources Deployment Plan

The required number of NMCH human resources is presented in Table 2-16. The proposed human resource deployment plan by department is shown in Appendix 5. Based on the NMC regulations, the number required was calculated for each stage of Letter of Permission (LOP) from one to five and Recognition⁹. The required number of each human resource was compiled through discussions between NMCH, DHFW and the JICA Survey Team, based on the NMCH's plan, the guidelines and recommendations mentioned in Section 2.1.2(3).

The NMCH has been recruiting human resources in accordance with the NMC's regulations, and particularly faculty members have been selected through an open recruitment process, including professors, associate professors, and assistant professors in the Departments of Forensic Medicine, Pharmacology, Physiology, Anatomy, Community Medicine, and Biochemistry. For the other departments, interviews took place several times until July this year, and it seems that there are basically enough applications for each post to enable selection from the pool of applicants.

Table 2-16 Human Resource Deployment Plan for NMCH

Position	2023 (LOP1)	2024 (LOP2)	2025 (LOP3)	2026 (LOP4)	2027 (LOP5)	2028 (Recognition)
Medical Doctor, Research Doctor	125	211	221	235	235	235
Professor	6	14	16	19	19	19
Associate Professor	21	25	28	30	30	30
Assistant Professor	25	38	39	44	44	44
Assist Prof (Blood Bank Experienced)	1	1	1	1	1	1
Coordinator / Experienced Faculty as per NMC (No additional recruitment)	1	1	1	1	1	1
Members (Experienced Faculty as per NMC / No additional recruitment)	8	8	8	8	8	8
Epidemiologist/ Asst. Professor	0	1	1	1	1	1
Jr. Resident	21	67	67	67	67	67
Sr. Resident	27	28	32	36	36	36
Statistician /Asst. Prof	0	1	1	1	1	1
Tutor/Demonstrator/Sr. Res	14	25	25	25	25	25
Professor/ Asso Prof (Blood Bank Experienced)	1	1	1	1	1	1
Health Asst. Male/ Health Inspector	0	1	1	1	1	1
Technical and scientific staff	351	508	511	637	637	697
Attendant	2	2	2	2	2	2
Audiometry Technician	1	1	1	1	1	1
Child Psychologist	0	1	1	1	1	1
Clinical Psychologist	1	1	1	2	2	2
Counsellor	1	1	1	1	1	1
Dark Room Asst.	0	2	2	2	2	2
Dental Technician	2	4	4	4	4	4
E.C.G. Technician	1	1	1	1	1	1

⁹ To open a new medical college, the owner shall submit proposal for the letter of permission (LOP) step by step for six years. After Recognition, the medical college and the teaching hospital could be fully operated.

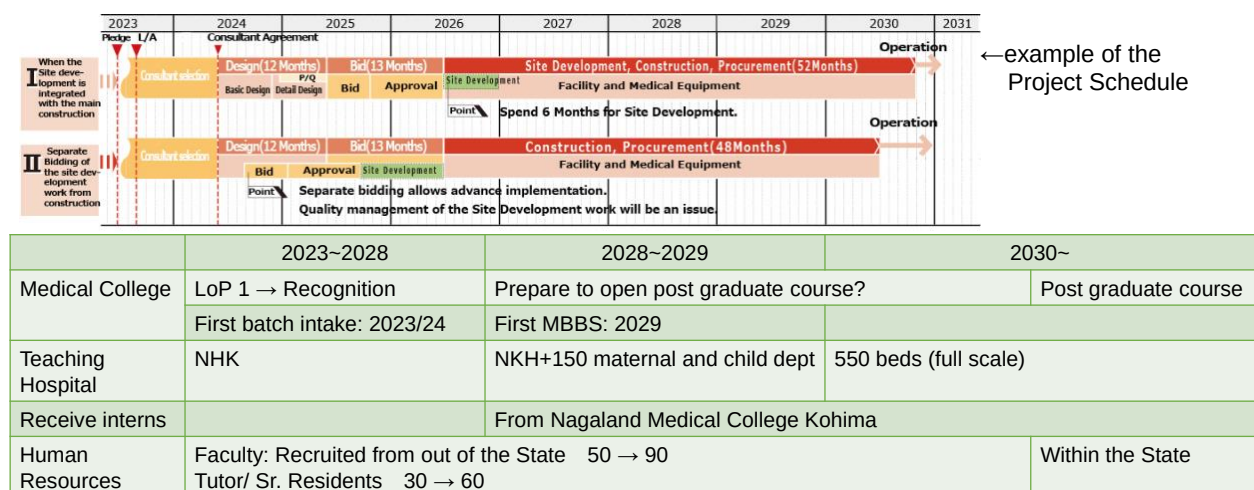
Position	2023 (LOP1)	2024 (LOP2)	2025 (LOP3)	2026 (LOP4)	2027 (LOP5)	2028 (Recognition)
Health Educator	0	3	3	3	3	3
Health Inspector	0	2	2	2	2	2
Dietician	1	1	1	1	1	1
Medical Officer of Health	0	2	2	2	2	2
Medical Social Worker	1	6	6	6	6	6
Multi-rehabilitation Therapist / Public Health Nurse / Rehabilitation Nurse	1	1	4	4	4	4
Occupational Therapists	2	2	2	2	2	2
Optometrist	1	1	1	1	1	1
Lab. Attendant	1	23	23	23	23	23
Lady Medical Officer	0	2	2	2	2	2
Physiotherapists	2	2	2	2	2	2
Prosthetic and Orthotic Technicians	2	2	2	2	2	2
Psychiatry Social Worker	0	2	2	2	2	2
Public Health Nurse	0	2	2	2	2	2
Radiographic Technicians	0	8	8	8	8	8
Refractionist	1	1	1	1	1	1
Social Worker	0	3	3	3	3	3
Speech Therapist	2	2	2	2	2	2
Statistician	1	1	1	1	1	1
Technical Assistant	8	8	8	8	8	8
Technical Asst./Technician	2	39	39	39	39	39
Technician	10	10	10	10	10	10
Technicians in Audio-visual Aids, Photography and Artist	2	2	2	2	2	2
Tuberculosis and Chest Diseases Health Visitor	0	2	2	2	2	2
Librarian	1	1	1	1	1	1
Assistant Librarian	2	2	2	2	2	2
Library Assistants	4	4	4	4	4	4
Blood Bank Technician	6	6	6	6	6	6
Blood Bank Lab Attendant	6	6	6	6	6	6
Documentalist	1	1	1	1	1	1
Nurse - ANS, DNS, NS, CSSD Matron, Nurse	200	250	250	375	375	435
Nurse	4	4	4	4	4	4
Dissection Hall Attendant	4	4	4	4	4	4
Medical Record Officer	1	1	1	1	1	1
Coding Clerk	4	4	4	4	4	4
Record Clerk	8	20	20	20	20	20
Chief Pharmacist	1	1	1	1	1	1
Sr. Pharmacist	3	3	3	3	3	3
Pharmacist	9	9	9	9	9	9
OT Technician	10	10	10	10	10	10
OT Assistant	20	20	20	20	20	20
Headcook (Therapeutic Kitchen)	2	2	2	2	2	2
Cook	6	6	6	6	6	6
Cookmate	13	13	13	13	13	13
Matron	1	1	1	1	1	1
Engineer and Administrative staff	103	231	234	234	234	234
Blacksmith	1	1	1	1	1	1
Carpenter	1	1	1	1	1	1
Class IV Workers	1	1	4	4	4	4

Position	2023 (LOP1)	2024 (LOP2)	2025 (LOP3)	2026 (LOP4)	2027 (LOP5)	2028 (Recognition)
Computer Op.	1	1	1	1	1	1
Dhobi/Washerman/Women	12	12	12	12	12	12
Packer / Laundry Assist	12	12	12	12	12	12
Peon	4	4	4	4	4	4
Record Keeper/ Clerk/ Computer Op.	0	1	1	1	1	1
Stenographer/ Computer Op.	1	2	2	2	2	2
Stenotypist	2	13	13	13	13	13
Store Keeper	7	17	17	17	17	17
Store Keeper/ Clerk/ Computer Op.	3	5	5	5	5	5
Store Keeper/ Record Clerk	0	4	4	4	4	4
Store Keeper/Clerk	0	1	1	1	1	1
Superintendent Engineer	2	2	2	2	2	2
Sr. Technician	2	2	2	2	2	2
Jr. Technician	2	2	2	2	2	2
Supervisor	2	2	2	2	2	2
Supportive Staff	2	2	2	2	2	2
Sweeper	10	21	21	21	21	21
Ward Boys	8	8	8	8	8	8
Workshop Workers	6	6	6	6	6	6
Stenotypist/ Computer Op.	0	1	1	1	1	1
Director Cum Dean	1	1	1	1	1	1
PS to Director Cum Dean	1	1	1	1	1	1
Medical Superintendent	1	1	1	1	1	1
PS to Medical Superintendent	1	1	1	1	1	1
Additional MS (No additional recruitment)	1	1	1	1	1	1
Deputy MS (No additional recruitment)	1	1	1	1	1	1
Deputy Director Admin	1	1	1	1	1	1
Deputy Director Finance	1	1	1	1	1	1
Officer Superuintendent	2	2	2	2	2	2
Upper Division Clerk	5	35	35	35	35	35
Lower Division Clerk	5	25	25	25	25	25
Multi Tasking Staff	4	40	40	40	40	40
Total	579	950	966	1106	1106	1166

Source: NMCH and JICA Survey Team

2.3 Recommendations on Medical Human Resource Development align with the Project

Considering the schedule of the Project, it could take nine years to produce the first senior resident and 23 years for the first professor as presented in Figure 2-3. Therefore, the Nagaland government will have to recruit faculty members consisting of a director, a dean, a medical superintendent, professors, associate professors, assistant professors, senior residents, and tutors, from out of the state. Also, at the initial state of the new medical college and hospital, capable leaders who are highly committed to improvement of quality of human resources and health services in the state should be engaged. One of the most possible options is to approach medical human resources who are from Nagaland and working in out of the state.

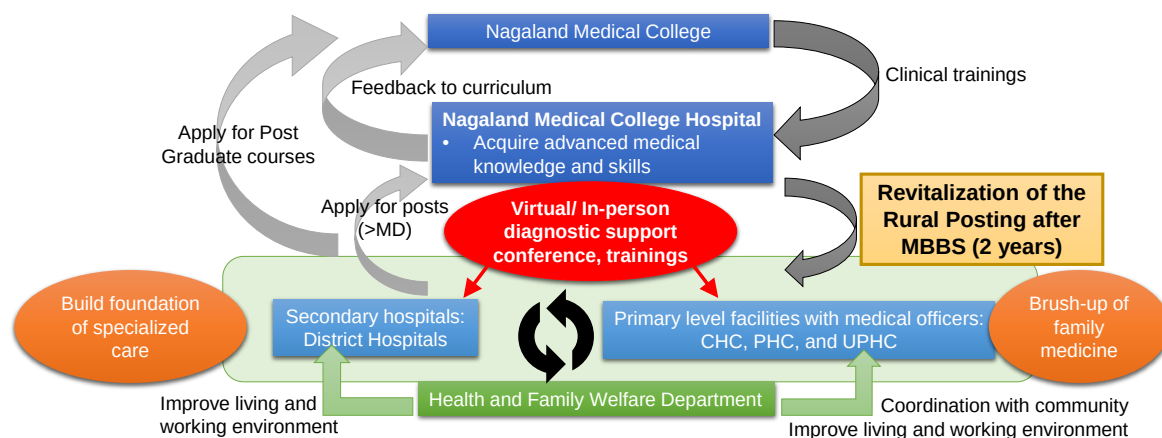


Source: JICA Survey Team

Figure 2-3 Overview of Human Resource Development Aligned with the Project

To attract such human resources, recruitment and retention strategy is quite important. According to the results of interviews with the health personnel, most of them seemed to be eager in continuing the development of their professions. Young doctors in the primary level health facilities appeared to be interested in opportunities of learning and technical support from professionals at the medical college hospital. At the same time, these could be good for health personnel working at the tertiary level as they could know the reality at the primary and secondary levels.

To respond to the above needs, it could be suggested to revitalise the rural posting system after MBBS and develop virtual and/or in-person diagnostic support between primary/ secondary health facilities and the medical college hospital as presented in Figure 2-4. Because the recruitment system of the medical college hospital is different from the primary and secondary health facilities, it is difficult to rotate the human resources from primary to tertiary. However, such exchange mechanism functions well, where medical human resources could accumulate balanced experiences from general to specialised medical care.



Source: JICA Survey Team

Figure 2-4 Proposed Human Resource Development Mechanism

2.3.1 India - Japan Medical Exchange Promotion

(1) Co-operation between India and Japan

As for India - Japan medical exchange at the national level, the “Memorandum of Cooperation between the Office of Healthcare Policy, Cabinet Secretariat, Government of Japan, the Ministry of Health, Labour and Welfare of Japan and the Ministry of Health and Family Welfare of the Republic of India in the field of Healthcare and Wellness” was exchanged in October 2018 with specific areas of cooperation including interaction of human resources in the field of emergency medical care, smooth implementation of nursing

care skills training, and upgrading of the healthcare logistics system in India. The following October 2019, the first Japan-India Joint Committee on Healthcare was held in accordance with the agreement of the memorandum of understanding (MOU).

In addition, since July 2021, a Global Health Strategy Promotion Council has been held, chaired by the Secretary General of the National Healthcare Policy Secretariat of Cabinet Office, comprising the Director-General of the International Cooperation Bureau of the Ministry of Foreign Affairs, and Director-General for Policy Coordination of Minister's Secretariat of the Ministry of Health, Labour and Welfare. The Global Health Strategy was formulated and published in May 2022.

The strategy includes prevention of public health crises including pandemics in advance, institutionalisation of a framework for collaboration between respective national finance and health authorities and relevant international organisations for rapid response in times of crisis, initiatives through international organisations, quantitative expansion and quality improvement of health ODA, strengthening cooperation with diverse stakeholders, addressing challenges surrounding global health, and promotion of bilateral cooperation. As part of bilateral cooperation, India has been selected together with Viet Nam and Ghana as one of the partnership countries. The promotion of bilateral cooperation with India is planned to be coordinated by the abovementioned Joint Committee, etc. [51] [52]

(2) Possible Potions on Medical Exchange between Japan and Nagaland

Considering these large-scale trends, the JICA Survey Team has been examining the possibilities for medical exchange between Japan and India. The JICA Survey Team held discussions with Kagawa University, which has been actively promoting international exchange such as JICA Knowledge Co-Creation Program (KCCP) training and JICA Partnership Program technical cooperation, as well as international seminars outside the JICA frame with Asian countries including India.

In the discussions, the university explained its policy on the selection of overseas partner organisations for exchange, stating that it is necessary to exchange effectively with limited human resource, and that it is considering whether it is meaningful to continue the collaboration and exchange in the future beyond the JICA scheme.

One of the advantages that the university has benefited from promoting international exchange is that while many academes basically collaborate and exchange with overseas schools in terms of research, the institution becomes one of the few universities that implements collaboration and exchange in human resource development in a distinguished way. In addition, the level of trainees participating in the training for doctors from the All India Institute of Medical Science (AIIMS), which has been conducted within the framework of JICA country-focused training course since last year, is very high, and the university has also found it a good source of stimulation and learning.

Considering medical exchanges between Nagaland and Japan, the characteristics and challenges of Nagaland and the advantages of Japan or regions in Japan, as well as the commonalities and complementary cooperation between the two, were considered. Based on the consideration, case study sharing forums and joint researches on telemedicine, joint trainings, and joint researches in the field of disaster medicine were considered as possible options. More details and institutions are described in Table 2-17.

Also, joint research with Japanese medical universities and research institutions in the field of medicine such as epidemiological research, which was requested during interviews with Japanese medical universities, can be possible. According to the local Nagaland Inservice Doctor's Association (NIDA), an organisation that supports the welfare of doctors affiliated to government institutions, doctors from Nagaland hesitate to work in university hospitals, although they are willing to do so. The background of this is that one of the requirements for establishing a career as a professor at a medical university, e.g., from assistant professor to associate professor, is the publication of a research paper according to the NMC regulations. However, due to the lack of medical colleges in Nagaland until now and the cultural lack of documentation, doctors from Nagaland who are relatively unfamiliar with writing research papers, and are expected to face with a bottleneck in publishing these papers and are therefore not expected to be promoted. In order to respond to this challenge, it is expected that joint research with Japanese medical colleges and

research institutions could match the needs for research from Japanese research institutions and the needs of doctors in Nagaland with regard to writing research papers.

In addition to medical exchange described in Table 2-17, joint research for genetic disease study and joint research for involvement of community related to tertiary level health service such as awareness raising of health check-up were raised from DHFW and NMCH.

Table 2-17 Idea for Medical Exchange between Japan and Nagaland

Field/Theme	Proposed Exchange Content and Organisation
Telemedicine	• <u>Exchange Content</u> Nagaland in its mountainous region requires improved telemedicine and promotion of its use at all levels including D2D and D2P. About telemedicine, there are university hospitals in Japan that are working on telemedicine by utilising IT equipment, etc. Case study sharing forums and joint researches to share their respective initiatives are one of the ideas. For example, in Nagaland, the telemedicine system has started to be developed, but due to some challenges such as shortages of doctors, it is not being successfully implemented. Therefore, it is possible to resolve such issues through case study-sharing forums, etc. There is also potential for Japanese companies offering telemedicine-related services to consider starting businesses in Nagaland. • <u>Organisation in Japan</u> Medical University: Universities that have experiences in telemedicine, such as those that have implemented the 2022 JICA KCCP training "Improvement of Community Health and Medical Systems with Telemedicine Services Including Pre-post COVID-19", by utilising their long-standing experience in telemedicine, and those that have implemented telemedicine support, etc., using broadband lines, telemedicine equipment, and smart phones/mobile communication networks, can be considered. Japanese Company: For example, collaboration with start-up companies that provide products and services in the field of telemedicine for ophthalmology and in the field of telemedicine for perinatal medicine, etc., is possible.
Emergency and Disaster Medicine	• <u>Exchange Content</u> Since Nagaland is an earthquake-prone region, joint trainings or joint researches in the field of disaster medicine with Japan, which is also an earthquake-prone country, is also an idea. A memorandum of understanding has already been signed between the National Institute of Disaster Management of India and the National Institute for Land and Infrastructure Management for the purpose of research on disaster prevention and mitigation against natural disasters as a bilateral initiative between India and Japan, and the two organisations have exchanged research information, exchanged researchers, and jointly organised workshops. • <u>Organisation in Japan</u> Disaster-based Hospital: The disaster-based hospitals, which have experiences in dispatching medical teams when disasters occur outside Japan, receiving visitors from abroad and conducting joint trainings, can be considered.

Source: JICA Survey Team based on [53] [54] [55] [56]

(3) Recommendations on Gender Consideration

The findings described in Section 1.1.2, confirmed that women's employment opportunities are not hindered, particularly in NHAK. Although female participation in decision-making seems to be limited in Nagaland as a whole, as represented by the fact that there is no female member of the State Legislative Assembly, in NHAK, about half of the members of the Hospital Management Committee are female, and the dean of NMCH is also a woman. Therefore, female participation in the management of NMCH can be expected. In view of the current situation and the direction of gender mainstreaming by the Government of Nagaland, it is considered effective to take into account the following points in the planning of NMCH, in addition to gender consideration regarding facilities, as discussed below in Table 2-18.

Table 2-18 Gender Consideration for NMCH

Gender Considerations
1) Ensure female participation in the Hospital Management Committee
2) Pay attention to gender balance in positions of doctors, nurses, etc., who interact with patients and provide medical care
3) Ensure equal access for men and women to training opportunities
4) Regularly review and discuss any inconveniences or barriers that patients may have in terms of gender in their NMCH visits

Source: JICA Survey Team

Chapter 3 Overview of the Project Site

3.1 Social Condition

3.1.1 Socioeconomic Activity

Nagaland consists of 11 districts, 56 health blocks, and 1,324 revenue villages that are inhabited by 16 major tribes (along with other sub-tribes). Due to political turmoil, and lack of peace and stability in the past few decades, patients requiring treatment for difficult illnesses are required to travel great distances to other places outside the state at a huge cost. This adversely affects the state's economy due to the quantum of case outflow.

The situation in the health sector is compounded by supply side constraints in the state, which largely depended on few central pools of Bachelor of Medicine and Bachelor of Surgery (MBBS)/ postgraduate seats in medical institutions outside the state. This has resulted in severe shortage of essential manpower to provide health services to the citizens of the state.

This is evident from the doctor to population ratio of the state, which is far behind other neighbouring states like Assam, Manipur, and Myanmar. Most of the neighbouring states in the North Eastern Region (NER) have made rapid strides in providing quality healthcare to the people through medical colleges and tertiary hospitals, while the state of Nagaland has lagged in this respect [22].

3.1.2 Land Acquisition Status

Land acquisition for the medical college and relevant facilities including the Project site (50.251 acres) has been already finished as of 11 July 2022 by Land Use Certificate (Table 3-1). The acquisition of surrounding greenspace regarded as buffer zone (70.274 acres) is still on the way for land registration. No dispute was recorded during acquisition. Hospital building plan was approved by Chief Engineer, Government of Nagaland in 50.251-acre area.

Table 3-1 Registration Status of the Project Site

Table 3.2 Registration Status of the Project Site						
Date of Registration	Land Area in Acres	Owner	Ownership Type	Owner Name	Land Use Permission granted to	Reference Letter
2018/3/23	40.251	Government of Nagaland	Ownership of land	Medical College Phriebagei	Nagaland Institute of Medical Sciences and Research (NIMSR) Society, Nagaland, Kohima	Land Use Certificate dated 11 Jul. 2022
2022/4/22	10.0					
	70.274	Land in the process of being acquired, and the land clearance is completed.				No. DHFW/8/33/JICA/2013-14(pt)/2700 dated 9 Feb. 2023

Source: Government of Nagaland

3.1.3 Land Use

In Nagaland, about 92% of the land is unclassified and are under community ownership, which may fall under any one of the recognised four categories: Private land, Clan land, Morung land, and Common land. The state government owns just about 7% of the total land area. (Department of Land Resources, Government of Nagaland). The land use status in Nagaland is shown in Table 3-2.

Increased privatisation and individual ownership, especially of land under permanent cultivation such as wet rice cultivation, terraced lands, orchards, gardens, tree farming, bamboo grooves, etc., are recent noticeable trends in the state. More so, these trends are seen in valley areas and lowlands than in the foothills. However, the practices and trends of land ownership differ from tribe to tribe, and these largely depend on existing traditions, availability of land, and interpersonal relationship with the traditional institutions or the headmen.

Table 3-2 Land Use Status in the State (Average of Preceding Five Years) (Area in ha.)

Sl. No.	Districts	Geographical Area	Tree Clad Area/Forest Area	Land under Non-Agricultural Use	Rainfed Area under		Permanent Pastures	Land under Miscellaneous Tree Crops and Groves	Current Fallow	Other Fallow	Net Sown Area	Net Area Sown More Than Once	Net Irrigated Area	Gross Cropped Area
					a) Cultivated	b) Cultivable Waste								
1	Wokha	162,800	82,980.58	4,863.88	13,134.33	9,291.45	NA		11,039.48	41,490.28	13,134.33		2,269.15	13,134.33
2	Longleng	58,721	23,721.40	2,545.30	8,908.10	3,869.60	NA		7,815.90	11,860.70	8,908.10		1,337.00	8,908.10
3	Tuensang	247,894	125,439.41	4,043.96	23,037.23	19,662.51	NA		12,991.18	62,719.71	23,037.23		6,476.49	23,037.23
4	Kiphire	116,185	57,352.00	2,646.00	8,960.00	1,514.00	NA		17,250.00	28,463.00	8,960.00		1,500.00	8,960.00
5	Phek	202,600	91,309.80	5,497.14	17,396.73	28,418.49	NA	59.00	14,263.94	45,654.90	17,396.73		9,441.95	17,396.73
6	Mon	178,600	90,788.30	5,501.70	32,519.10	42,676.60	NA		3,937.82	3,176.48	32,519.10		2,332.30	32,519.10
7	Zunheboto	125,500	51,035.53	4,997.14	14,178.62	11,561.54	NA		18,209.40	25,517.77	14,178.62		6,120.50	14,178.62
8	Mokokchung	161,500	57,067.11	8,992.88	12,597.94	31,558.84	NA		22,749.67	28,533.56	12,597.94		5,601.69	12,597.94
9	Dimapur	92,700	42,200.00	8,200.00	18,470.00	13,910.00	NA	5,850.00	1,670.00	2,400.00	18,470.00	2,234.00	14,635.23	20,704.00
10	Peren	179,224	88,715.04	3,789.59	14,399.79	16,965.81	NA	2,220.27	8,775.98	44,357.52	14,399.79	54.00	4,381.27	14,453.79
11	Kohima	132,176	57,123.92	4,944.02	13,346.78	22,443.85	NA	98.34	5,657.14	28,561.95	13,346.78		7,056.81	13,346.78
Nagaland		1,657,900	767,733.09	56,021.61	176,948.62	201,872.69	NA	8,227.61	124,360.51	322,735.87	176,948.62	2,288.00	61,152.39	179,236.62

* The entire area of Nagaland is under rainfed except some pockets which are irrigated. (Source: Nagaland Science & Technology Council (NASTEC))

3.2 Geological, Topographical, and Climate Conditions

3.2.1 Geography

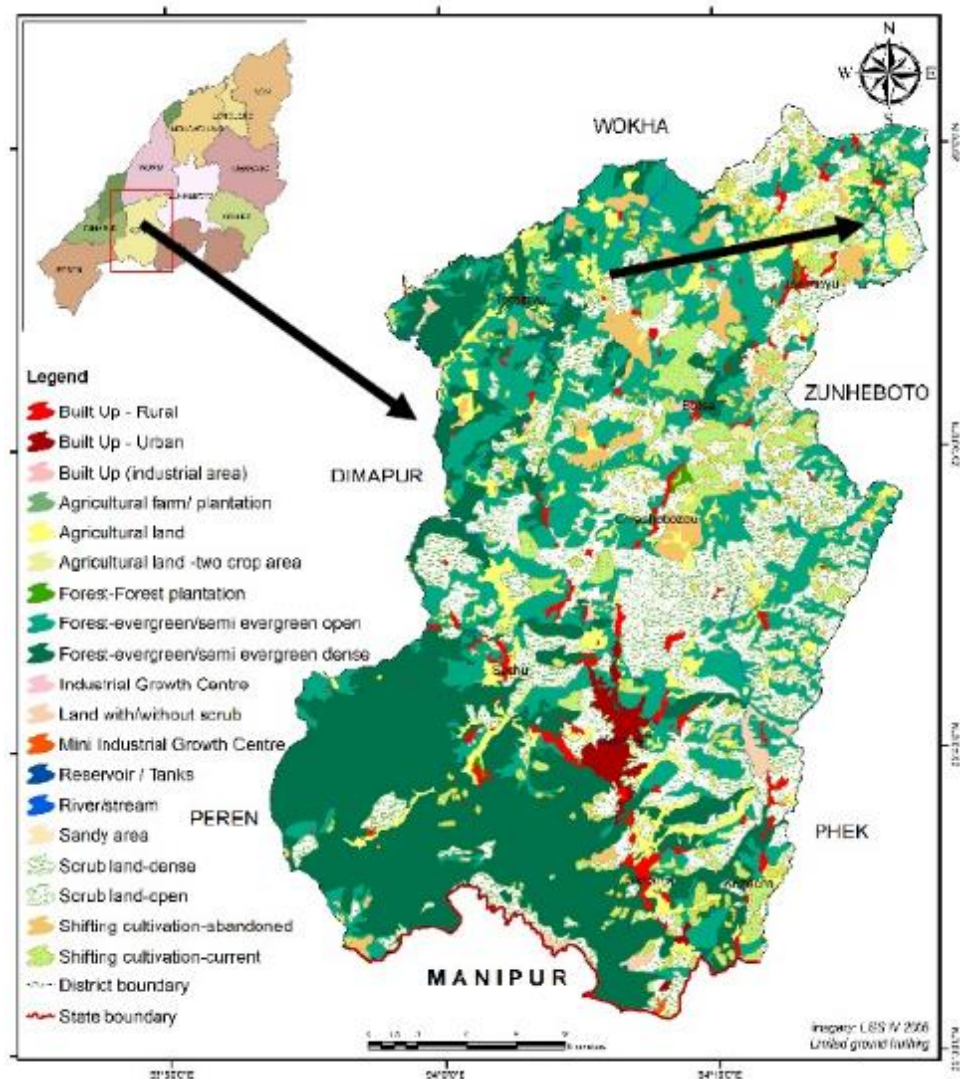
(1) General Geography

Nagaland is a hilly state located at the extreme north-eastern end of India. The state shares its boundary with Arunachal Pradesh and parts of Assam in the north, Manipur in the south, Assam in the west, and Myanmar in the east. The state covers an area of 16,527 km² and has 11 districts.

Nagaland consists of a narrow strip of hilly area running northeast to southwest. The Barail Mountain range runs from the south-west corner to the northeast direction almost up to Kohima. Near Kohima, the Barail range merges with the mountain ranges which have extended to Manipur and the main range assumes a much more northerly trend. This range is considerably higher than the Barail, with peaks like Saramati Mountain (3,826 m) and Mataung Kien Mountain (3,420 m) at its extreme east. Between Mao and Kohima, there are several very high peaks including Japvo. The north of Kohima, the main range, declines in height, and extends as far north in Mokokchung District. The Japukong range attains an average elevation of 750 m.

In general, 94% of the area is under hilly and rugged terrain and only 6% land is plain. The state has a rolling landscape with low hills.

In Kohima, the forest cover of the state is 13,345 km², which is approximately 80% of the total land, and the residential area is limited to only a few percent of the total land (Figure 3-1).

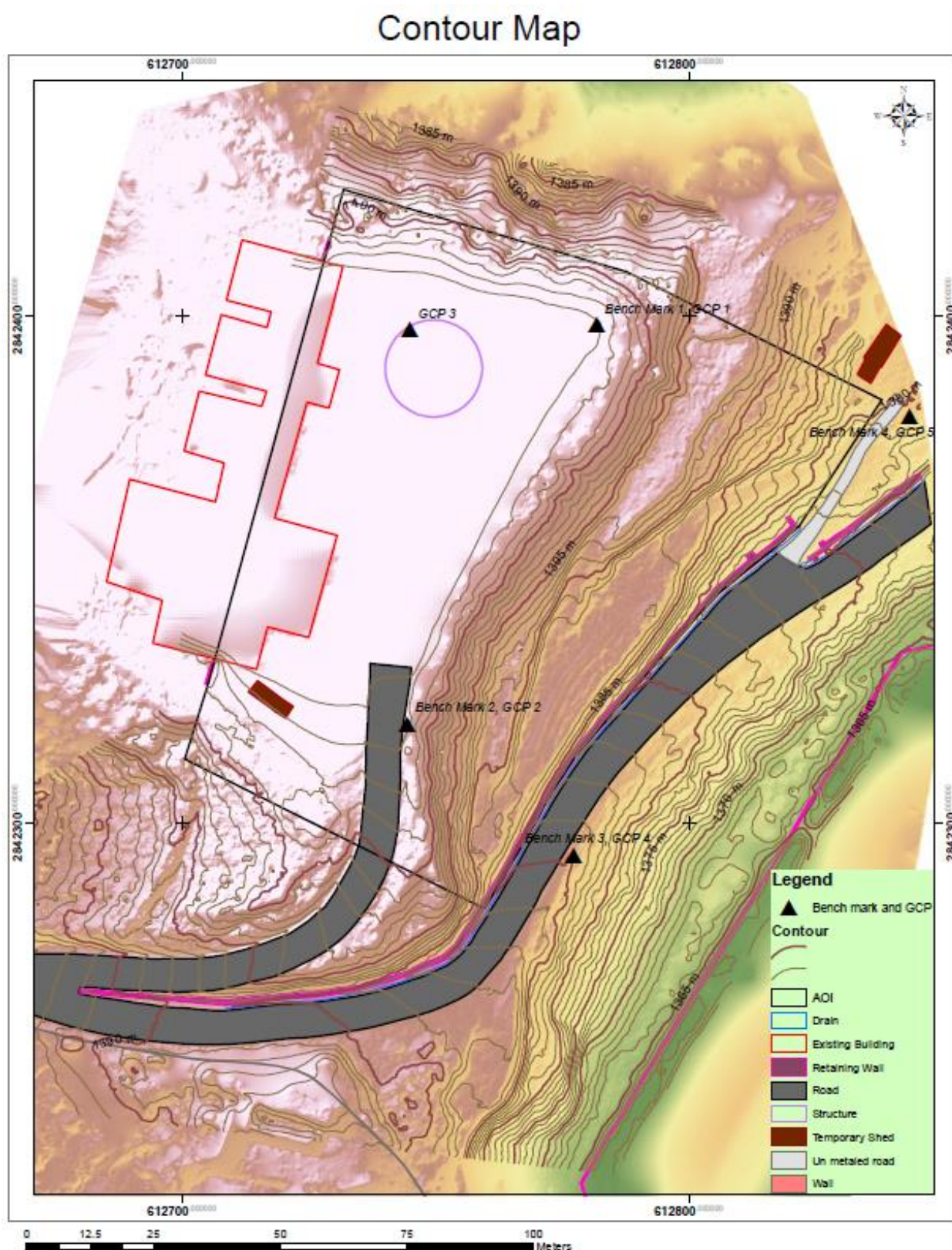


Source: [57]

Figure 3-1 Land Use Map of Kohima

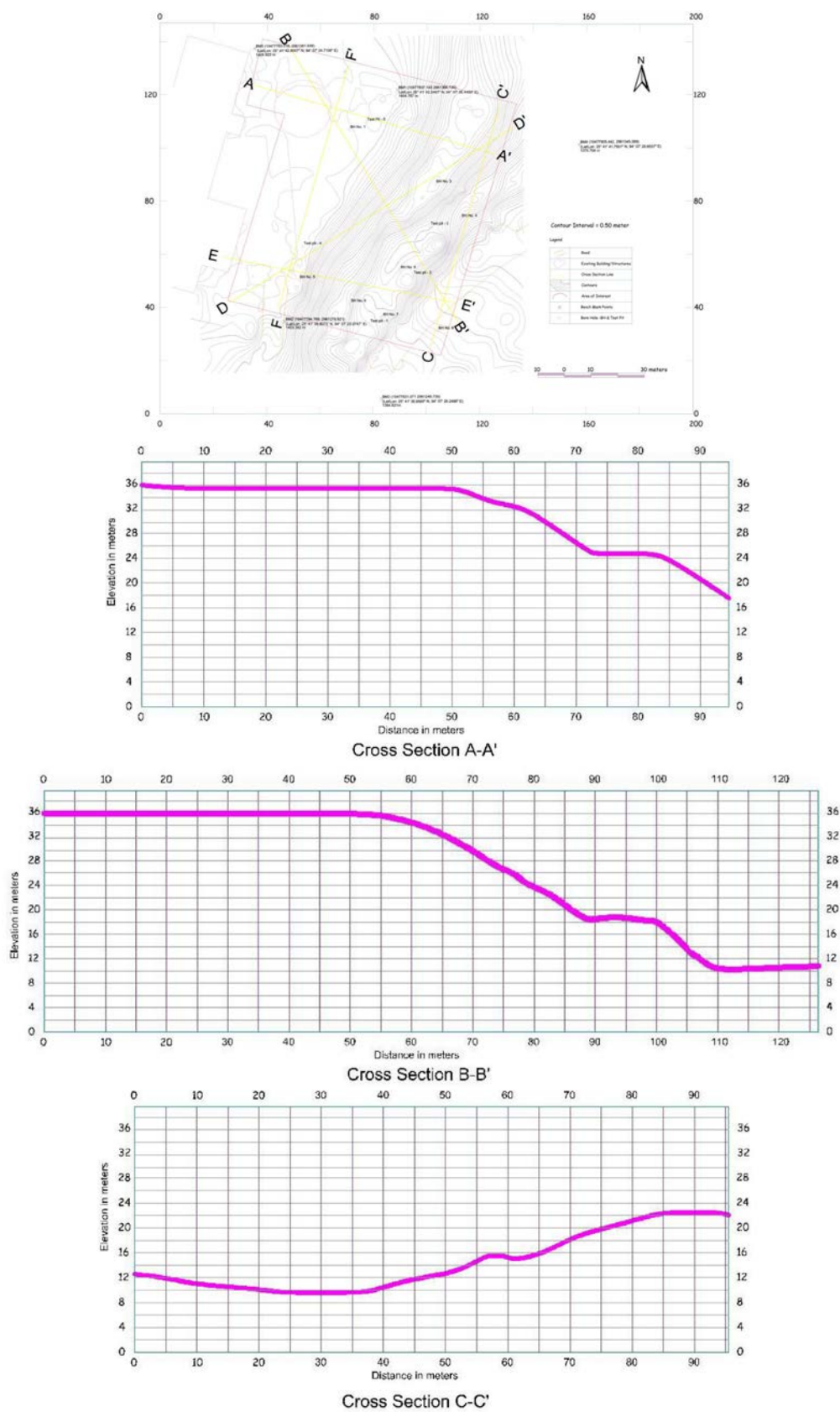
(2) Site Topography

In order to accurately determine the topography of the proposed construction site, topographic survey was conducted using a global positioning system (GPS) survey equipment and a total station. The survey area is shown in Figure 3-2 and the coverage is about 13000m². GPS surveying was carried out at 542 points, with temporally benchmarks at five locations, to produce topographic plan and cross sectional maps. In parallel with surveying, aerial photographs were taken by a drone in order to grasp the current status of the area around the planned construction site.



Source: JICA Survey Team

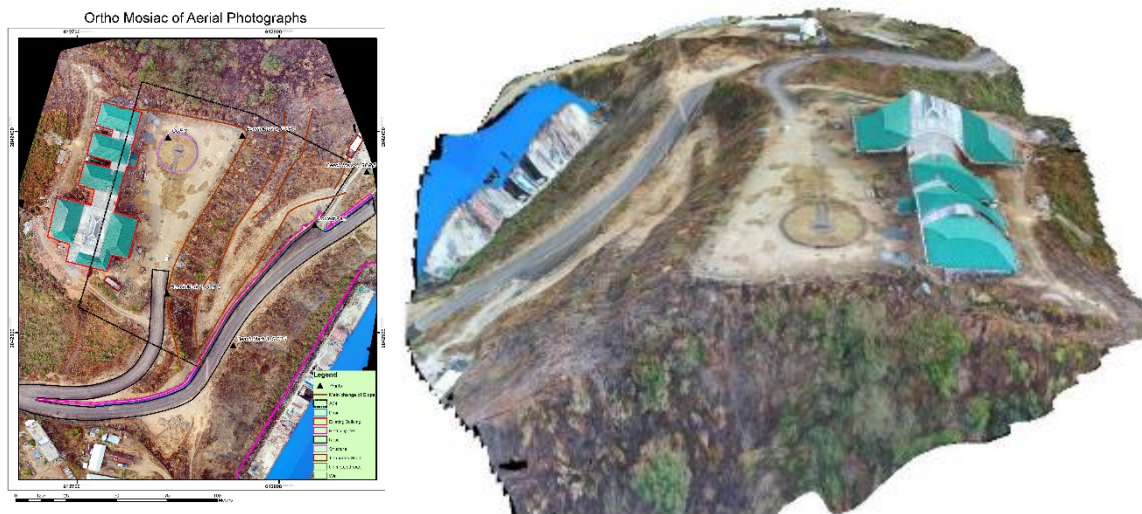
Figure 3-3 Topographic Plain Map



Source: JICA Survey Team

Figure 3-4 Topographic Cross Section Map

Aerial photographs of the area around the study site taken by drone and a bird's-eye view map created using the data obtained are shown in Figure 3-5.



Source: JICA Survey Team

Figure 3-5 Aerial Photo and Bird's Eye View

3.2.2 Geology

(1) General Geology

The cenozoic sedimentary cover in Nagaland accounts for nearly 95% of the area; whereas, the rest is being occupied by igneous and crystalline rocks of Mesozoic-Cenozoic age (Figure 3-6). The lineament shows a general trend of north-northeast and south-southwest with moderate to steep dips towards the northwest and southeast.

Based on the morphotectonic elements, the Naga Hills has been longitudinally divided, from west to east, into three distinct units, namely: the Schuppen Belt, the Inner Fold Belt, and the Ophiolite Belt.

The Schuppen Belt has been defined as a narrow linear belt of imbricate thrust slices which follows the boundary of Assam valley alluvium for a distance of 350 km along the flank of the Naga-Patkai hill ranges. It is postulated that this belt comprises eight or possibly more overthrusts along which the Naga Hills have moved north-westwards relative to the Foreland spur. Sediments ranging in age between Eocene-Oligocene and Plio-Pleistocene along with the total absence of Disang rocks together characterise the Schuppen Belt.

The Inner Fold Belt occupies the central part of Naga Hills and extends up to Pangsau Pass in Arunachal Pradesh. A large spread of Disang rocks with isolated covers of Barail as well as Disang-Barail Transition sequences characterise the geological setting of this belt. The Inner Fold Belt is occupied by two major synclinoria, namely: the Kohima synclinorium to the south and Patkai synclinorium to the north, where the Mokokchung and adjoining areas being the culmination point of the two. In Kohima synclinorium, the younger Surma rocks are developed in its core.

The northeast-southwest trending of the Ophiolite belt of Naga Hills extends along the eastern margin of Nagaland State for nearly 200 km bordering Myanmar. It is characterised by dismembered tectonic slices of serpentinites, cumulates, and volcanics. The associated pelagic sediments include mainly chert and limestones that are often interbedded with the volcanics.

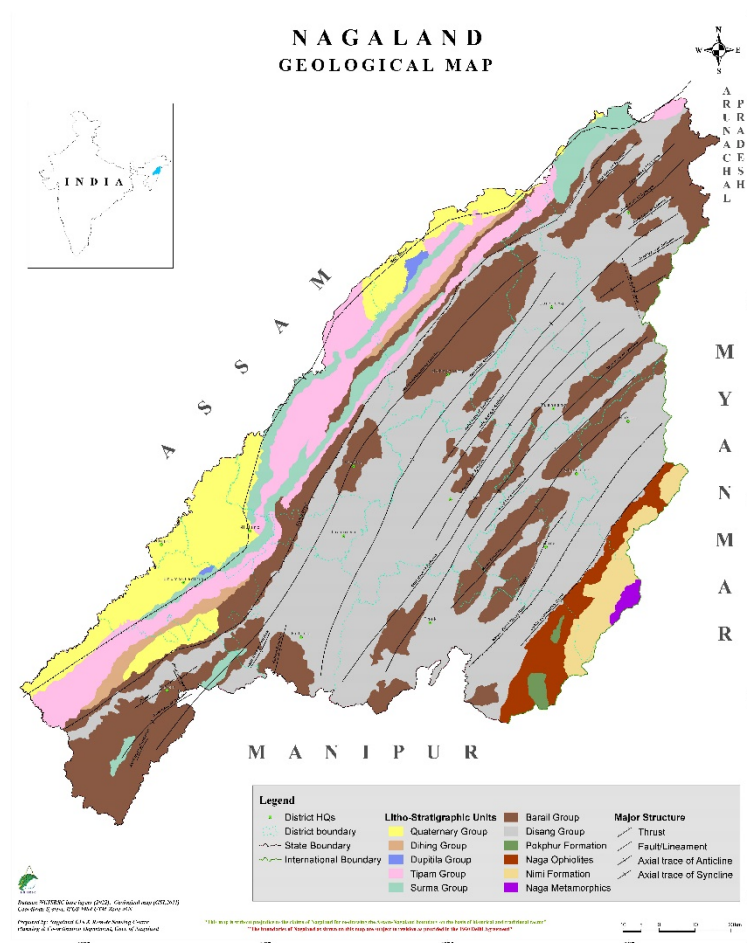
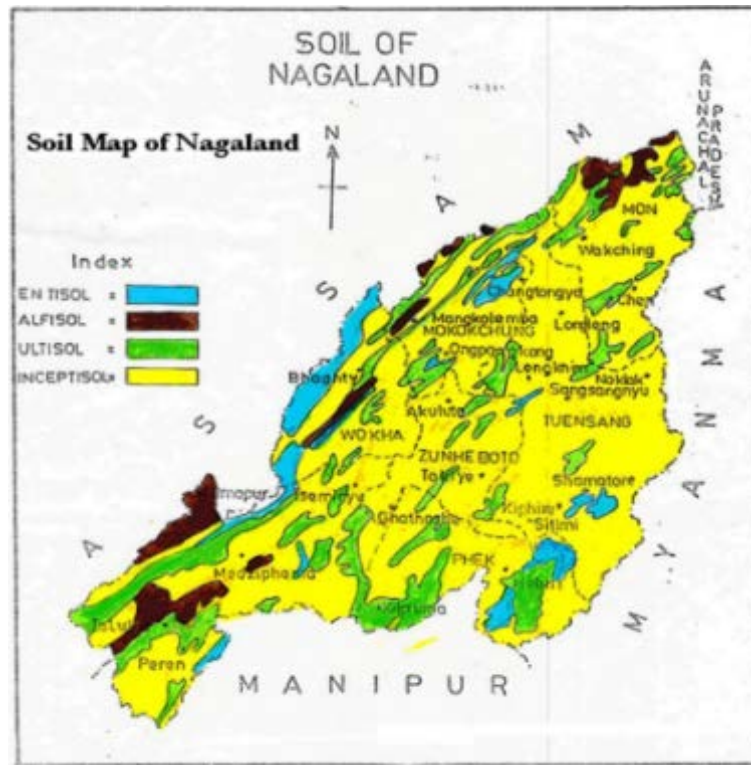


Figure 3-6 **Geological Map of Nagaland**

The soils of Nagaland belong to 4 orders, 7 sub-orders, 10 great groups, 14 sub-groups and 72 soil families. The four orders distributed in Nagaland are (i) Alfisols, (ii) Entisols, (iii) Inceptisols, and (iv) Ultisols. Inceptisols dominate the soils of the state at 66% followed by Ultisols at 23.8%, Entisols at 7.3%, and Alfisols at 2.9% of the total 16.6 million hectares of the state geographical area (Figure 3-7).



Source: Department of Soil & Water Conservation

Figure 3-7 Soil Map of Kohima

(2) Site Geology

The area around the site belongs to Disang group. The main geology is shale with some sandstone and siltstone. The outcrops of shale observed in the vicinity of the site are strongly weathered and brittle enough to be crushed by hand. The surface layer is composed of very loose soil, 2 to 5 meters thick (Figure 3-8).



Source: JICA Survey Team

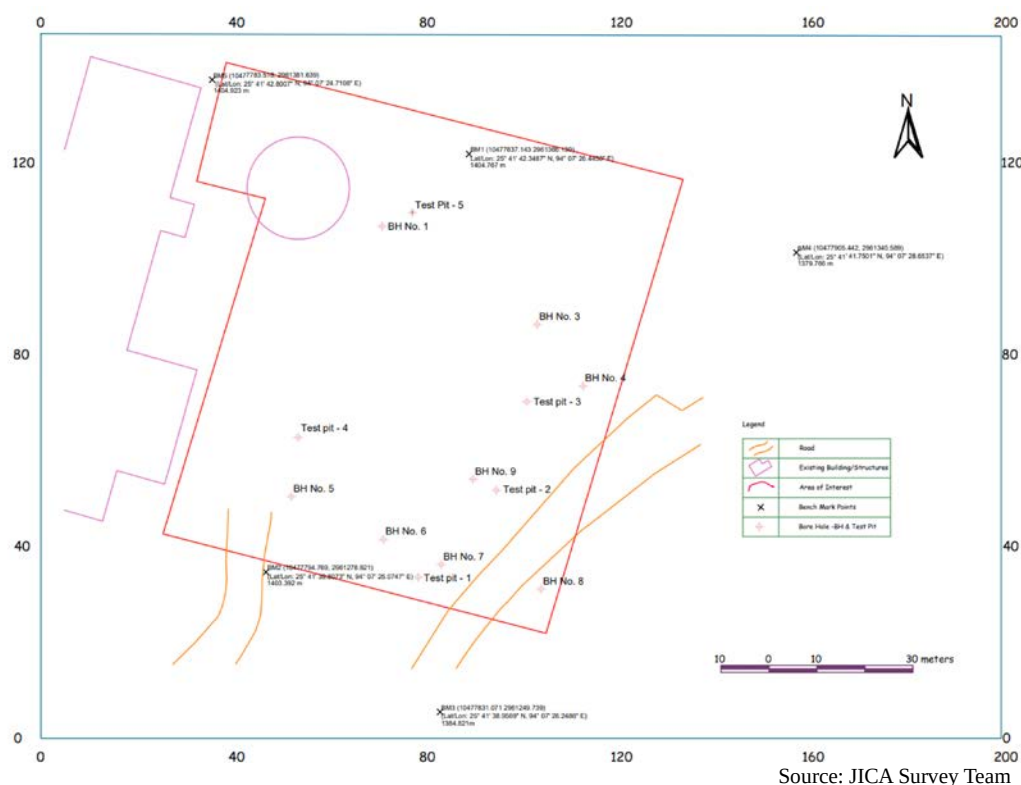
Figure 3-8 Outcrop of the Site

Boring survey and laboratory tests were conducted at the proposed hospital construction site to confirm the depth and strength of the foundation layer. The survey items are shown in Table 3-4, and the investigation locations are shown in Figure 3-9 and Table 3-5.

Table 3-4 Items of Boring Survey and Laboratory Test

Boring Survey	
Items	Quantity
Core Drilling	Total 150m
Standard Penetration Test (SPT)	150 times (every 1m)
Groundwater Monitoring	At the beginning of each day's Survey
Test Pit	
Items	Quantity
Nos.	5 pits
Dimension	2m x 2m x 2m
Purpose	Taking soil sample
Laboratory Test	
Items	Quantity
Particle size analysis by sieve and hydrometer	5 samples from Test Pit
Liquid limit, plastic limit, plastic index	5 samples from Test Pit
Specific gravity of soil	5 samples from Boring Core
Natural water content of soil	5 samples from Test Pit
Proctor compaction test	5 series from Test Pit

Source: JICA Survey Team



Source: JICA Survey Team

Figure 3-9 Location Map of Boring Survey

Table 3-5 Location of Core Drilling

Boring No.	Location	Drilling Depth (m)
1	N 25°41'41.8368" E 94°07'25.8288"	24
3	N 25°41'41.1402" E 94°07'26.9280"	20
4	N 25°41'40.7034" E 94°07'27.2544"	16
5	N 25°41'39.9198" E 94°07'25.1844"	24
6	N 25°41'39.6156" E 94°07'25.8372"	20
7	N 25°41'39.4386" E 94°07'26.2482"	16
8	N 25°41'39.2646" E 94°07'26.9556"	10
9	N 25°41'40.0422" E 94°07'26.4726"	20
Test Pit No.	Location	
1	N 25°41'39.3468" E 94°07'26.0832"	
2	N 25°41'39.9648" E 94°07'26.6382"	
3	N 25°41'40.5924" E 94°07'26.8548"	
4	N 25°41'40.3398" E 94°07'25.2324"	
5	N 25°41'41.9328" E 94°07'26.0436"	

Source: JICA Survey Team

1) Boring Survey Results

Table 3-6, Table 3-7, and Table 3-8 summarises the results of SPT and geological information at each boring site.

Table 3-6 Results of Core Drilling and SPT (1)

Boring No. 1					Boring No. 3					Boring No. 4					
Depth (m)	Geology	SPT		Converted N Value	Depth (m)	Geology	SPT		Converted N Value	Depth (m)	Geology	SPT		Converted N Value	
		N Value	Depth (m)				N Value	Depth (m)				N Value	Depth (m)		
1	Filling Sand				1	Brown to Ash Colour Clay with Weathered Shale				1	Brown Colour Clay				
2	Weathered Shale	29	1.15	29	2			12	1.15	12	2	Ash to Brown Colour Clay with Weathered Shale	14	1.15	14
3		36	2.15	36	3			24	2.15	24	3		17	2.15	17
4		91	3.15	91	4			32	3.15	32	4		24	3.15	24
5		47	3.45	94	5			70	3.45	70	5		31	3.45	31
6	Brown to Gray Colour Weathered Shale with Clay	50	4.30		6			73	4.45		6	Gray Colour Shale	73	4.45	73
7		83	5.07	108	7			82	5.45		7		55	5.45	550
8		94	6.15	141	8			76	6.43	88	8		53	6.15	227
9		103	6.38	140	9			79	7.15	76	9		55	6.18	275
10		107	7.35		10		Ash Colour Shale	70	7.45		10		52	7.07	260
11		52	8.37	780	11	Ash Colour Clay with Shale	76	8.45	70	11	53		8.06	318	
12	Gray Colour Shale with Clay	50	9.45	375	12		95	9.45	95	12	55	9.06	413		
13		55	10.15	550	13		52	10.45	312	13	51	10.00	306		
14		50	11.15	750	14		56	11.45	336	14	54	11.04	405		
15		55	12.00	330	15		57	12.05	285	15	50	12.00	500		
16		50	13.02	375	16	Ash Colour Shale	54	13.05	324	16	53	13.04	398		
17	58	14.00	348	17			52	14.06	390	17	51	15.00	510		
18	53	15.00	398	18			57	15.04	428						
19	55	16.00	550	19			53	16.03	530						
20	Gray Colour Shale with Clay	57	18.03	428	20		56	18.00	420						
21		52	19.00	520				19.04							
22		56	21.00	840											
23		58	21.02	348											
24		52	22.00	520											
		56	23.00	840											
		56	24.00												
			24.02												

Source: JICA Survey Team

Table 3-7 Results of Core Drilling and SPT (2)

Boring No. 5					Boring No. 6					Boring No. 7						
Depth (m)	Geology	SPT		Converted N Value	Depth (m)	Geology	SPT		Converted N Value	Depth (m)	Geology	SPT		Converted N Value		
		N Value	Depth (m)				N Value	Depth (m)				N Value	Depth (m)		N Value	
1	Filling Sand				1	Brown Colour Clay with Weathered Shale				1	Weathered Shale					
2	Weathered Shale with Clay	28	1.15 1.45	28	2			9	1.15 1.45	9		2		26	1.15 1.45	26
3		105	2.15 2.45	105	3			12	2.15 2.45	12		3	Brown Colour Clay with Weathered Shale	30	2.15 2.45	30
4		108	3.15 3.45	108	4			17	3.15 3.45	17		4		24	3.15 3.45	24
5		125	4.15 4.45	125	5			20	4.15 4.45	20		5		31	4.15 4.45	31
6		74	5.15 5.45	74	6		45	5.15 5.45	45	6	Ash to Brown Colour Clay with Weathered Shale	36		5.15 5.45	36	
7		83	6.15 6.45	83	7	Brown to Ash Colour Clay with Weathered Shale	52	6.15 6.45	52	7		38		6.15 6.45	38	
8		40	7.15 7.45	40	8		60	7.15 7.45	60	8		46	7.15 7.45	46		
9		47	8.15 8.45	47	9	Ash to Brown Colour Clay with Weathered Shale	64	8.15 8.45	64	9		Ash Colour Clay with Shale	105	8.15 8.35	158	
10		49	9.15 9.45	49	10		69	9.15 9.45	69	10			56	9.15 9.22	240	
11		48	10.15 10.30	96	11	Ash Colour Clay with Shale	77	10.15 10.45	77	11	58		10.15 10.20	348		
12	Weathered Shale	52	11.15 11.30	104	12	Ash Colour Shale	57	11.15 11.22	244	12	55		11.00 11.04	413		
13		40	12.15 12.45	40	13			52	12.00 12.04	390	13		58	12.00 12.04	435	
14		32	13.15 13.45	32	14			54	13.00 13.05	324	14		52	13.00 13.05	312	
15		53	14.15 14.45	53	15			55	14.00 14.04	413	15		53	14.00 14.04	398	
16		55	15.15 15.45	55	16			58	15.00 15.04	435	16	56	15.00 15.03	560		
17		Gray Colour Shale	86	16.00 16.06	430	17	Gray Colour Shale	53	16.00 16.05	318			58	16.00 16.03	580	
18	57		17.00 17.05	342	18			52	17.00 17.04	390						
19	Gray to Brown Colour Clay with Shale	52	18.00 18.05	312	19			55	18.00 18.03	550						
20		76	19.15 19.45	76	20			52	19.00 19.03	520						
21		90	20.15 20.45	90				53	20.00 20.02	795						
22		112	21.15 21.45	112												
23	Gray Colour Shale	118	22.15 22.45	118												
24		124	23.15 23.37	169												
		124	24.15 24.40	149												

Source: JICA Survey Team

Table 3-8 Results of Core Drilling and SPT (3)

Boring No. 8					Boring No. 9				
Depth (m)	Geology	SPT		Converted N Value	Depth (m)	Geology	SPT		Converted N Value
		N Value	Depth (m)				N Value	Depth (m)	
1	Brown Colour Clay with Weathered Shale				1	Brown Colour Clay			
2		34	1.15	34	2	Brown Colour Clay	11	1.15	11
3		36	2.15	36	3	with Weathered Shale	12	2.15	12
4	Ash Colour Clay with Weathered Shale	51	3.15	51	4	Ash to Brown Colour Clay with Weathered Shale	21	3.15	21
5		65	4.15	65	5		29	4.15	29
6	Ash Colour Clay with Shale	52	5.00	260	6		34	5.15	34
7		56	6.15	420	7		36	6.15	36
8		53	7.00	530	8		52	7.15	52
9		55	8.00	413	9		72	8.15	72
10		61	9.00	610	10		74	9.15	74
		50	10.00	500	11		77	10.15	77
			10.03		12		81	11.15	81
					13		Ash Colour Clay with Weathered Shale	93	12.15
					14	Ash Colour Clay with Shale	50	13.00	130
					15	Gray Colour Shale	53	14.00	199
					16		55	15.00	236
					17		53	16.00	318
					18		52	17.00	520
					19		50	18.00	750
					20		56	19.00	420
						52	20.00	520	
							20.03		

Source: JICA Survey Team

The geology of this site consists of filling material, weathered/clayed shale, and flesh shale from top to bottom. Filling material was identified at about 1 m below the surface in Boring No. 1 and No. 5, which were drilled on the flat areas at the top of the study site. Fresh shale was identified at all drilling points, with N values greater than 50, and was determined to be a foundation layer (highlighted portion in Table

3-6, Table 3-7, and Table 3-8). Photographs of core samples of the flesh shale that were determined to be the foundation layer are shown in Figure 3-10. No groundwater was confirmed in any of the boreholes.



Source: JICA Survey Team

Figure 3-10 Photos of Core Sample

The degree of hardness/softness of the soil and rock was determined by N-values as a guide for evaluating the foundation layer. Table 3-9 shows the correspondence table between the N-value and the Soil/Rock evaluation classifications in international building standards, including the Indian standard. Since N-values of 50 and 15 are the criteria for classification except for the Indian standard, this criteria of ASCE7, IBC 2009 and Eurocode 8 was used in this study.

The classification results for each drilling site are shown in Table 3-10. Class E (soft soil) is identified in the surface layer. All of the foundation layer, including the weathered shale in the upper part, is classified as Class C (soft rock), but as shown in Figure 3-10, no significant weathering is observed and the rock fragments are relatively hard (many of them show converted N values of 100 or higher) in the foundation layer, so the rock is judged to be very close to medium-hard rock (Class B).

Table 3-9 Correspondence of N-values and Soil/Rock Evaluation Classification

Site Class	Description	ASCE7	IBC 2009	Eurocode 8 ^{*1}	Indian Standards
A	Hard Rock	N/A	N/A	N/A	- *2
B	Rock	N/A	N/A	N/A	- *2
C	Very dense soil and soft rock	> 50	> 50	> 50	> 30
D	Dense to medium soil	15 - 50	15 - 50	15 - 50	10 - 30
E	Medium to soft soil	< 15	< 15	< 15	< 10

N/A: Not applicable

*1: The site classes B, C, D, E in this table correspond to site classes A, B, C, D as per Eurocode 8

*2: Not mentioned

Source: JICA Survey Team

Table 3-10 Results of Soil/Rock Classification

Boring No.1		Boring No.3		Boring No.4		Boring No.5	
Depth	Class	Depth	Class	Depth	Class	Depth	Class
0m ~ 1m	E	0m ~ 2m	E	0m ~ 1m	E	0m ~ 1m	E
1m ~ 3m	D	2m ~ 5m	D	1m ~ 5m	D	1m ~ 2m	D
3m ~ 10m	C	5m ~ 9m	C	5m ~ 16m	C	2m ~ 7m	C
10m ~ 24m	C	9m ~ 20m	C			7m ~ 10m	D
						10m ~ 12m	C
						12m ~ 14m	D
						14m ~ 16m	C
						16m ~ 24m	C
Boring No.6		Boring No.7		Boring No.8		Boring No.9	
Depth	Class	Depth	Class	Depth	Class	Depth	Class
0m ~ 3m	E	0m ~ 1m	E	0m ~ 4m	D	0m ~ 3m	E
3m ~ 6m	D	1m ~ 8m	D	4m ~ 5m	C	3m ~ 7m	D
6m ~ 11m	C	8m ~ 16m	C	5m ~ 10m	C	7m ~ 13m	C
11m ~ 20m	C					13m ~ 20m	C

* The orange shaded cell corresponds to the foundation layer.

Source: JICA Survey Team

2) Laboratory Test Results

The results of various laboratory tests at each borehole and test pit are shown in Table 3-11, Table 3-12, Table 3-13, and Table 3-14.

Table 3-11 Results of Laboratory Test for Boring Core Sample (1)

Boring No. 1					Boring No. 3					Boring No. 4				
Depth (m)	Geology	Field Density (g/cm3)	Specific Gravity	Uniaxial Compressive Strength (Mpa)	Depth (m)	Geology	Field Density (g/cm3)	Specific Gravity	Uniaxial Compressive Strength (Mpa)	Depth (m)	Geology	Field Density (g/cm3)	Specific Gravity	Uniaxial Compressive Strength (Mpa)
1	Filling Sand				1					1	Brown Colour Clay	1.78	2.66	
2					2					2		1.89	2.64	
3	Weathered Shale	2.47	2.70		3		1.98	2.74	1.77	3	Ash to Brown Colour Clay with Weathered Shale			
4					4	Brown to Ash Colour Clay with Weathered Shale				4				
5		2.52	2.77		5					5		2.12	2.65	2.14
6					6					6				
7	Brown to Gray Colour Weathered Shale with Clay				7					7				
8					8					8				
9					9					9				
10					10	Ash Colour Shale	2.48	2.76	4.31	10		2.62	2.83	5.28
11					11	Ash Colour Clay with Shale				11	Gray Colour Shale			
12					12					12				
13	Gray Colour Shale with Clay	2.67	2.79	1.02	13		2.71	2.88	6.22	13				
14					14					14				
15					15					15				
16					16	Ash Colour Shale				16				
17					17									
18					18									
19		2.71	2.77	6	19									
20	Gray Colour Shale with Clay				20									
21														
22														
23														
24														

Source: JICA Survey Team

Table 3-12 Results of Laboratory Test for Boring Core Sample (2)

Boring No. 5					Boring No. 6					Boring No. 7				
Depth (m)	Geology	Field Density (g/cm3)	Specific Gravity	Uniaxial Compressive Strength (Mpa)	Depth (m)	Geology	Field Density (g/cm3)	Specific Gravity	Uniaxial Compressive Strength (Mpa)	Depth (m)	Geology	Field Density (g/cm3)	Specific Gravity	Uniaxial Compressive Strength (Mpa)
1	Filling Sand				1	Brown Colour Clay with Weathered Shale				1	Weathered Shale	2.26	2.64	
2					2					2	Brown Colour Clay with Weathered Shale			
3		2.04	2.64		3		2.27	2.69	2.91	3				
4					4					4				
5		2.02	2.65		5		2.41	2.77	3.02	5		2.53	2.68	2.68
6		Weathered Shale with Clay				6				6	Ash to Brown Colour Clay with Weathered Shale			
7					7	Brown to Ash Colour Clay with Weathered Shale			7					
8	2.57		2.70	8.82	8				8					
9					9	Ash to Brown Colour Clay with Weathered Shale				9				
10					10	Shale	2.39	2.78	4.44	10		2.28	2.81	3.62
11				11	Ash Colour Clay with Shale				11					
12	Weathered Shale	2.6	2.70		12	Ash Colour Shale				12	Ash Colour Clay with Shale	2.41	2.73	3.78
13					13					13				
14					14					14				
15					15					15				
16		2.7	2.90	5.44	16					16				
17	Gray Colour Shale				17	Gray Colour Shale								
18					18									
19					19									
20	Gray to Brown Colour Clay with Shale				20									
21														
22														
23	Gray Colour Shale													
24														

Source: JICA Survey Team

Table 3-13 Results of Laboratory Test for Boring Core Sample (3)

Boring No. 8					Boring No. 9				
Depth (m)	Geology	Field Density (g/cm3)	Specific Gravity	Uniaxial Compressive Strength (Mpa)	Depth (m)	Geology	Field Density (g/cm3)	Specific Gravity	Uniaxial Compressive Strength (Mpa)
1	Brown Colour Clay				1	Brown Colour Clay	1.89	2.60	
2	with Weathered Shale	2.44	2.56	9.1	2	Brown Colour Clay			
3					3	with Weathered Shale	2.01	2.69	1.98
4	Ash Colour Clay with Weathered Shale				4				
5		2.41	2.78	4.61	5				
6					6		2.26	2.76	3.07
7					7	Ash to Brown Colour Clay with Weathered Shale			
8					8				
9					9				
10		2.55	2.89	4.38	10		2.28	2.69	3.41
					11				
					12				
					13	Ash Colour Clay with Weathered Shale	2.34	2.63	2.91
					14	Ash Colour Clay with Shale			
					15				
					16		2.78	2.85	2.44
					17	Gray Colour Shale			
					18				
					19				
					20				

Source: JICA Survey Team

Table 3-14 Results of Laboratory Test for Test Pit Samples

Test Pit No.	Particle Size			Natural Water Content (%)	Atterberg Limit		Proctor Test	
	Gravel (%)	Sand (%)	Silt&Clay(%)		Liquid (%)	Plastic (%)	MDD(g/cm3)	OMC (%)
1	1.74	15.08	83.18	18.40	43.34	12.73	1.67	21.15
2	9.64	21.44	68.92	23.31	45.27	9.02	1.63	21.19
3	13.08	31.48	55.43	17.35	29.41	4.95	1.89	15.82
4	14.62	17.9	67.48	29.44	36.95	1.61	1.61	23.11
5	7.4	25.75	66.85	13.84	31.77	6.53	1.88	13.97

Source: JICA Survey Team

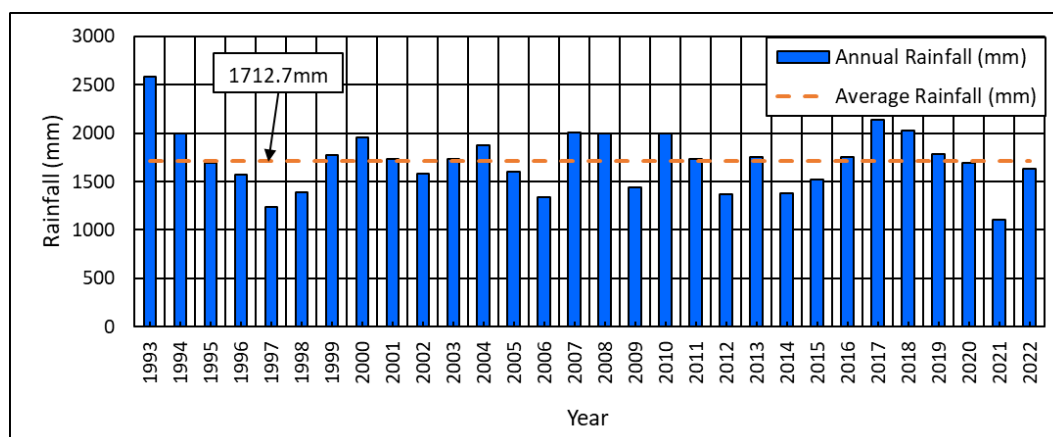
3.2.3 Climate

There is one meteorological station in Kohima that is managed by the Directorate of Soil and Water Conservation, Government of Nagaland. The precipitation, temperature, and wind speed measured at this station are described below.

(1) Rainfall

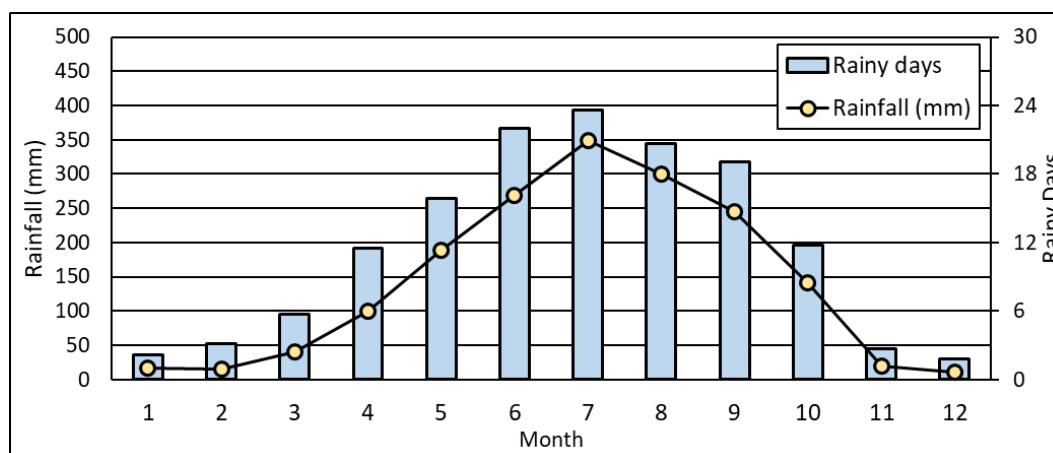
Annual rainfall over the past 30 years is shown in Figure 3-11. The year with the highest rainfall is 1993 (2,579 mm), while the year with the lowest rainfall is 2021 (1,101 mm), and the average rainfall is 1712.7 mm in these 30 years.

Monthly rainfall and rainy days averages for the past 20 years are shown in Figure 3-12. The climate of Nagaland is typical of a tropical country with heavy rainfall. Rainfall is high during the monsoon from April to October. Also, the period from June to September counts more than half a month of rainfall days.



Source: Department of Soil & Water Conservation

Figure 3-11 Annual Rainfall of Kohima



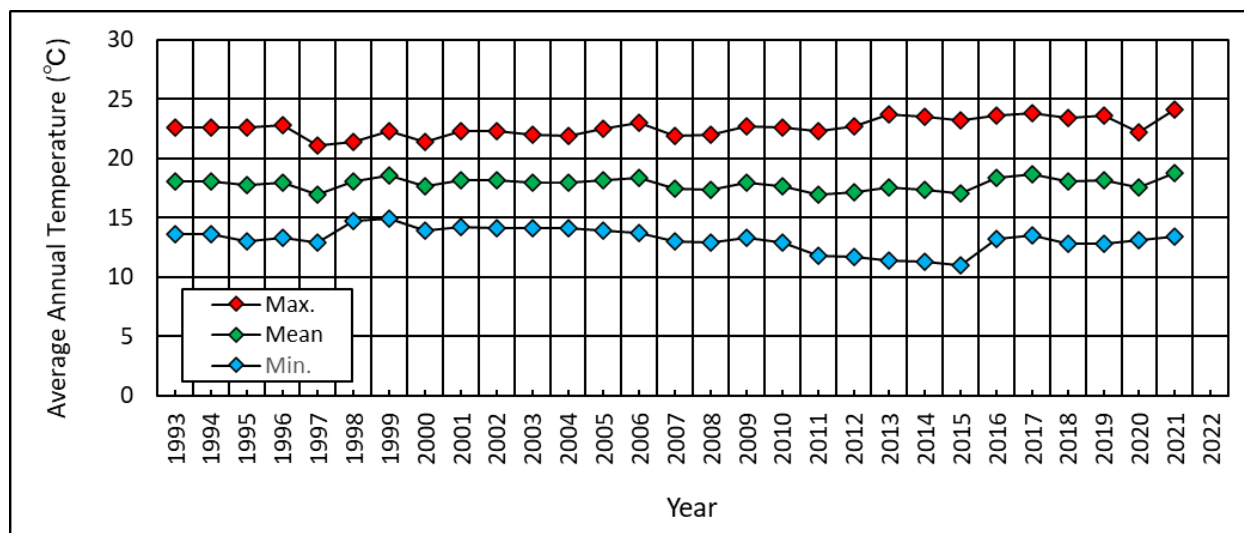
Source: Department of Soil & Water Conservation

Figure 3-12 Monthly Rainfall and Rainy Days of Kohima

(2) Temperature

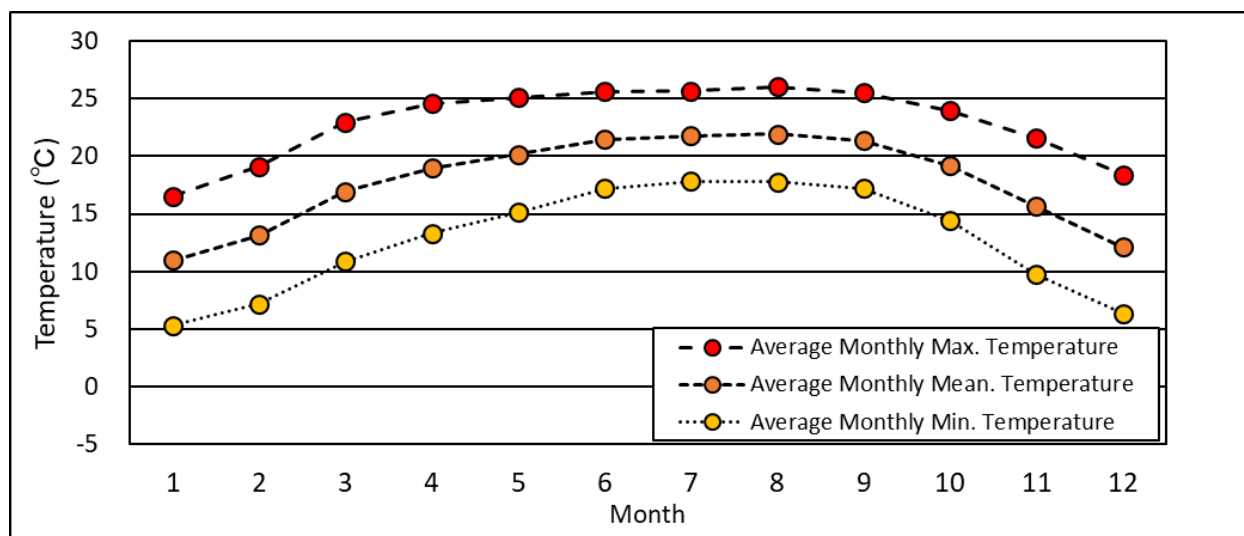
Average annual temperature over the past 30 years is shown in Figure 3-13. The maximum temperature is ranging between 20 °C to 25 °C and minimum temperature is ranging between 10 °C to 15 °C, respectively. The mean temperature is almost unchanged and is about 18 °C.

Average monthly temperature for the past 20 years is shown in Figure 3-14. The maximum temperature exceeds 25 °C during the monsoon from May to September. In general, the climatic condition of the state is cool and bracing.



Source: Department of Soil & Water Conservation

Figure 3-13 Annual Temperature of Kohima

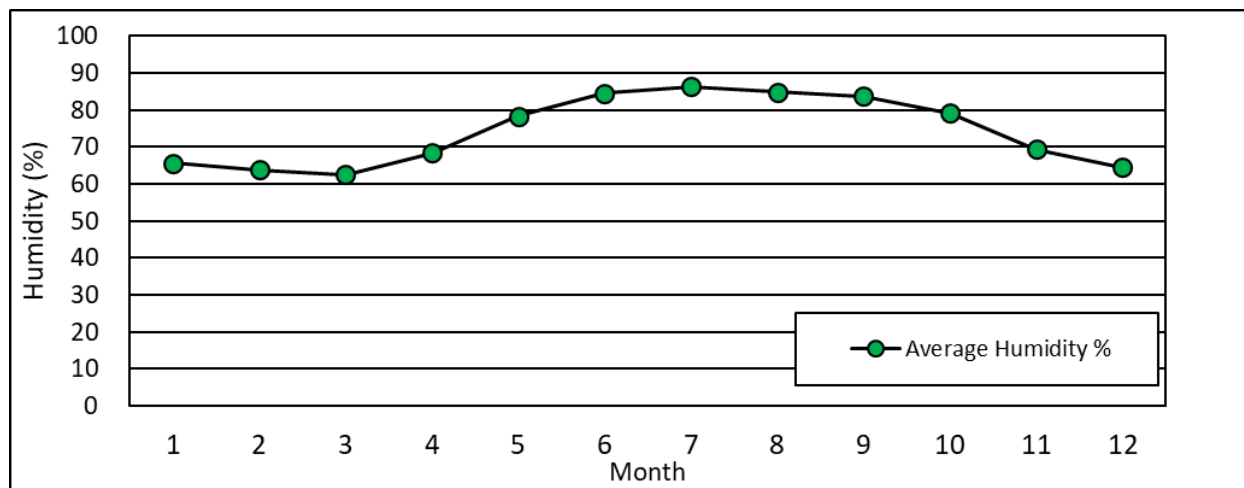


Source: Department of Soil & Water Conservation

Figure 3-14 Monthly Temperature of Kohima

(3) Humidity

Average monthly humidity for the past 20 years are shown in Figure 3-15. The humidity exceeds 80% from June to September. The month with the lowest humidity is March, but it is above 60%.

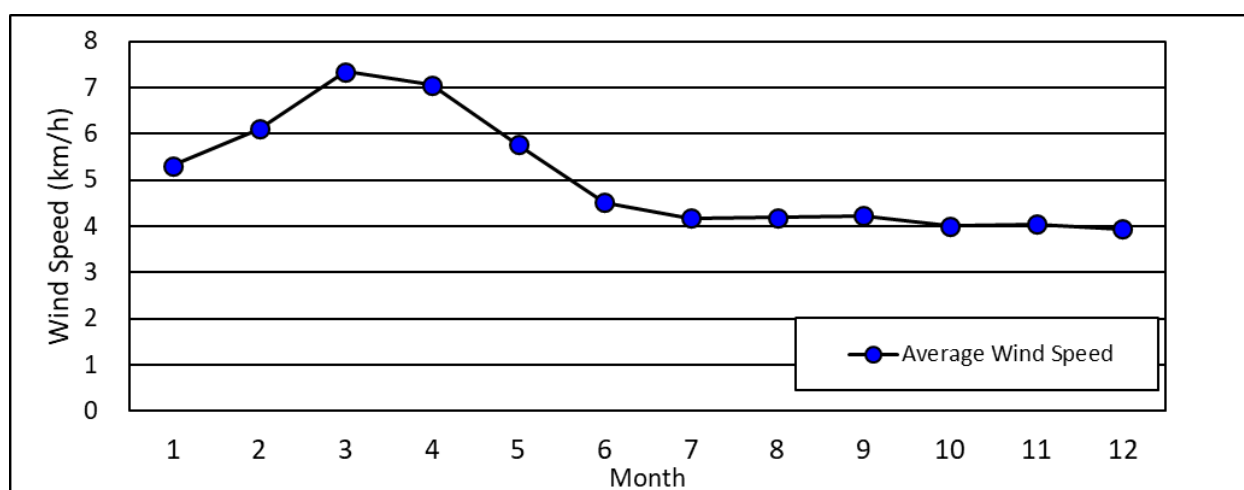


Source: Department of Soil & Water Conservation

Figure 3-15 Monthly Humidity of Kohima

(4) Wind Speed

Average monthly wind speed for the past 20 years are shown in Figure 3-16. The season with the highest wind speeds is from March to April, with average wind speeds exceeding 7 km/h. From June to December, average wind speeds are low, around 4 km/h. As the proposed site is in a highland area, there is a slight risk of building swaying and damage from strong winds in the case of high-rise buildings.



Source: Department of Soil & Water Conservation

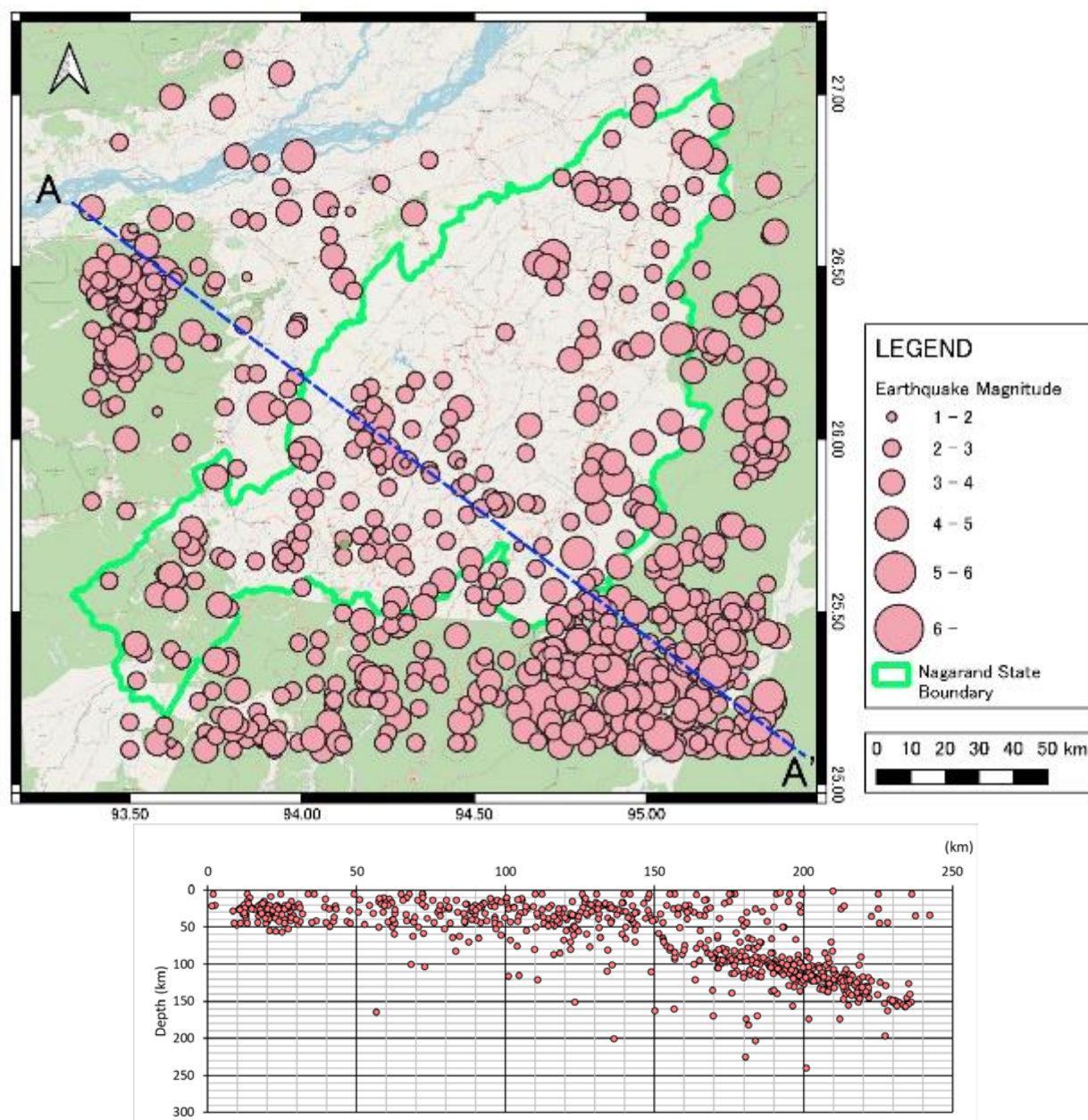
Figure 3-16 Monthly Wind Speed of Kohima

3.2.4 Natural Disaster

(1) Earthquake

The seven NER states including Nagaland is considered as one of the major earthquake-prone belts in the world. Nagaland lies in seismic zone V which falls under a very high damage risk zone. The natural tectonic setting makes Nagaland prone to earthquakes resulting to loss of life and properties.

Figure 3-17 shows the distribution map and depth distribution (A-A' section in Figure 3-17) of earthquake epicentre that have occurred in and around Nagaland since 2007. During this period, two earthquakes of magnitude six or greater occurred in November 2011 and September 2013, both located around the Myanmar border. The depths of the earthquakes in the NER state are concentrated at depths shallower than 50 km, and the earthquakes are caused by active fault movement in the crust. On the other hand, in Myanmar side, the depth of the earthquakes gradually deepens from the Myanmar border to the south, suggesting that the earthquakes were caused by plate movement.



Source: Nagaland State Disaster Management Authority (NSDMA)

Figure 3-17 Distribution of Epicentres in and around Nagaland Since 2007

Many moderate to large magnitude earthquakes have occurred within the state boundaries as well as within a range of 100 km around it. Altogether, 12 major earthquakes have occurred in the region in the last 100 years of which the epicentre of the 1950 Great Earthquake was located only 7 km towards the north of Mon, a district headquarter located about 200 km north of the capital town of Kohima. The shock lasted eight minutes causing 1,500 deaths, destruction of 2,000 houses and other structures while rendering rail and road connectivity useless. One of the most notable earthquakes, which had its impact in Nagaland, was the Great Shillong Earthquake on 12 June 1897 that left over 1,600 people dead.

(2) Landslide

Landslide is a major disaster that keeps affecting Nagaland especially in the monsoon when heavy down pour is experienced all over Nagaland.

Much of the state is very hilly comprising steep slopes and high relief. It is predominantly made up of shales and sandstones in various combinations. The shales are sheared, fractured, crumpled, and weathered to various extents. Such shale and sandstone areas are known for rock falls and debris slides.

The most tragic landslide that affected Nagaland in the past was the 26 May 2005 Landslide that occurred in Mokokchung Town. In this pre-dawn landslide, 14 people were buried alive, and injuries and damage to property was extensive.

On 17 October 2007-about 150 metres of the National Highway 39 near Kiruphema went down almost 400 metres. This resulted in complete blockade of the highway for two days.

In July 2018, major road lifelines were cut-off by massive landslides in Kohima when NH-29, also connecting Manipur, was cut off putting the survival of the two states at stake. A school in Kohima was also affected by massive sinking of land, which led to the evacuation and shifting of the primary campus located 2 km away. Incessant rains have also triggered massive landslides at Pezielietse Colony in Kohima damaging at least 42 houses and affecting more than 40 families.

In July 2018, a road was cut off at Sidzu River in the district of Phek due to a major landslide from the upstream coming from an artificial dam and disrupted the downstream including roads and paddy fields because of uncontrolled release of water from the artificial dam. Major landslides have also occurred in Chozuba to Kohima via Khusoh, about 13 km from Chozuba Town, which have been totally cut off the road. The NH-39 is snapped by a deep and wide landslide at the NMCK dumping area. The once sinking zone has now become a valley, stretching from above the road to the river below in a stretch of about a kilometre. The NH-39, afflicted with numerous other landslides, is only a sample. There are reports that almost all roads connecting the different areas of Nagaland are under peril.

A list of the most recent landslides that occurred within the Kohima is shown in Table 3-15, and the location map of the landslides is shown in Figure 3-18. Some of the landslides occurred more than once in the same location. Landslides have also occurred along the access road to the hospital construction site.

Table 3-15 List of Landslide Occurred in Kohima

Name	Year of Occurrence	Damage
Paramedical Landslide	2002, 2018	Road and settlements above the road
Local Taxi Stand Landslide	2018	Houses and roads
Pezielietse Landslide	1996, 2010, 2018	5 houses and roads
Upper Bayavu Landslide	2017	House and roads
GREF Camp, High School Colony	2017, 2018	6 houses, 15 kutcha houses, roads
High School Colony Landslide	2004, 2017	16 houses
Perizie Colony	2018, 2019	37 kutcha houses
Secretariat BSF Camp	2018	1 RCC building /agri land
Sect-BSF Camp Road	2017	State highway
Midland Colony Landslide	2015	1 kutcha house
Merhulietse Colony Landslide	2018	2 RCC buildings / Church

Source: NSDMA

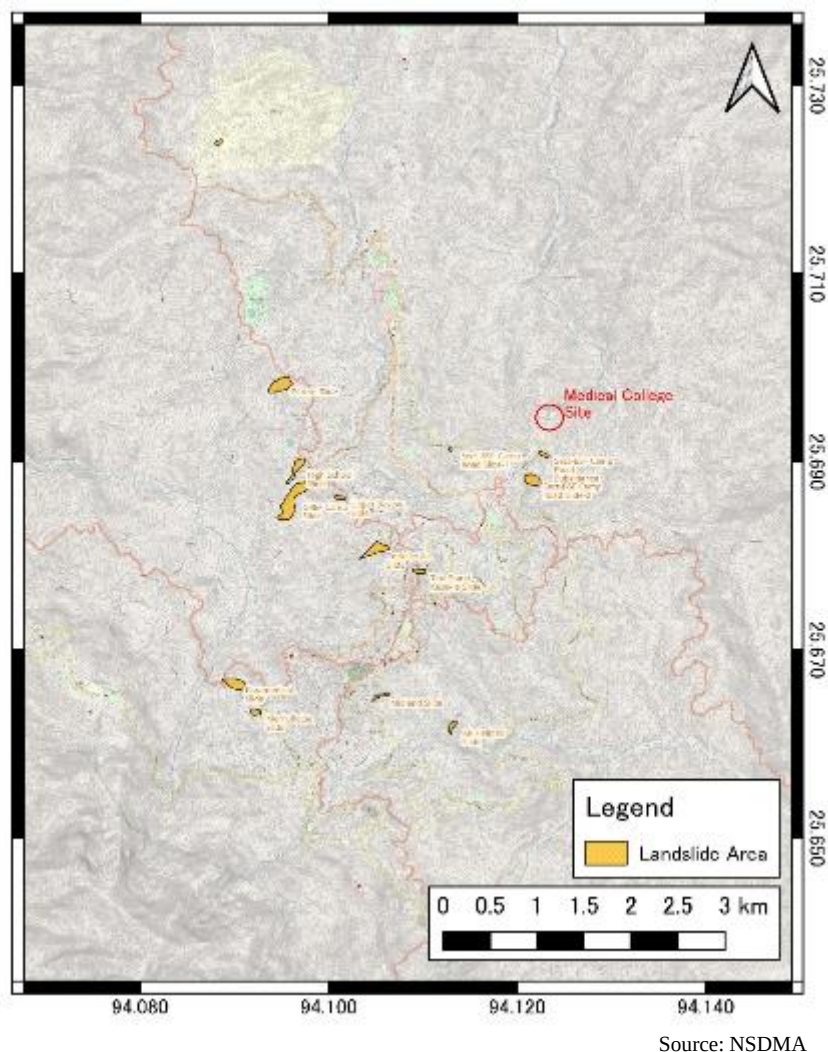


Figure 3-18 Landslide Occurrence Area in Kohima

(3) Flood

Flood affects all low-lying areas of Nagaland bordering Assam.

In the year 2005, the township of Tuli and the adjoining areas were very badly affected by flood. This left the area marooned for many days.

The different colonies of Dimapur Town remained submerged from 11 to 24 September 2008. This includes Dobhinalla, supermarket, Nagarjan, Burma Camp, Walford, Sachu Colony, Nagagaon, Kharmahal, Netaji Colony, Naharbari, and the airport areas. Examinations that were going on during this time were badly affected.

Due to the non-stop rain, which was recorded from 1 to 3 August 2018 (492 mm rainfall), floods affected parts of Dimapur which disrupted normal activities. The flood also caused a casualty in Dimapur (1 dead) at Netaji Colony. Heavy rains eroded the soil, which destroyed properties, houses, and cultivated areas in parts of Dimapur. Many roads within the city of Dimapur and the surrounding areas in the district were severely damaged.

(4) Heavy Rainfall / Windstorm

Windstorm/heavy rainfall is a major disaster that keeps affecting Nagaland especially during the monsoon.

A total of 3,759 houses were damaged during the year 2016 that ravaged different parts of Nagaland. In Mokokchung District, hailstorm/windstorm incidents caused damages to 1,382 houses. In Longleng District, hailstorm incidents affected 34 villages from five circles, namely: Yachem, Sakshi, Yongnyah, Sadar, and

Longleng. There were also recorded damages to infrastructure and plantations. In Kohima, heavy rainfall accompanied by strong winds damaged six houses in Chiechema and Phezha under Kohima District besides damaging electrical post, power lines, uprooting trees along the NH-2, and even the rooftop of two houses were also blown away.

In July 2018, Kiphire District became inaccessible to the rest of the state after all roads leading to the district were completely cut off in multiple locations owing to incessant rains.

(5) Drought

In 2009, Nagaland faced a drought like situation in three districts of the state, namely: (Peren, Dimapur, and Mon). Jalukie Valley in Peren District has been very badly affected by drought this year. Huge areas of paddy cultivable land have been left because of shortage of water.

The city of Kohima is experiencing a drought in 2020. The drought affected 75 villages and 3,213 farmers, with an impact area of 813.8 ha.

3.3 Current Situation

3.3.1 The Site

The project site is in the north of Kohima City and is hilly. Several buildings are scattered throughout the site, most of which are still under construction when the JICA Survey Team visited the site in September 2022 (Figure 3-19).



Source: JICA Survey Team

Figure 3-19 Existing Buildings in the Compound

Table 3-16 summarises the construction work progress received from the Medical Engineering Division-Department of Health and Family Welfare (DHFV) at the end of March 2023.

Table 3-16 Latest Physical Progress Report for Nagaland Medical College Kohima

S.No.	Scope of Work in Physical Terms	Physical Achievement	Date of Commencement of Work	Target Date for Completion of Work
1	Medical College Building	90%	Dec-18	May-23
2	Existing Mother and Child Hospital	85%	Dec-18	May-23
3	Boys and Girls Hostel	70%	Dec-18	Apr-23
4	Sports Complex	95%	Dec-18	Nov-22
5	M.S. Residence	95%	Dec-18	Nov-22
6	Dean Residence	95%	Dec-18	Nov-22
7	100-sqm Apartment (four blocks)	95%	Dec-18	Nov-22
8	200-sqm Apartment	45%	Dec-18	To be decided
9	Library and Lecture Theatre	20%	Dec-18	To be decided
10	External Electrification (Power Department)	0%	Dec-18	To be decided
11	External Water Supply (Public Health Engineering Department)	0%	Dec-18	To be decided

Source: Medical Engineering, Division-Health & Family Welfare Department, Nagaland

3.3.2 Existing Buildings

(1) Medical College Building

As per the data collected from the DHFW, 90% of the work is completed (Table 3-17). The target date for completion is in May 2023, and the probability of meeting the target date as observed after the physical survey is very low. This building shall contain administrative and academic functions.

Table 3-17 Work Status - As per Physical Survey (Medical College Building)

Civil (External and Internal)	Internal Finishes	Services			Other work
		HVAC	Electrical	Plumbing	
Work is in progress. The deadline is at the end of March 2023.	95% of flooring and painting work is done	No work is done	85% of electrification work is done	95% of plumbing work is done	Lift is not yet installed
			Two 250 KVA transformers are to be installed soon.	Fire hydrant system is installed.	

Source: JICA Survey Team

According to the drawing obtained, the building is G + 3 floors. The building function is shown in Table 3-18.

Table 3-18 Medical College Building Functions

Floors	Departments
3F	Pharmacology, Forensic Medicine
2F	Community Medicine, Microbiology
1F	Pathology, Physiology
GF	Anatomy, Bio-chemistry

Source: JICA Survey Team



View from the West



Internal Work



Close View



Internal Work

Source: JICA Survey Team

Photo 3-1 Medical College Building

(2) Boys and Girls Hostel

As per the data collected from the DHFW, 70% of the work is completed (Table 3-19) and the target date for completion is in April 2023. However, the probability of meeting its target date as observed after physical survey is very low. This is the hostel building for students necessary at the time the medical hospital is in operation.

According to the drawing obtained, the building is G + 4 floors. One bedroom is shared by two students, and the number of beds can be counted as 224 based on the drawings.

Table 3-19 Work Status - As per Physical Survey (Boys and Girls Hostel)

Civil (External and Internal)	Internal Finishes	Services			Other Work
		HVAC	Electrical	Plumbing	
Front side of painting work is done. Back side of plastering work is yet to be done.	90% of flooring and painting work is done.	No work done	85% of electrification work is done.	Fire hydrant system is not yet installed.	

Source: JICA Survey Team



Exterior View



Exterior View

Source: JICA Survey Team

Photo 3-2 Boys and Girls Hostel

(3) Sports Complex

As per the data collected from the DHFW, 95% of the work is completed (Table 3-20) and the target date for completion was in November 2022, but the construction is not yet completed in the middle of March 2023. Based on the drawings obtained, the building function is shown in Table 3-21.

Table 3-20 Sport Complex Functions

Rooms	Area
Sports hall (two badminton courts, three table tennis courts)	790.0 sqm
Gymnasium (Training machines, such as bikes and running machines)	172.5 sqm
Room for indoor games	42.0 sqm
Office	22.0 sqm
Others (Toilets, storage, etc.)	-

Source: JICA Survey Team

Table 3-21 Work Status - As per Physical Survey (Sports Complex)

Civil (External and Internal)	External Finishes	Internal Finishes	Services			Other Work
			HVAC	Electrical	Plumbing	
Completed	Paint work pending	Completed	No proposal	Internal works done	Internal works done. Firefighting remains.	External services like water supply, sewage, rain water harvesting, etc., pending

Source: JICA Survey Team



Exterior View from the North



Exterior View from the East

Source: JICA Survey Team

Photo 3-3 Sports Complex

(4) M.S. and Dean Residence

As per the data collected from the DHFW, 95% of the work is completed (Table 3-22).

Based on the obtained drawing, the building is G + 1 floor.

Table 3-22 Work Status - As per Physical Survey (M.S. and Dean Residence)

Table 3-22 Work Status As per Physical Survey (MSR and Dean Residence)					
Civil (External and Internal)	Internal Finishes	Services			Other Work
		HVAC	Electrical	Plumbing	
M.S. Residence					
Completed	Completed	No proposal	Internal works done	Internal works done. Firefighting remains.	External services like water supply, sewage, rain water harvesting, etc., pending. Immediate surrounding work pending.
Dean Residence					
Completed	Completed	No proposal	Internal works done	Internal works done. Firefighting remains.	External services like water supply, sewage, rain water harvesting, etc., pending. Immediate surrounding work pending.

Source: JICA Survey Team



M.S. Residence



Dean Residence

Source: JICA Survey Team

Photo 3-4 M.S. Residence and Dean Residence

(5) 100-sqm Apartment (four blocks) and 200-sqm Apartment

There are four blocks of 100-sqm apartment and one block of 200-sqm apartment. The construction of 100-sqm apartments is 95% completed, while the 200-sqm apartment is 45% done (Table 3-23).

Consistent with the obtained drawing, the 100-sqm apartment is G + 3 floor. One floor consists of two households. The 200-sqm apartment is G + 5 floor. One floor consists of two households.

Table 3-23 Work Status - As per Physical Survey (Apartments)

Civil (External and Internal)	Internal Finishes	Services			Other Work
		HVAC	Electrical	Plumbing	
Completed	Completed	No proposal	Internal works done.	Internal works done.	External services like water supply, sewage, rain water harvesting, etc., pending.
Plastering work and painting work is not yet started.	Yet to start	No proposal	Iron box and PVC conduit work has just started.	Interior of ground floor work has just started.	Yet to start

Source: JICA Survey Team



Exterior of 100-sqm Apartment



Overhead Tank of 100-sqm Apartment



Exterior of 200-sqm Apartment



Exterior of 200-sqm Apartment

Source: JICA Survey Team

Photo 3-5 100-sqm Apartment (four blocks) and 200-sqm Apartment

(6) Library and Lecture Theatre

The civil work is on progress at the middle of March 2023 (Table 3-24).

The target date of completion of work is not obtained.

Table 3-24 Work Status - As per Physical Survey (Library and Theatre)

Civil (External and Internal)	External Finishes	Internal Finishes	Services			External Development
			HVAC	Electrical	Plumbing	
Ground floor slab is just casted	Yet to start	Yet to start	No proposal	Yet to start	Yet to start	Yet to start

Source: JICA Survey Team



Civil work is on progress

Source: JICA Survey Team

Photo 3-6 Library and Lecture Theatre

(7) Existing Mother and Child Hospital (MCH)

The construction of a dedicated 150-bed mother and child hospital is under way. The target date for completion is May 2023 (Table 3-25).

Table 3-25 Work Status - As per Physical Survey (MCH)

Civil (External and Internal)	External Finishes	Internal Finishes	Services			Other Work
			HVAC	Electrical	Plumbing	
Completed	90% of painting work is done.	90% of flooring and painting work is done. 40% of ceiling work is done.	Nothing observed at site	50% of electrification work at top floor is done. As for other floors, the work is not yet started.	Yet to start	Lift is not installed.

Source: JICA Survey Team



Exterior View of Mother and Child Hospital



Internal View

Source: JICA Survey Team

Photo 3-7 Existing Mother and Child Hospital

(8) Site Road Conditions

The roads within the project site have mostly been completed.



The Condition of the Road within the Project Site

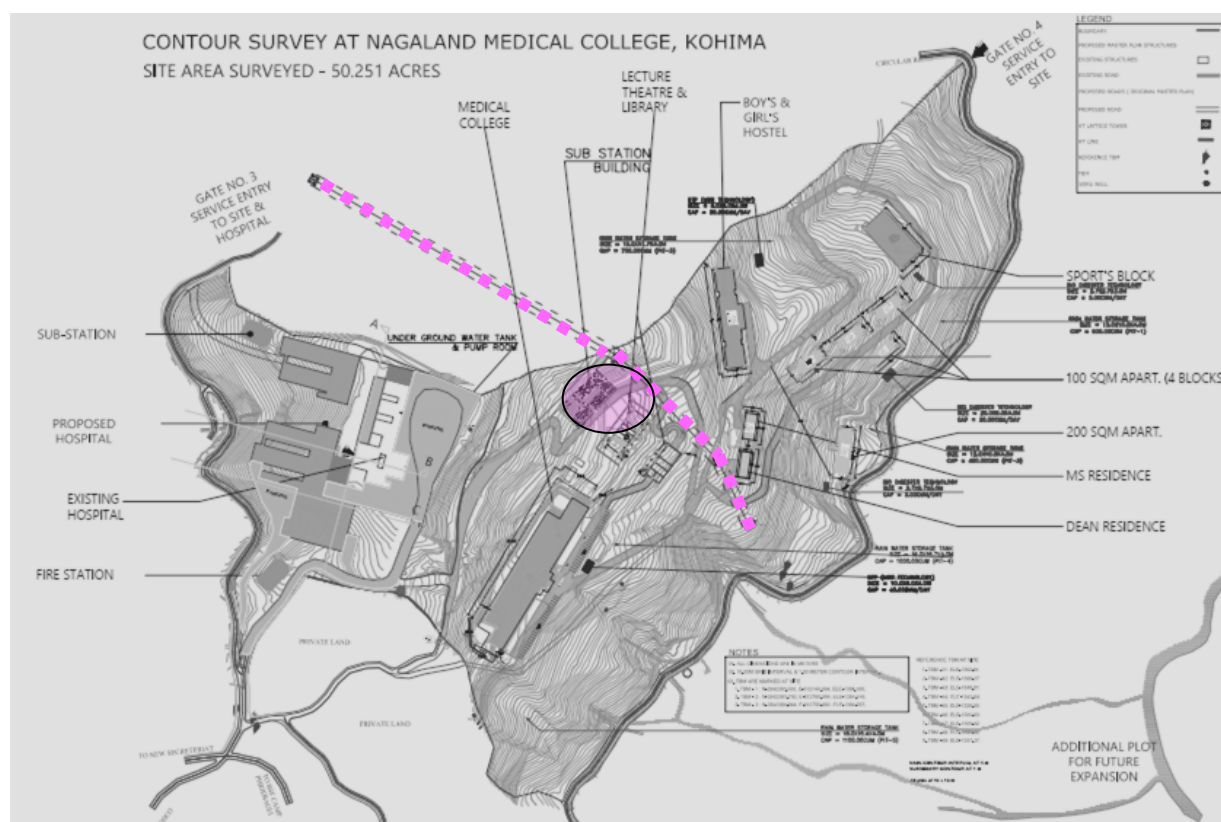
Source: JICA Survey Team

Photo 3-8 Site Road Conditions

3.3.3 Status of Services

(1) Power

An overhead 33 KV HT line cuts across the shorter part of the side. Lattice towers have been set up by the Transmission and Generation Department of the Department of Power, Nagaland. Tapping the power from the HT line and distribution to the individual building blocks via substations is under the scope of the Distribution and Revenue Department of the Department of Power, Nagaland (Figure 3-20). As per the information collected at the end of March 2023, due to the financial issues, the proposed substation has not been constructed. As an alternative solution, the Department of Power is planning to tap the current power supply from the nearby existing substation in the Boundary Safe Guard camp area tentatively. The Department of Power recognises the responsibility for their own transformer of the power not only for the medical college but also for upcoming JICA projects. As per the information from DHFW at the end of July 2023, 250 kVA transformer was set for the existing maternal and child hospital and at the same time, the upgradation of the substation to 10MVA is in progress.



Source: Department of Power, Nagaland

Figure 3-20 Location of 33 KV HT Line

(2) Water Supply and Drainage

The water supply for the entire campus shall be provided by the Public Health Engineering Department (PHED) of Nagaland. It was verbally communicated by the department that the water shall be sourced from the nearest village. As per the information collected at the timing of the end of March 2023, the city water supply line has not reached the site yet. As for the alternative solution, one boring well is set at each building. As per the information from DHFW at the end of July 2023, the city water supply line to the project site is under process, then the construction work has not yet commenced. The construction for the hospital can begin even if the city water supply is not yet in place, but it must be in place at least three months prior to the completion of construction because the water supply is required for the HVAC and sanitation system checks.

As for the drainage system, according to the master layout plan, septic tanks will be installed near each building. In addition, several rainwater tanks will be installed at the lower area of the project site.

(3) Telephone and Communication Lines

Provision for telephone and communication lines are yet to be observed at the site. Lack of communication lines will not interfere with construction, but if not in place by the time of completion, it will hinder the hospital operations.

3.4 Construction Regulations and Restrictions

3.4.1 Facility Planning Guidelines / Building Regulations

In India, each state has its building codes and regulations. The Nagaland Building By-laws, 2012, was published and all the buildings constructed must comply with the regulations contained herein. The Indian Public Health Standards (IPHS), revised in 2022, provides not only design guidelines for infrastructure, but also human resources and services to be delivered from Sub-centres, Primary Health Centres (PHCs), Community Health Centres (CHCs), Sub-District Hospitals (SDH), and District Hospitals (DH).

The criteria for designing buildings will basically conform to the following, other than the National Building Code (NBC).

- Guidelines for Sub-district Hospital and District Hospital, 2022, Indian Public Health Standards (IPHS)
- The Nagaland Building By-laws, 2012
- Design Guidelines, National Accreditation Board for Hospitals and Health Care Providers (NABH)
- Standard Requirements for Medical Colleges, National Medical Council (NMC)
- Design Guidelines of the Healthcare Engineering Association of Japan (HEAJ): To ensure the quality required as international standard, operation theatre (OT) rooms and intensive care units (ICUs) will conform to this.
- Guidelines and Space Standards for the Barrier-free Built Environment for Disabled and Elderly Persons
- Rights of Person with Disability Act, 2016

The project site is located in Seismic Zone V¹⁰, therefore the structural design will basically conform to the following.

- Bureau of Indian Standard, IS456, IS875¹¹, IS1893 part-1, part-2¹², part-6 and IS13920

The project site is located at hilly area. The following guidelines are applied for designing retaining walls.

- Bureau of Indian Standard, IS14458 (Part1,2 & 3), IS14496 (Part2)

3.4.2 Major Issues on Relative Building Rules

Major issues on relative building rules for the Project are summarised in Table 3-26. In the Project, the regulations pertaining to the shape of the building, such as setbacks will not be applied because the area of the project site is so large. Regarding height restrictions, it was confirmed that there are no regulations regarding the maximum height of buildings in Nagaland, so it is still possible to construct a high-rise building.

¹⁰ Described in Bureau of Indian Standard (BIS), CED39 (22343)

¹¹ Design loads other than earthquake (for example, wind loads etc.) will basically conform to this guideline.

¹² Design guideline for water receiving tank and liquid tank for medical gas etc.

Table 3-26 Major Issues on Relative Building Rules

Issues	Contents
The Nagaland Building By-laws, 2012	
Setbacks	Commercial building with plot size above 1,000 sqm: Rear setback: 3.0 m From road: 1.0 m-4.5 m distance is required according to the road widths. In case it is a downhill slope, protect the road by protection wall.
Parking	There are no provisions for carpark other than for disabled people. (a) Surface parking with maximum travel distance: 30 m from building entrance. (b) Width of parking bay: minimum 3.6 m.
Height Restrictions	- No restrictions unless the authority deems necessary to do so in certain areas. - Below should be exempted when measuring the height. a) Roof tanks and their supports not exceeding 1.5 m in height. b) Ventilating, air conditioning and lift rooms and similar service equipment, stair covered with roof up to 3.0 m in height, architectural features not exceeding 1.5 m in height. - Omit the height of the parking floor up to a maximum of 2.7 m for a building constructed on stilt with parking floor on the ground level.
Energy Efficient Building Design	- The use of solar water heating systems will be mandatory in hospitals. - Ensure energy efficient building design concepts. - Workable rooftop rainwater harvesting arrangements shall be included. - Incorporate wastewater re-cycling system for horticultural purposes. (For all buildings having a minimum discharge of 10,000 litres and above per day)
Window	- Opening size: Including frames at least 1/10th the floor area of the room. - Every room for human habitation shall have at least one window opening to outside. - All other rooms shall have ventilation provision in addition to doors.
Approach Ramp and Steps	- For ramp. Minimum width: 1,800 mm, Maximum gradient: 1:12, Length of ramp: Shall not exceed 9.00 metres, Handrail: 800 mm high on both sides extending 300 mm beyond the ramp; Gap from the adjacent wall to the handrail: Minimum 50 mm.; Clear opening for the entrance door: Minimum 1,000 mm; Threshold shall not be raised more than 12 mm. - For stepped approach. Tread: Shall not be less than 300 mm, Maximum riser: 150 mm, Handrail: Similar to the ramped approach.
Stairs	- Tread: Minimum 0.25 m (10"), Risers: Maximum 0.2 m (8"), Preferably not more than 12 risers in a flight. - Widths: (Hospitals) 1.25 metres, (cinema and Auditorium) 1.5 metres. - In no case will the width of a landing be less than width of the stair.
Excerpts from the Indian Public Health Facility Guidelines for Sub-district Hospital and District Hospital 2022	
Site Layout	60% of the total area of the facility (can be read as site) should be reserved for landscaping, play area, circulation area, etc. - Remaining 35-40% should be the plinth area (for the building). - An estimated 80% of the built-up areas should be dedicated to core patient services and clinical areas. - The facility should have a high boundary wall. - At least two gates for entry/exit. For larger facilities, three gates may be required.
Setbacks	- At least 10 metres of space all around the boundary wall should be left open. (Desirable) - At least 6 metres to allow easy access to the fire engine.
Environmentally friendly	- Where possible, the use of rainwater harvesting, solar energy and energy-efficient bulbs/equipment should be encouraged. - Renewable energy with battery backup should be considered during times of storms, floods, or power blackouts. - Refrigerants used in the heating, ventilation, and air-conditioning (HVAC) equipment should be chloro fluoro carbon (CFC) free, with a low greenhouse warming potential (GWP) when available.
Corridors	- Widths: At least 3 m. - Ramps shall have a slope of 1:15 to 1:18.
Facility Requirements	- Structural and non-structural earthquake proof measures should be incorporated, especially in high seismicity earthquake-prone areas. - Isolate critical care and emergency services in view of pandemics or outbreaks. - Various wings and critical care areas can have separate entry or exit.

Issues	Contents
Fire and Water	• Availability of open spaces on each floor, clearly visible fire exits. • Fire detectors, extinguishers, sprinklers, and water connections should be functional. • Approximately 450 to 500 L of water per bed (including day care, emergency, dialysis, and LDR beds) per day is required for a District Hospital. • Overhead water tank with a provision to store at least three days of water requirement. • Water supply preferably through two independent sources must be ensured. • A separate water tank for critical care areas should be made available.
Standards for Outpatient Departments	• Registration area should be well ventilated, lit, and spacious. • Each registration counter ensuring a minimum space of 15-20 sqm. Required number of counters for DH 400 beds: 6 counters. • Waiting area should be built to a scale of 1 sq ft per one-third of peak hour load for the registration area and about one-half of peak hour load for OPD areas. • A minimum of 400 sq ft of area should be provided for waiting area. • Consultation room should have enough space with a minimum area of 12 sqm.
Drug Dispensing Counter	• It should be well ventilated, lit, and spacious with each counter ensuring a minimum space of 15-20 sqm. • Required number of counters for DH 400 beds: 6 counters.
Operation Theatre	• Required number of OTs for DH 400 beds: 5 OTs • No requirements for room size.
Inpatient Wards	• The beds should be placed either on one side or both sides of a nursing station ensuring good visibility and ventilation.

Source: JICA Survey Team

3.4.3 Summary of Other Regulations and Rules

As for barrier-free related regulations, the National Building Code of India, the Nagaland Building By-Laws, 2012, and IPHS 2022 (Table 3-27) shall be followed. Apart from these regulations, as a barrier-free measure, departments and rooms related to the outpatient department, where people frequently come and go, should be set on a single floor in order to reduce vertical movement as much as possible. As for the vertical flow plan, elevator for general patients and elevator for bed patients should be installed separately so that general patients can easily use the elevators.

Table 3-27 Major Issues on Relative Barrier-Free Rules

Major Rules Relative to Barrier Free
Install handrails for the physically challenged at stairs and ramps.
Slopes for use of evacuation and barrier free shall be at least 2.4 m wide and have a maximum slope of 1:12.
At least one of the approaches to a facility shall be equipped with ramp.
Staircase: The maximum width shall be 1.350 m. The maximum height of rise shall be 0.15 m. The minimum width of tread shall be 0.275 m. The maximum number of steps on each flight of staircase shall be 10.
Ensure that there are at least two parking spaces for the physically challenged within 30 m from the entrance and exit. The width of the cell should be at least 3.6 m.
At least one of the elevators should be large enough to accommodate a wheelchair (80 cm by 150 cm).
Install toilets for use by the physically challenged.
Door width to be at least 90 cm.

Source: JICA Survey Team

3.5 Facility Planning Considerations for Natural Disasters

To prevent and minimize negative impacts caused by natural conditions and disasters such as earthquakes, landslides, flood, and heavy rain/windstorms described in Section 3.2.4, facility planning considered the measurements as summarised in Table 3-28.

Table 3-28 Facility Planning Considerations for Natural Disasters

Disasters	Considerations
Earthquake	Since the project site is located in an area with high seismic risk, the adoption of the seismic isolation structure will be considered. Seismic isolation structure reduces shaking during earthquakes, allowing for continuity of medical care in the event of a disaster. A seismic isolation structure is a structure that separates the building from the ground and incorporates a seismic isolation system consisting of rubber bearings and dampers that suppress the shaking of the building between the building and the ground. The seismic isolation rubber prevents seismic energy from being transmitted to the building, and also reduces acceleration and lengthens the period of shaking, resulting in a gentle shaking rather than a violent shaking. This reduces the damage to the building, minimizing damage to medical staff and patients, and also protects various equipment essential to medical operations from damage due to falls.
Landslide	Loose ground surface conditions are not suitable for spread foundation, therefore, pile foundations should be adopted. Adopting the earth anchor method during construction prevents the temporary retaining wall from collapsing due to large amounts of rainwater as the anchors are driven into the hard rock layer.
Flood	The project site is a mountain ridge area and will not be subject to flooding. The installation of a rainwater harvesting tank will be considered to take measures for stormwater drainage downstream.
Heavy rain/ Windstorm	During construction, it is desirable to set the timing of commencement avoiding the rainy season because earthwork in the early stages of construction is more susceptible to the effects of rain.

Source: JICA Survey Team

Chapter 4 Facility Planning

4.1 Three Concepts for Facility Planning

In order to achieve the objectives of the Project, facilities will be developed to provide complete and comprehensive medical care within Nagaland State, and a centre for advanced research and medical human resource development will be established. The facility plan will be based on the following three concepts in order to develop a world-class hospital as well as to introduce advanced medical equipment. An outline of the facility plan is shown in Appendix 2.

1. One integrated and compact hospital
2. World-class hospitals
3. Patient-centred hospital

4.1.1 One Integrated and Compact Hospital

The project site is located in a mountainous area, and there is limited availability of flat and spacious construction sites. By keeping related departments in close proximity, minimising the footprint of the building, and increasing the building height, a compact yet integrated hospital is planned.

4.1.2 World-class Hospital

In addition to the installation of the latest medical equipment, the facility should be planned with zoning that allows necessary departments to be in close proximity to each other, coupled with organised and shortened lines of flow for patients as well as medical staff. In addition, the hospital should be designed to provide an environment in which medical services can be provided continuously even in the event of a disaster, likewise be able to respond to changes in accordance with social demands and changes and developments in medical technology. Specific items are listed below.

- To prevent nosocomial infections, rooms for handling clean items and rooms for handling dirty items should be clearly separated. Moreover, the flow lines to these rooms should be organised and planned. To ensure proper hand washing, hand wash basins should be provided at the doors of each examination room, each bedroom, and each department.
- The facility should be able to properly manage air conditioning and wastewater by maintaining air conditioning in rooms requiring cleanliness, maintaining negative pressure rooms to accommodate infected patients, and managing wastewater from infected systems separately from general wastewater.
- The facility should allow for the safe evacuation of patients and medical staff in the event of a fire.
- The facility shall be capable of continuing medical care in the event of an earthquake. Adopt a seismic isolation structure and secure power supply in the event of power outage by using a private generator.
- The plan should provide appropriate pipe shafts and duct space for equipment and facilitate maintenance and management.
- The structural floors of the diagnostic imaging and laboratory departments will be lowered and the pit will be planned to accommodate future replacement of medical equipment and layout changes.
- The interior walls will be drywall system based, and the plan will be able to accommodate future layout changes.
- The plan should be energy efficient by reducing the heat load on the building using insulation on the roof and exterior walls, double glazing windows, etc.
- To reduce the amount of construction-related waste, durable, and long-lasting materials and equipment should be adopted.

4.1.3 Patient-centred Hospital

Plan a hospital where patients can feel comfortable by providing quality medical care. Specific items are listed below.

- Corridors in patient-occupied zones should be wide enough for beds to pass each other, and be planned so that there are no obstacles to movement.

- The area around the bed in the wards should be planned in consideration of privacy, with sufficient personal space for treatment.
- All bedrooms in wards can be seen from the staff station so that medical staff can travel shorter distances.
- The design shall be based on universal design to ensure that the facility is accessible for all. This includes the installation of universal toilets, floor plans with no steps, handrails in areas used by unspecified number of people, and signage plans that will allow people to reach their destinations even if they cannot read.

4.2 Architectural Plan

4.2.1 Scope of Work

Table 4-1 and Table 4-2 show the scope of work included in the official development assistance (ODA) loan and those not included, respectively.

Table 4-1 Works Included in ODA Loan

Categories	Contents
Building Construction	• Main hospital • Evacuation ramp • Connecting bridge corridor
External Works	• Pavement around the new main hospital • Courtyard development between the existing mother and child hospital and the new main hospital • Parking lot • Planting • Outdoor lightings • Road in the premise
Land Preparation	• Land levelling of the construction site for new main hospital • Temporary road for construction work • Replacement of existing road • Replacement of existing receiving water tank

Source: JICA Survey Team

Table 4-2 Works Not Included in ODA Loan

Classification	Construction Work
Infrastructure Development	• Water supply, power supply, telecommunication line construction and connection to the project site • Drainage from the project site to outside • Improvement of access road to the project site

Source: JICA Survey Team

4.2.2 Size of the Facility

(1) Outline of the Building

The facilities to be planned are shown in Table 4-3.

Table 4-3 Outline of the Building

Total Floor Area	Building Coverage Area	Structure	Story	Remarks
1) Main Hospital				
Approx.49,270 m ²	Approx.4,480 m ²	Reinforced concrete, Seismic isolation	Basement-3F /G + 10F, Penthouse-2	400 beds (General: 300 beds, Emergency: 30 beds, ICU: 20 beds, Private pay ward: 50 beds)
2) Evacuation Ramp				
Approx. 780 m ²	Approx. 260 m ²	Reinforced concrete	From GF to 2F	-
3) Connecting Bridge Corridor				
Approx. 80 m ²	Approx. 80 m ²	Steel, connecting to main hospital with expansion joint	Connected at 2F	

Source: JICA Survey Team

(2) Outline of Utilities

Outline of the facility utilities is shown in Table 4-4.

Table 4-4 Outline of Facility Utilities

Category	Contents
1) Electrical Facilities	Power substation, Generator ¹³ , UPS, Lighting, Telephone, Local Area Network (LAN), Public address system, TV system, Intercom system, Nurse call system, Electric lock system, Security camera system, Fire alarm system, Lightning protection system
2) Air Conditioning Facilities	Cooling and heating system, Ventilation system, Air heat exchanging system, Central monitoring system
3) Water Supply, Drainage and Sanitary Facilities	Water reservoir, Hot water supply system, Medical gas system, Wastewater treatment plant, Kitchen equipment, Firefighting system
4) Transport Facilities	General Elevator×2 Basement-3 – Tenth Floor (21 persons) Medical Elevator×3 Basement-3 – Tenth Floor (21 persons), Basement-3 – Penthouse Floor-2 (26 persons), Basement-2 – Tenth Floor (21 persons) Basement-3 – Penthouse Floor-2, Basement-2 – Tenth Floor) Food Elevator×1 (Basement-2 – Tenth Floor) Service Elevator×1 (Basement-2 – Penthouse Floor-1) Fire Elevator×1 (Basement-3 – Tenth floor)

Source: JICA Survey Team

4.3 Site Layout Plan

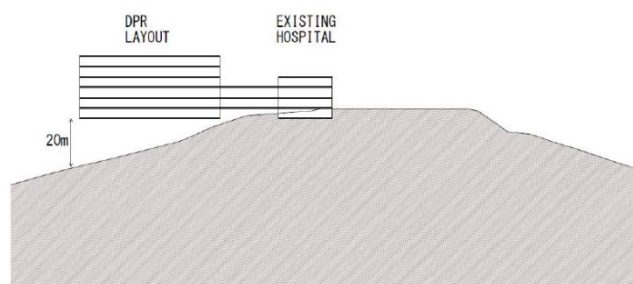
4.3.1 Layout of Main Hospital

(1) Site Layout of the Main Hospital

Although the project site is very large, the new main hospital must necessarily be in close proximity to the existing Maternal and Child Hospital in order to develop it as one integrated university hospital, since the existing Maternal and Child Hospital is under construction ahead of the new main hospital at a cost to be borne by the Nagaland side.

The west side of the existing Maternal and Child Hospital is steeply sloped, with a height difference of approximately 20 m between the ground floor of the building and the ground surface level (Figure 4-1).

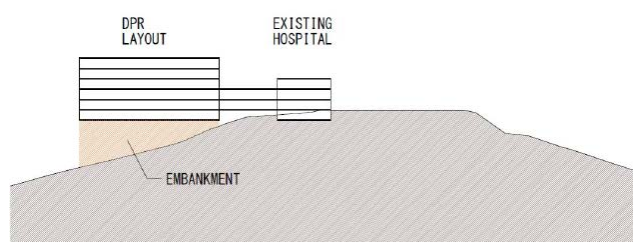
¹³ The capacity of the generator is assumed to be approx..750 KVA. Ensure that the main departments such as surgical unit, ICU, diagnostic imaging department and emergency unit in the advanced clinical area can continue to be supplied with electricity in the event of a power outage.



Source: JICA Survey Team

Figure 4-1 Condition on the West Side of the Existing Maternal and Child Hospital

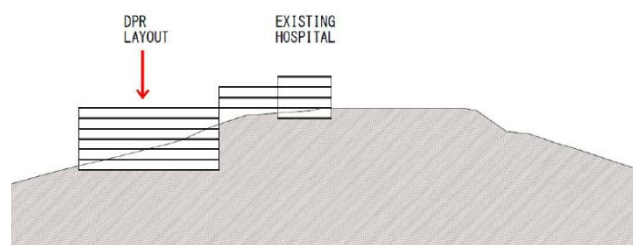
The embankment is necessary to fill the height difference, but the embankment on the steep slopes is unstable and undesirable (Figure 4-2).



Source: JICA Survey Team

Figure 4-2 Embankment at the Steep Slope

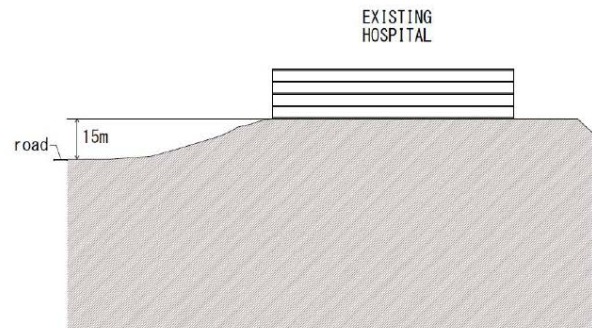
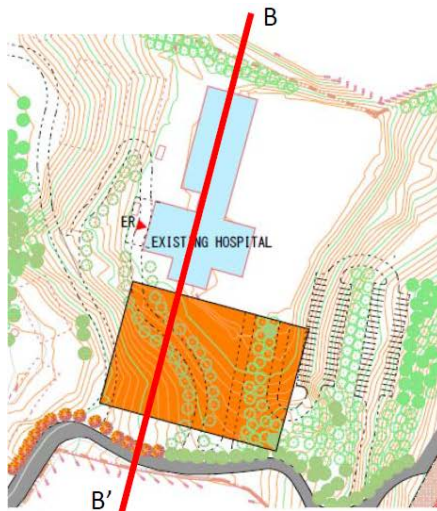
If the new hospital is placed on stable ground, the connection to the existing Maternal and Child Hospital will no longer be secured, furthermore, since half of the facility will be underground, it will be difficult to ensure natural light to the areas where patients will stay (Figure 4-3).



Source: JICA Survey Team

Figure 4-3 Case Study to Set the Building on the Stable Ground

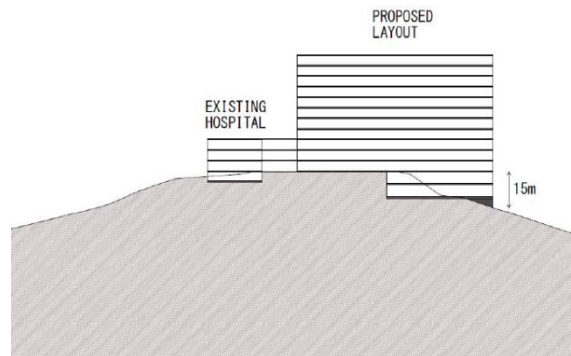
Based on the above, it is not realistic to locate the new hospital on the west side of the existing Maternal and Child Hospital. The condition on the south side of the existing hospital is not much different from that on the west side, as there is a 15 m difference in elevation, although the slope is slightly less steep than that on the west side. In addition, it is difficult to secure access to the main entrance and the emergency entrance of the existing Maternal and Child Hospital during the new hospital is under construction (Figure 4-4).



Source: JICA Survey Team

Figure 4-4 Condition on the South Side of the Existing Maternal and Child Hospital

Finally, the situation on the east side of the existing Maternal and Child Hospital is as shown in Figure 4-5.



Source: JICA Survey Team

Figure 4-5 Condition on the East Side of the Existing Maternal and Child Hospital

There is a spacious flat area to the east of the existing Maternal and Child Hospital, which provides the easiest connection to the existing Maternal and Child Hospital. In addition, it is possible to secure access to the emergency entrance and the main entrance of the existing Maternal and Child Hospital during the construction of the new hospital. For these reasons, the new hospital is planned to be located on the east side of the existing Maternal and Child Hospital (Figure 4-6). Since the area is flat, but not vast, the building will be high-rise in order to secure the necessary floor area while keeping the building coverage area compact.

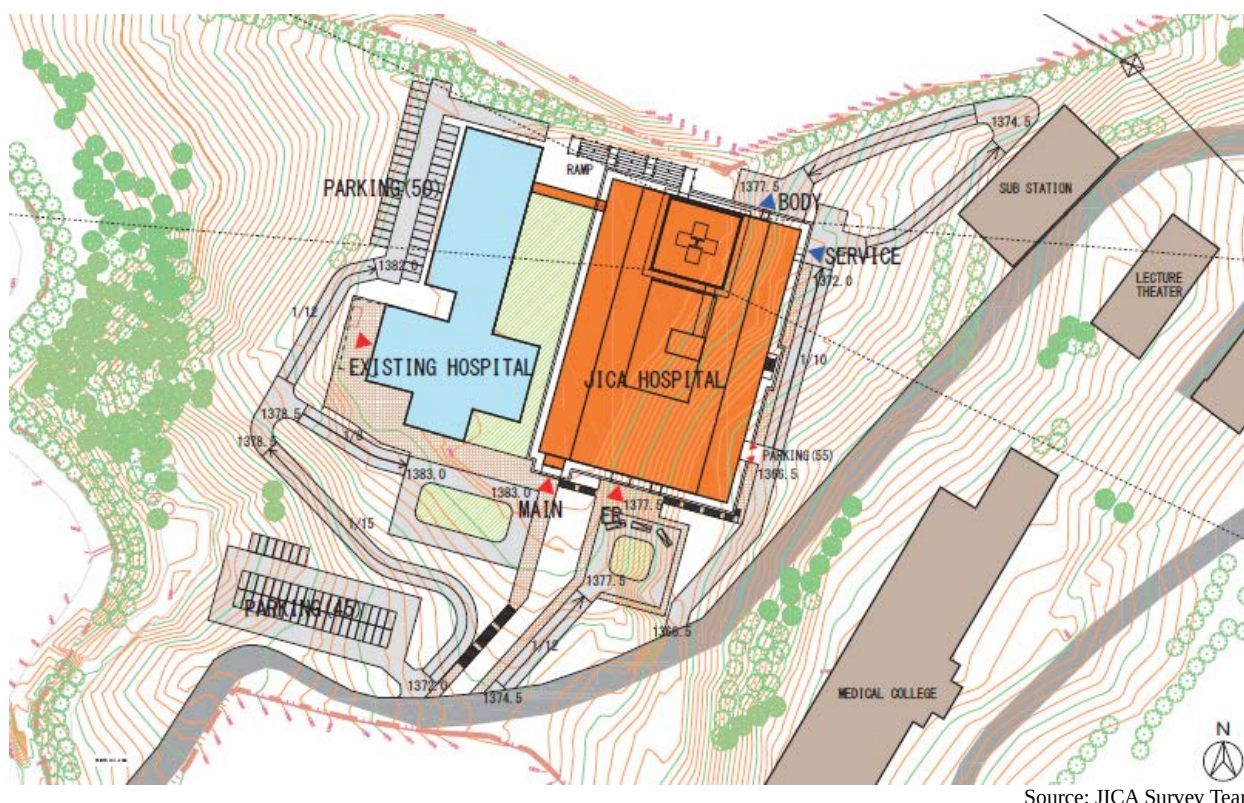


Figure 4-6 Layout of the New Hospital

(2) Sectional Zoning of the New Hospital

The sectional zoning of the new hospital (main hospital) is shown in Table 4-5.

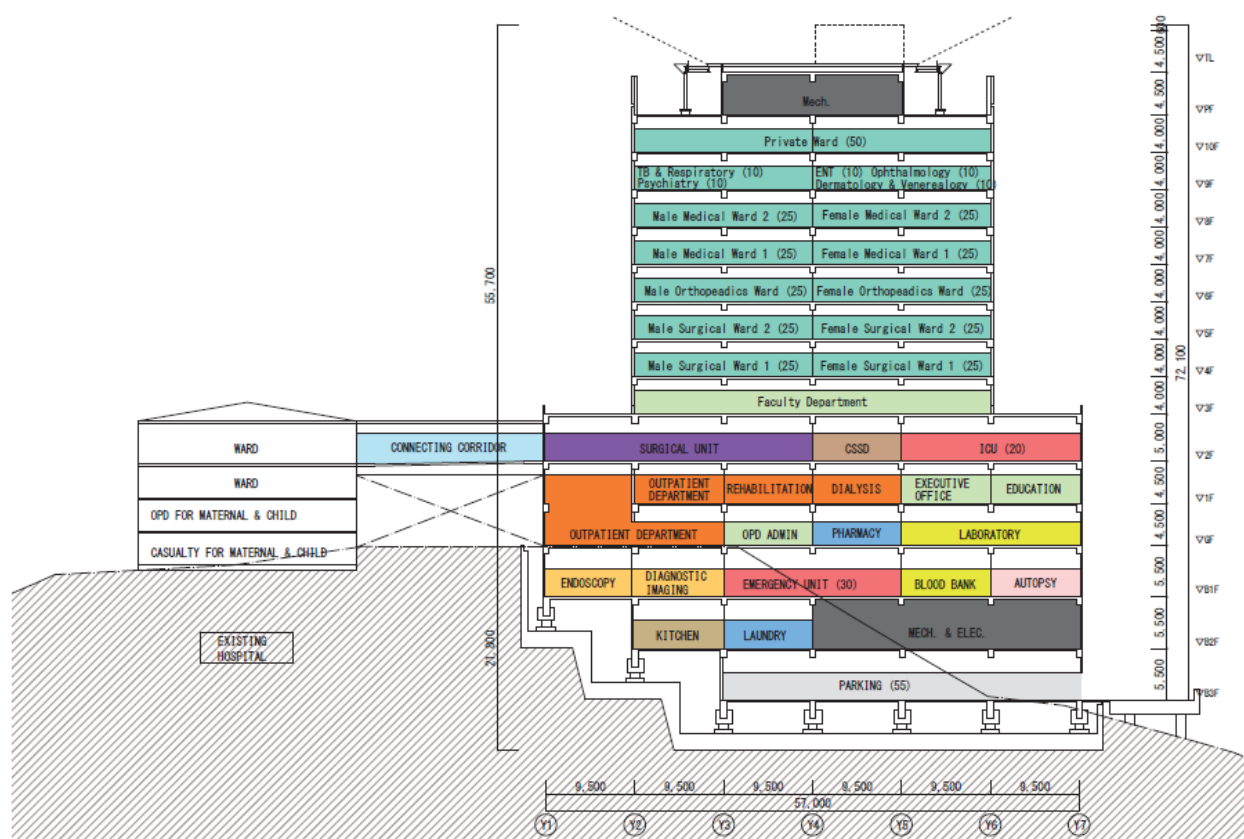
Table 4-5 Sectional Zoning of the New Hospital

Floor	Components
Penthouse 2F (PH2F)	Helipad
Penthouse 1F (PH1F)	Mechanical room
10F	Wards (Private pay cabin)
9F	Wards (ENT, Ophthalmology, Dermatology & Venereology, TB & Respiratory, Psychiatry)
8F	Ward (General Medicine)
7F	Ward (General Medicine)
6F	Ward (Orthopaedics)
5F	Ward (General Surgery)
4F	Ward (General Surgery)
3F	Professor's Office, Associate Professor's Office, Doctor's Office
2F	Surgical Unit, ICU, Central Sterile Supply Department (CSSD), Medical Engineering
1F	Outpatient Department (Respiratory, Dental), Rehabilitation Department, Dialysis Department, Education Department, Administration
GF	Outpatient Department (General Medicine, General Surgery, Orthopaedics, Dermatology & Venereology, ENT, Ophthalmology, Psychiatry) Medical Record, Laboratory, Pharmacy
B1F	Emergency Unit, Diagnostic Imaging Department, Endoscopy Department, Blood Bank, Morgue
B2F	Kitchen, Laundry, Facility Management Department, Electrical Room, Mechanical Room
B3F	Parking Lot

Source: JICA Survey Team

(3) Section Plan of the Main Hospital

The building height from ground level (parapet level) is approximately 55.7 m from the higher ground level and 72.1 m from the lower ground level. The Nagaland Building By-laws, 2012, does not regulate building height, so it is feasible to build tall structures (Figure 4-7).



Source: JICA Survey Team

Figure 4-7 Proposed Section Zoning

4.3.2 Parking Plan

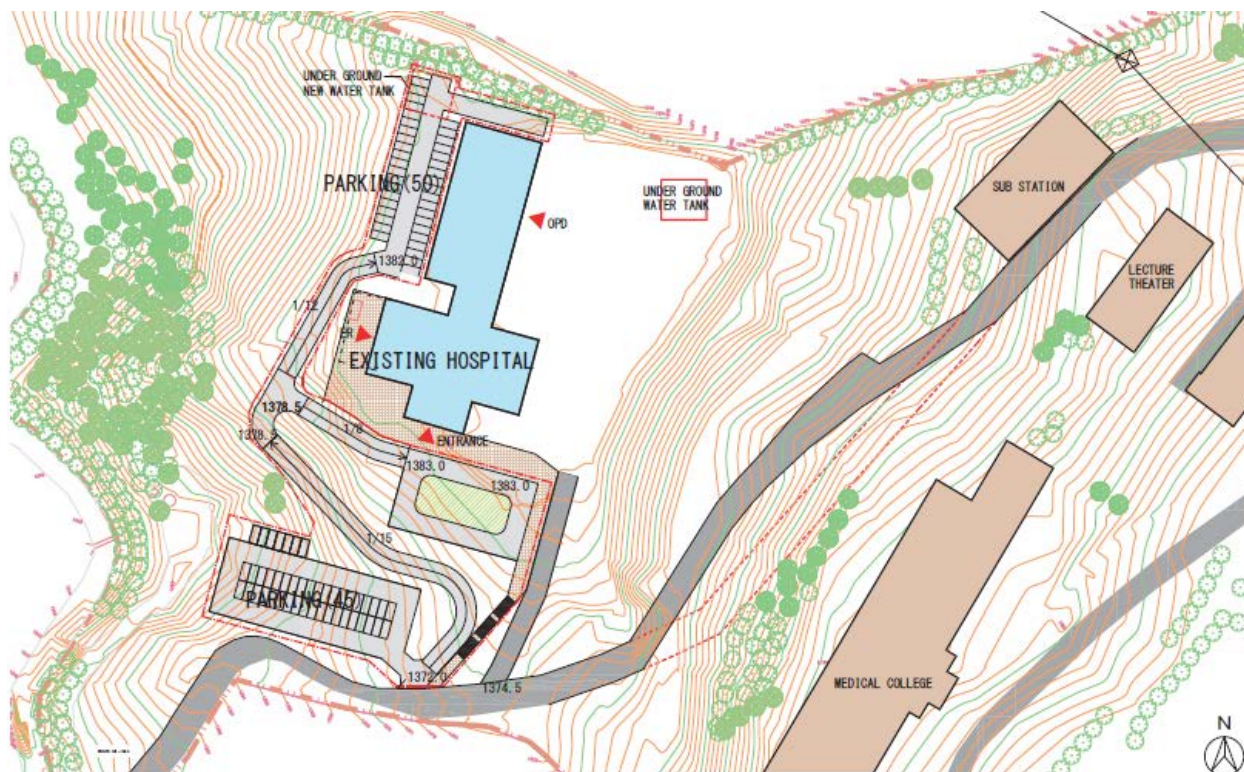
While most patients and their families will access the hospital via shuttle buses, taxis, etc., parking for staff will be needed. As mentioned earlier, there is limited flat land available on the site, and an underground parking is planned to secure the required number of parking spaces. A total of 150 parking lots will be provided: 45 drive-in ground parking lots near the approach road to the hospital, 50 drive-in ground parking lots on the west side of the existing Maternal and Child Hospital, and 55 drive-in underground parking lots on the basement three of the new hospital.

4.4 Construction Plan and Considerations

4.4.1 Construction Plan

The following construction steps will be required to build the new hospital (Figure 4-8, Figure 4-9, and Figure 4-10).

1. Construct a new driveway, access road, and parking lots.
(During the construction of the new hospital, safe access to the existing Maternal and Child Hospital will be ensured using the above facilities.)
2. Relocate the existing underground receiving water tank.
3. The existing internal road will be shifted to the eastward.
(These relocations will secure a site for the construction of a new hospital.)



Source: JICA Survey Team

Figure 4-8 Construction Plan for the New Hospital (Phase 1)

4. Temporary fence will be installed around the site of the new hospital as well as the area for the storage of construction materials, the contractor office, and the consultant office.
5. The surface of the ground at the construction site is not stable enough to support a high-rise building, but there is a hard rock support layer deeper than 17 m. It is appropriate to use pile foundations that reach the support layers. Since the construction site is on a slope, the piling work will start from the higher ground area. Temporary retaining walls will be installed prior to the excavation of the lower ground area.

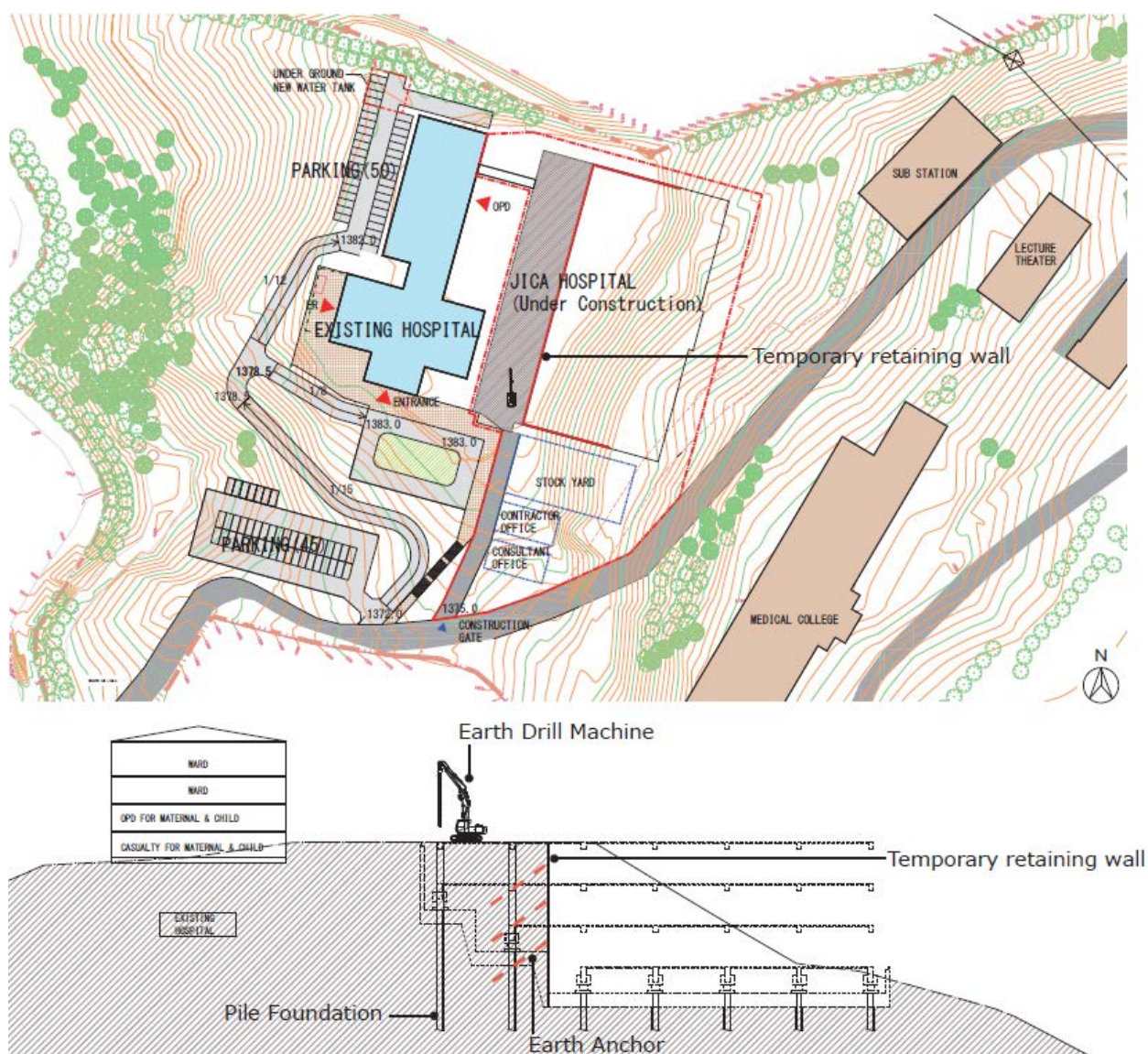
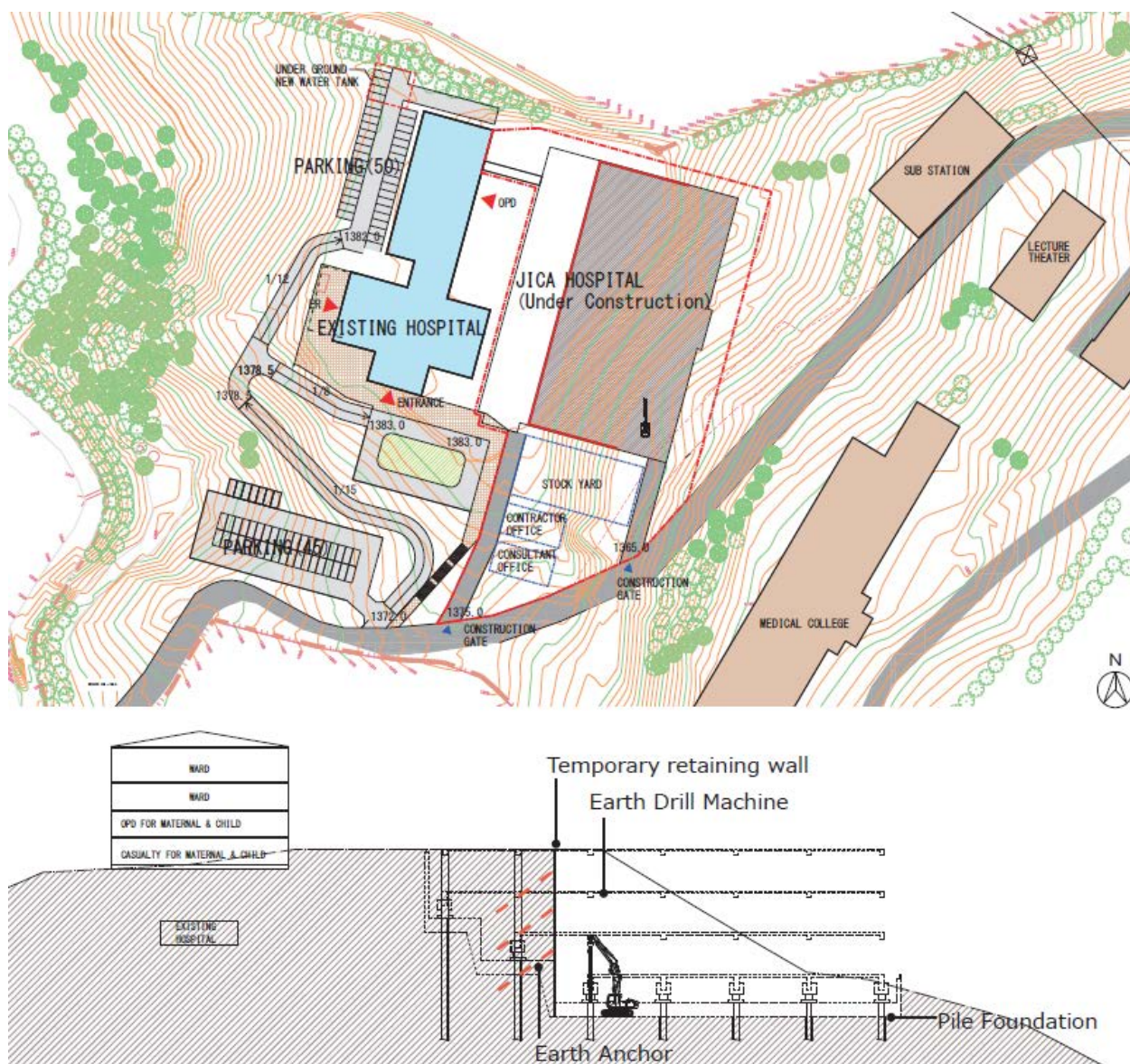


Figure 4-9 Construction Plan for the New Hospital (Phase 2)

6. Temporary road for access to the lower ground will be installed.
7. Pile work will be conducted in areas of lower ground.



Source: JICA Survey Team

Figure 4-10 Construction Plan for the New Hospital (Phase 3)

4.4.2 Working Permission

It is assumed that the project will require mobilization of skilled workers from outside the state. Workers from outside Nagaland will first obtain a temporary permit and then, an Inner Line Permit (ILP)¹⁴ from the respective government district where they will actually work. This ILP must be renewed every three months, but recently it has become possible to obtain it online.

4.4.3 Procurement of Construction Materials and Equipment

Basic materials and equipment would be procured from Dimapur. Assuming that some materials and equipment would be procured from Assam state.

¹⁴ Inner Line Permit cost is 50 rs. It will take two-three days to get it accepted. Then, the applicant will get a workers card.
<https://ilp.nagaland.gov.in/services/ilp/apply>

4.4.4 Noise Control during construction

The new hospital will be constructed adjacent to the existing maternal and child hospital, therefore noise during construction needs to be taken into consideration. The contractor should not perform construction work that makes noise early in the morning or at night, and if the work is particularly noisy during the day, the hospital should be notified in advance and the time of day when the noise is acceptable should be determined in advance.

4.5 Architectural Plan

4.5.1 External Access Plan

The external access plan is presented in Figure 4-11.

(1) Main Entrance

The main entrance is located on the southwest side of the building, and the driveway is large enough to accommodate multiple bus stops (city buses, shuttle buses, etc.). A canopy should be planned to allow visitors to access the hospital without getting wet in case of rain.

(2) Emergency Entrance

The emergency entrance is located on the south side of the building for easy access by ambulances from the main access road and to prevent the flow line from intersecting with that of general patients.

This allows for the rapid transport of emergency patients.

(3) Service Entrance

The service entrance is located on the northeast side of the building and the space for transport trucks to stop is secured. Drugs, consumables, and food ingredients, etc., can be transported into the hospital without intersecting with the general patient flow line.

(4) Mortuary Service Exit

The body from mortuary shall be carried out through an exit located on the north side of the building. The body can be carried out quietly from a position out of sight of the general patients.

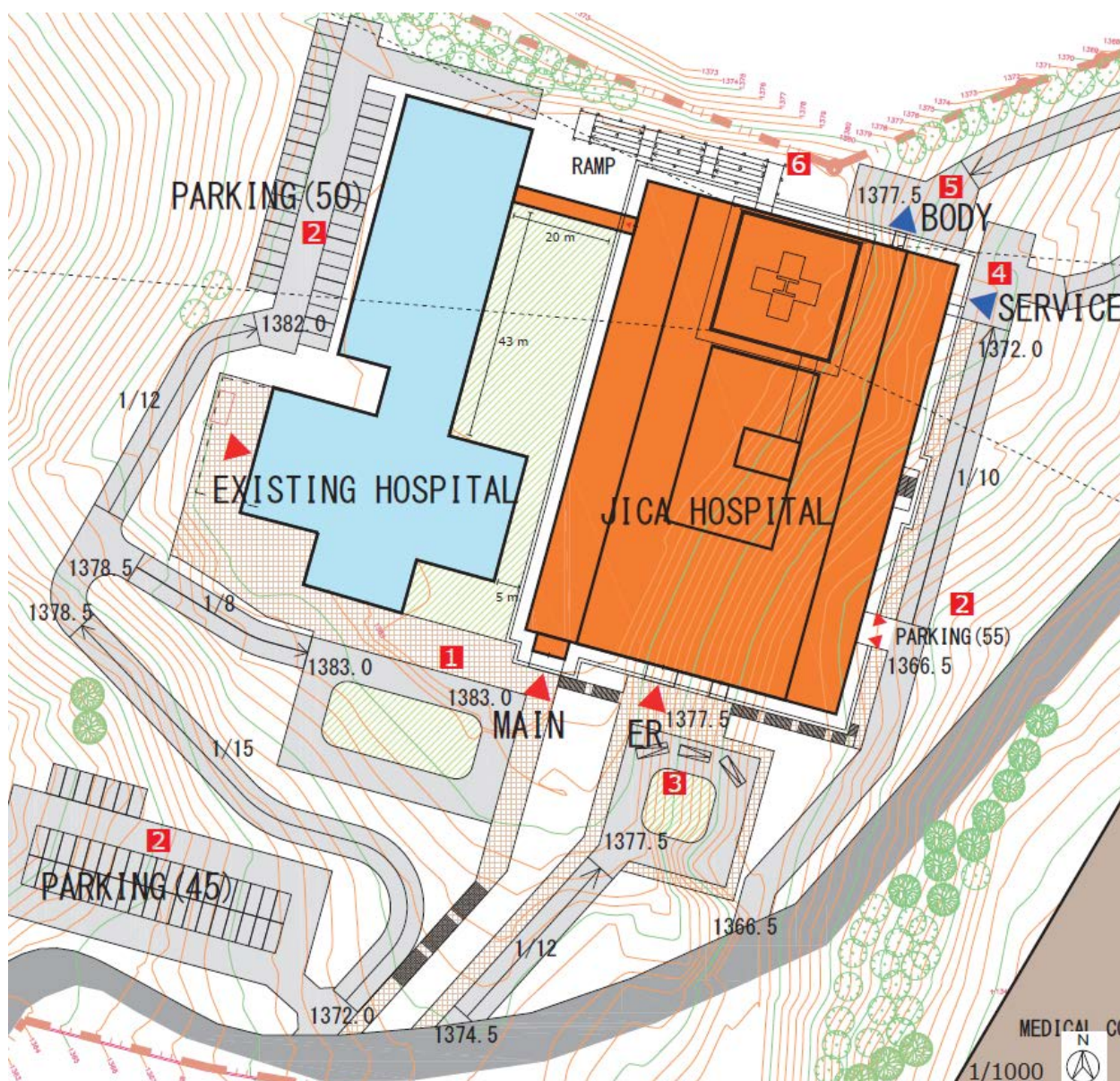


Figure 4-11 External Access Plan for the New Hospital

4.5.2 Internal Facility Plan

Table 4-6 summarises the facility requests that were confirmed with the DHFW. The target number of beds for the medical college hospital is 500 beds, but since 100 beds for obstetrics, gynaecology, and paediatrics are planned for the Maternal and Child Hospital, which has already begun construction, the required number of beds for the new hospital is now 400 beds.

Table 4-6 Required Major Components of Facility

No.	Item	Confirmation Details	Answers
1	Overall Size of Facility	Required number of beds	• 400 beds
2	Outpatient Department	Required clinical departments	• General Medicine - Examination room (4) - Procedure room (1) • Orthopaedics - Examination room (4) - Procedure room (1) • Ophthalmology - Examination room (2)

No.	Item	Confirmation Details	Answers
			- Procedure room (1) • ENT - Examination room (2) - Audiometry room (1) - Speech therapy room (1) • General Surgery - Examination room (4) - Procedure room (1) • Dentistry - Examination room (1) - Dental X-ray room (1) - EEG treatment room (1) - Procedure room (1) • Neurology - N/A • Psychiatry - Examination room (2) • Dermatology & Venerology - Examination room (2) - Procedure room (1) • Respiratory - Examination room (2) • Oncology - N/A
3	Diagnostic Imaging Department	Required number and type of diagnostic imaging devices	• CT room (1) • MRI room (1) • Fluoroscopy room (1) • General X-ray room (3) • Ultrasound room (1) • ECG room (2)
4	Endoscope Unit	Required number and type of rooms	According to the standards of National Medical Commission, Endoscopy Unit is not required for teaching hospitals, but since it will be required once the post-graduate residency course starts, it is desirable to set the unit in JICA hospital.
5	Radiation Therapy Department	Required number and type of radiation therapy and nuclear medicine devices	N/A
6	Emergency Department	Required emergency services	Emergency ward (30)
7	Surgical Unit	Required number of operation theatres	Major operation theater (6) Pre-operative beds (6) Recovery beds (8)
8	ICU Department	Required number of ICU beds	ICU beds (5) ICCU beds (5) Surgical ICU beds (5) Obstetric HDU/ICU beds (5) NICU beds (5) Obstetric HDU/ICU beds and NICU beds are not needed because they are already accommodated in the existing Maternal and Child Hospital; 20 beds are needed in the new hospital
9	Ward	Required number of beds for each clinical department Required nursing unit size	• General Medicine Male_1 (25) • General Medicine Male_2 (25) • General Medicine Female_1 (25) • General Medicine Female_2 (25) • General Surgery Male_1 (25) • General Surgery Male_2 (25) • General Surgery Female_1 (25) • General Surgery Female_2 (25)

No.	Item	Confirmation Details	Answers
			• Orthopaedics Male (25) • Orthopaedics Female (25) • Ophthalmology (10) • ENT (10) • Tuberculosis and Respiratory (10) • Dermatology and Venereology (10) • Psychiatry (10)
10	Chemotherapy Department	Required number of chemotherapy beds	N/A
11	Laboratory Unit	Required test types conducted in the hospital	• Biochemistry • Microbiology • Pathology • Blood bank
12	Pharmacy	Required condition for the formulation in hospital	N/A
13	Rehabilitation Department	Required types of rehabilitation	• Physiotherapy
14	Dialysis Department	Required number of dialysis beds	10 beds (including 2 positive pressure beds for HIV patients)
15	Faculty function	Required number of professor rooms for each department Required number of associate professor rooms for each department Required number of assistant professor rooms for each department	• General Surgery - Professor room (1) - Associate Professor room (3) - Assistant Professor room (4) • General Medicine - Professor room (1) - Associate Professor room (3) - Assistant Professor room (4) • Orthopaedics Surgery - Professor room (1) - Associate Professor room (1) - Assistant Professor room (2) • Anaesthesiology Faculty - Professor room (1) - Associate Professor room (2) - Assistant Professor room (4) • ENT - Professor room (1) - Associate Professor room (1) - Assistant Professor room (1) • Ophthalmology - Professor room (1) - Associate Professor room (1) - Assistant Professor room (1) • Dermatology - Professor room (0) (not required) - Associate Professor room (1) - Assistant Professor room (1) • Respiratory - Professor room (0) (not required) - Associate Professor room (1) - Assistant Professor room (1) • Psychiatry - Professor room (0) (not required) - Associate Professor room (1) - Assistant Professor room (1) • Radiology - Professor room (1) - Associate Professor room (2) - Assistant Professor room (2)

Source: JICA Survey Team

(1) Outpatient Department

- The floor plan should be easy for patients to reach their destination and also easy to understand.
- New patient flow lines are as follows:
 - Patient registration at the reception desk.
 - The medical staff at the reception desk will instruct the patient, based on the patient's symptoms, which examination room he/she must go.
 - The doctor interviews the patient in the examination room and determines necessary tests.
 - Required tests are conducted. (physiological laboratory, diagnostic imaging tests, blood collection, etc.)
 - The doctor in the examination room diagnoses the patient based on the test results and makes the next and subsequent appointments.
 - Receive medications based on prescriptions at the pharmacy counter.
 - Patients are accounted for at the reception desk, as needed.
- The back of each examination room is connected by a staff corridor, allowing medical staff to move around without facing the outpatients, thus enabling efficient provision of medical care.
- Blood and urine collection rooms are adjacent to the biochemistry laboratory so that specimens can be transported quickly.
- Establish a medical consultation office to provide support for patients hospitalising and leaving the hospital and to consult with patient support after discharge.

(2) Emergency Department

- The floor plan shall be capable of providing prompt diagnosis and treatment to emergency patients.
- Locate rooms for CT, MRI, and other imaging equipment frequently used in emergencies near the Emergency Department.
- Place a medical elevator near the Emergency Department so that patients requiring surgery can be quickly transported to the Surgical Unit.
- A helipad will be installed on the roof to allow for the possibility of transporting emergency patients to other states. The plan shall allow for direct elevator transport from the Emergency Department to the helipad.

(3) Diagnostic Imaging Department

- The location should be easily accessible from both the Outpatient Department and the Emergency Department to reduce the burden of patient travel.
- Combine the operation rooms of each diagnostic equipment into one room to create an environment in which imaging tests can be performed efficiently by a small number of staff.

(4) Endoscopy Department

- It should be planned in a location that is easily accessible to both outpatient and inpatient.
- The back of each examination room is connected by a staff corridor, allowing medical staff to move around without facing the patients.

(5) Laboratory Unit

- Laboratory rooms are centralised in one location so that minimum staff can conduct lab-tests efficiently.
- Blood and urine specimens collected in the Outpatient Department are promptly transferred directly to the biochemistry laboratory.
- Establish an environment in which biochemical, haematological, microbiological, and pathological tests can be performed.

(6) Blood Bank

- Blood transfusions required for treatment will be prepared and procured in the hospital.
- Locate the department adjacent to the Emergency Department in order to provide blood transfusions quickly.

(7) Dialysis Department

- It should be planned in a location that is easily accessible to both outpatients and inpatients.
- The plan should be able to accommodate HIV patients.

(8) Rehabilitation Department

- Locate the department in a location that is easily accessible to both outpatients and inpatients.
- Provide physical therapy.

(9) Education

- A lecture room (approximately 130 seats) will be planned to accommodate not only lectures by medical students, but also medical staff, including those from other medical institutions, to share and disseminate medical information in the state.
- Plan four lecture rooms (approximately 55 seats) for medical students.
- Plan three shared meeting rooms that can be used by all departments in the hospital.

(10) ICU

- Plan ICU with 20 beds.
- Locate the department adjacent to the Surgical Unit in order to respond quickly to sudden changes in patient condition.

(11) Surgical Unit

- Eight operating rooms (including two for future expansion) are planned.
- Locate the department adjacent to the ICU in order to respond quickly to sudden changes in patient condition.
- Set a department entrance near the medical elevator to allow for rapid response to emergency patients.
- Central Sterile Supply Department (CSSD) shall be located adjacent to the department in order to collect dirty medical instruments and provide sterile medical instruments promptly.

(12) Medical Engineering Department

- Medical engineering room is set for maintenance and repair of medical equipment used in the hospital such as blood transfusion pumps, etc.

(13) Administrative department

- Administrative staff rooms will be centralised in one location.
- Locate the department in a position where the lines of flow do not intersect with patients.

(14) Ward

- The nursing unit shall be the standard 25 beds in India.
- Majority of multi-bedded rooms shall be four-bedded, and the ward shall consist of four-bedded rooms and single-bedded room.
- The composition of each ward is listed in Table 4-7.

Table 4-7 Composition of Each Ward

Location	Hospital Department	Number of Beds
4F Ward	General Surgery (Male)	25 beds (5 x 4-bedded rooms, 5 x 1-bedded rooms)
	General Surgery (Female)	25 beds (5 x 4-bedded rooms, 5 x 1-bedded rooms)
5F Ward	General Surgery (Male)	25 beds (5 x 4-bedded rooms, 5 x 1-bedded rooms)
	General Surgery (Female)	25 beds (5 x 4-bedded rooms, 5 x 1-bedded rooms)
6F Ward	Orthopaedics (Male)	25 beds (5 x 4-bedded rooms, 5 x 1-bedded rooms)
	Orthopaedics (Female)	25 beds (5 x 4-bedded rooms, 5 x 1-bedded rooms)
7F Ward	General Medicine (Male)	25 beds (5 x 4-bedded rooms, 5 x 1-bedded rooms)
	General Medicine (Female)	25 beds (5 x 4-bedded rooms, 5 x 1-bedded rooms)
8F Ward	General Medicine (Male)	25 beds (5 x 4-bedded rooms, 5 x 1-bedded rooms)
	General Medicine (Female)	25 beds (5 x 4-bedded rooms, 5 x 1-bed rooms)
9F Ward	Ophthalmology	10 beds (2 x 4-bedded rooms, 1 x 2-bedded room)
	ENT	10 beds (2 x 4-bedded rooms, 1 x 2-bedded room)
	Dermatology and Venereology	10 beds (2 x 4-bedded rooms, 2 x 1-bedded rooms)
	Psychiatry	10 beds (2 x 4-bedded rooms, 2 x 1-bedded rooms)
	TB and Respiratory	10 beds (1-bedded room x 10 rooms)
10F Ward	Private pay cabins	50 beds (1-bedded room x 50 rooms)

Source: JICA Survey Team

- All private rooms are equipped with toilets and unit showers.
- For multi-bed rooms, one toilet shall be provided for every four beds.
- The staff stations should be located at a location where staff can oversee all the bed rooms, with the shortest moving distance.

(15) Doctor's Office

- Professor's office, Associate Professor's office, Assistant Professor's office, and Resident's office will be centralized on the third floor in order to promote mutual communication across departments.

(16) Pharmacy

- No formulations are conducted in the hospital.
- Plan rooms for dispensing and storing drugs.
- Mixing is not conducted centrally in the Pharmacy Department, but is conducted in each ward.

(17) Kitchen

- Locate the department so that delivery of ingredients, transportation of serving carts, and washing of the serving carts do not intersect with the general flow lines.
- In order to enable rapid delivery of meals to each ward, the food service elevator will be set for serving and discharging meals.
- A staff cafeteria (approximately 150 seats) is planned.

(18) Supply Processing Distribution (SPD)

- Establish a room for centralised management of medical supplies used in the hospital.
- Locate the department in a position where the delivery of goods does not intersect with the general patient flow line.

(19) Morgue

- A body refrigerator that can keep approximately ten bodies will be installed.
- Autopsy room and organ store will be planned adjacently.
- Family waiting room will be planned and bodies can be transported from the exit where is out of sight of general patients.

(20) Other

- Plan a room for the IT engineers near the server room.
- The Laundry Department is planned on the second basement level, where it does not intersect with patient flow lines.
- A room for the engineers who manages the facility is planned on the second basement level, where it does not intersect with the patient flow lines.
- A janitor's room is planned on the second basement level, where it does not intersect with the patient flow line.

4.6 Gender Initiatives

Gender initiatives will be implemented in terms of both patient and staff considerations. Major initiatives are summarised in Table 4-8.

Table 4-8 Gender Initiatives

Target	Initiatives
Patient Considerations	As for the wards, while original DPR plan adopts Nightingale-type ward which consists of one large room, the wards should consist of four-bed rooms and one-bed rooms so that the number of male and female inpatients can be flexibly adjusted. Provide a safe and comfortable environment for women to be hospitalised.
Staff Considerations	Regarding staff changing rooms (including not only doctors but also nurses and administrative staff), provide male and female changing rooms in an equitable manner to create a comfortable working environment for female staff.

Source: JICA Survey Team

(1) Environment Consideration Initiatives

Major initiatives related to environment considerations are summarised in Table 4-9.

Table 4-9 Environment Consideration Initiatives

Target	Initiatives
Solar power generation	Solar panels on the rooftop to provide some of the electricity used in the hospital.
Rainwater harvesting	Some portion of rainwater is collected in a pit in the building and used for toilet flushing etc.

Source: JICA Survey Team

Chapter 5 Medical Equipment Planning

5.1 Current Situation

5.1.1 Overview of Current Medical Equipment at Naga Hospital Kohima

Naga Hospital Authority Kohima (NHAK), like other District Hospitals in Nagaland, is under the Department of Health and Family Welfare (DHFV). Although it is the only autonomous hospital that is allowed to operate on a self-financing basis, the hospital receives a small amount of government subsidies as a source of income, and it is under the umbrella and control of the state government. Basically, the hospital is managed by the Hospital Board.

It will function as a teaching hospital until the new medical college hospital opens, but after its opening, it will continue to function as a District Hospital of Kohima as before. Currently, a radiation therapy building, and a gynaecology ward building are under construction, and the former will be equipped with a linear accelerator, a cyberknife (cobalt 60), and a brachytherapy unit. A computed tomography (CT) for simulators is also planned to be procured.

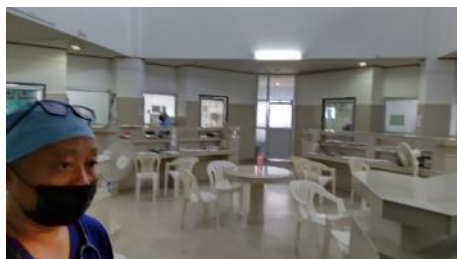
The reason for the expansion of facilities and the expansion and renovation of departments is that it is necessary to prepare for the approval as a medical college hospital, even though not all of the expansion and renovation departments are subject to the same requirements. The following is a list of existing equipment in major departments.

(1) Operating Theatre

The operating theatre, located in the part of second floor, includes operating rooms for ophthalmology, otorhinolaryngology (ENT), general surgery, orthopaedics, and obstetrics and gynaecology. C-section is performed in a separate operating room located in a separate obstetrics ward. In addition, there is an operating room undergoing renovation, and the hospital administrative staff have explained that they are preparing to invite specialists to perform urological, paediatric, and plastic surgeries. No neurosurgery or cardiology surgeries are being performed. The Trauma Care Centre, which is under construction, will also have one operating room.

The operating rooms are arranged around a central nurses' station, which is also equipped with sterilisers for operating instruments used in the various types of surgical operations. The Central Sterile Supply Department (CSSD) is located in a separate building, where sterilised materials generated in the ward blocks are processed.

Each operating room is equipped with a certain level of equipment, including operating light, operating table, vital sign monitors, anaesthesia machines, and suction machines, and oxygen is supplied by a central piping system. The C-Arm for orthopaedic surgery is out of order and unavailable.



Nurses Station



Scrub Unit



Operating Room for Ophthalmology



Operating Room for Obstetrics and Gynaecology



Operating Room for Orthopedics



Operating Room under Construction

Source: JICA Survey Team

Photo 5-1 Medical Equipment in Operating Theatre

(2) Intensive Care Unit (ICU)

Located on the second floor opposite the operating theatre across the corridor, it is staffed by five (5) physicians and thirty-seven (37) nurses working in three shifts, with one shift consisting of one (1) physician and seven (7) nurses. As in the operating theatre, there is a nurse station in the centre, surrounded by six-bed and two-bed rooms.

Each room has a centrally piped medical gas outlet for oxygen, compressed air, and vacuum at the bedside, and is equipped with vital sign monitor(s) (some with central venous pressure sensors, but no arterial pressure sensors), ventilator(s), and suction machines. There seem to be several types of vital sign monitors, and in some cases, two monitors were installed on the same patient, with only SpO₂ being displayed on the monitor next to it. In the central nurses' station, nurses record result of examinations, medical diagnosis and treatments. Since the central nurses' station was not equipped with a central monitor, vital signs were recorded over time with bedside vital sign monitors. More than half of the beds were in occupancy status.



Central Nurses' Station



Six-bed Room



Two-bed Room



Central Medical Gas Supply Outlets



Recorded Patients' Vital Sign Parameters, etc.



ECG Monitor, Showing only SpO₂ on the Right Side

Source: JICA Survey Team

Photo 5-2 Medical Equipment in ICU-1

The most common illnesses treated are stroke, kidney failure, upper gastrointestinal bleeding due to alcoholic liver injury, and traffic trauma. Care for cardiovascular diseases such as myocardial infarction is not provided. At the time of the survey visit, a patient with brain injury due to traffic trauma was on a ventilator (equipment is provided by Mindray brand, China). The ICU is equipped with eight ventilators.



Brain-injured Patients due to Traffic Trauma



Ventilator

Source: JICA Survey Team

Photo 5-3 Medical Equipment in ICU-2

Endoscopic treatment is provided for upper gastrointestinal bleeding where two ultrasound machines are available for the abdomen. One attendant is allowed in each patient room. General medical equipment such as infusion pumps are maintained by two biomedical engineers (staff allocated by the National Health Mission) who are responsible for maintenance after the equipment warranty period.



Family Member(s) Accompanying the Patient



Infusion Pumps

Source: JICA Survey Team

Photo 5-4 Medical Equipment in ICU-3

(3) Neonatal Intensive Care Unit (NICU)

The NICU had about eight infant warmers installed against the wall and was nearly full at the time of the survey. All but one child receiving phototherapy was wrapped in blankets and receiving care. One mother was at the bedside and was breast feeding via tube to the newborn; the NICU was managed concurrently by the intensive care unit (ICU) staff, with no neonatologist involvement. The system is designed to contact the paediatric department for specialist advice when necessary. It was very interesting to note that there was not a single infant incubator, and when asked about premature infant care, especially those requiring warming, the nurse responded that there was no survival record for infants under 1,000 grams.



Infant Warmers / Infant Care Units



Breast Feeding via Tube



Neonate on Phototherapy for Jaundice

Source: JICA Survey Team

Photo 5-5 Medical Equipment in NICU-1

In addition, one neonate (a mature infant) was being treated on a ventilator for respiratory failure due to meconium aspiration syndrome. Blood samples were drawn by inserting a needle into a vein and picking up a spontaneously falling blood drop.



Newborn Baby Receiving Respiratory Care with Ventilator



Blood Collection Tubes

Source: JICA Survey Team

Photo 5-6 Medical Equipment in NICU-2

(4) Diagnostic Imaging Department

Equipment related to diagnostic imaging includes a general radiography X-ray and a mobile X-ray, as well as CT (8 slices, Philips) and magnetic resonance imaging (MRI) (1.5 Tesla, Siemens), but the locations of these are dispersed. The general X-ray currently in use was showing of aging, and the new one was in the process of being installed. Even mobile X-ray, which is usually used in the wards and ICUs, is almost fixed and utilised in the diagnostic imaging department.

The currently broken CT (8 slices, Philips) cannot be repaired because its depreciation period has been completed (ten years), and a new CT (32 slices, Philips) has been approved for procurement. The mammography is also scheduled to be renewed and upgraded on the premise that it will be disposed of due to its aging and failure.



Mobile X-ray System



Aged General X-ray System



Equipment for Converting Analog Images to Digital Images



General X-ray System under Installation



Room Equipped with MRI



MRI



Room Equipped with CT



CT to be Disposed of

Source: JICA Survey Team

Photo 5-7 Medical Equipment in Diagnostic Imaging Department

(5) Laboratory

It is equipped with machines for general laboratory tests such as biochemistry, immunology, haematology, serology, bacteriology, and pathology. Automated equipment is also available for biochemistry, immunology, and haematology tests due to the high throughput. Some of them are provided free of charge on the condition that consumables are purchased (RRC: Reagent Rental Contract).



Biochemistry Analyser



Immunology Analyser



Hematology Analyser



Machines for Preparing Pathological Disgnostic Specimens

Source: JICA Survey Team

Photo 5-8 Medical Equipment in Laboratory

(6) Blood Bank

The refrigerated centrifuge for separating donated blood (whole blood) is malfunctioning, which is causing problems in the storage of component blood (blood products). It is also equipped with an ELISA system and other equipment for testing donated blood.



Broken Refrigerated Centrifuge



ELISA System for Testing Antibodies, etc.

Source: JICA Survey Team

Photo 5-9 Medical Equipment in Blood Bank

(7) Specialty Care Services of Outpatient Department

1) Ophthalmology

Some machines are in place, including a slit lamp used to perform basic eye examinations, such as lens and vitreous, a tonometer for measuring intraocular pressure, and a visual field meter.



Slitlamp



Tonometer

Source: JICA Survey Team

Photo 5-10 Medical Equipment in Specialty Care Services of Outpatient Department-1

2) Dialysis

The hospital is equipped with five dialysis machines. About 40 patients with chronic renal failure who need dialysis treatment are receiving dialysis treatment twice a week at the hospital. The hospital is also equipped with batteries in case of power outages. Failures that cannot be handled by the hospital's maintenance engineers and check-ups for quality control are performed by Guwahati's (Assam State) equipment distributor engineers.



Dialysis Machines



Batteries (One for Each Dialysis Machine) in Case of Power Failure

Source: JICA Survey Team

Photo 5-11 Medical Equipment in Specialty Care Services of Outpatient Department-2

(8) General Wards

The male, female, and paediatric wards were located on the ground floor facing the courtyard. Each ward had 12 beds, and each ward had its own nurses' station separated by a partition. At the time of the survey, only two patients were admitted to the male ward and about four patients were using the female ward, while the paediatric ward was almost full. The maternity ward is located separately to the other maternal and child ward.



General Hospital Beds around the Courtyard



Male Ward



Female Ward



Nurses' Station



Paediatric Ward



Breast Feeding Room

Source: JICA Survey Team

Photo 5-12 General Wards

5.1.2 Medical Equipment Procurement System

Procurement of medical equipment in India is described in the General Financial Regulation (GFR). Procurement by the central government is currently conducted through GeM (Government e-Marketplace: <https://gem.gov.in/>), while the Nagaland government procurement is conducted through the e-Procurement System (<https://nagalandtenders.gov.in/nicgep/app>) which is being used depending on the size of procurement.

Companies participating in procurement in Nagaland must register their companies in the e-Procurement System ¹⁵.

For the procurement of medical equipment, each district submits a budget request to the state government (<https://nagalandhealthproject.org/dohfw/about>), which in turn submits a budget application to the central

¹⁵ A Goods and Service Tax (GST: <https://services.gst.gov.in/services/gstlaw/gstlawlist>) is added to, and the GST rate is divided into five levels, 0%, 5%, 12%, 18%, and 2%, depending on the type of goods or services. The GST is further divided into Central Goods and Services Tax (CGST), State Goods and Services Tax (SGST), and Integrated Goods and Service Tax (IGST). For luxury goods such as automobiles and tobacco products, a GST Compensation Cess of 3-200% is added on top of the 28%. As far as goods are concerned, cereals are exempt from tax, daily necessities are taxed at 5%, luxury goods are taxed at 28%, and the standard tax rates of 12% or 18% are applied to all other goods. Compared with many developed countries that have adopted a single indirect tax rate, India's rate is still complicated, but it has been simplified considering the multiple tax types and rates that existed before the GST was introduced.

government. A Program Implementation Plan (PIP) is prepared for the budget request. Once the budget is approved, procurement is carried out based on the Record of Procurement (ROP). The budget is allocated on a quarterly basis, and some consumables are provided in-kind by the central government.

Bid documents are approved by the Procurement Board through a process of preparing an item list (list of equipment) and then specifications. The bid price includes the warranty period (one year, three years, five years, etc., depending on the type of equipment) and the price of comprehensive maintenance contract (CMC) or annual maintenance contract (AMC) for high-end equipment.

As other procurement methods, Reagent Rental Contracts (RRC), in which manufacturers and/or distributors install medical equipment at no upfront cost and collect funds through the purchase of reagents is introduced for mainly some laboratory equipment.

For reference, procurement of some goods is conducted as a part of the World Bank-supported project (Nagaland Health Project), and the procurement for the Project is carried out based on the World Bank's guidelines, Systematic Tracking of Exchanges in Procurement (STEP).

In addition, Indian government has been introduced “Make in India” since 2014 which is an initiative to create and encourage companies to develop, manufacture and assemble products made in India and incentivize dedicated investments into manufacturing, and the condition that some ratio of medical equipment shall be manufactured inside India has been required for the government procurements, which makes foreign companies including Japanese ones difficult to participate in the biddings. The ratio was 50% for Class I local supplier and 20% for Class II local supplier, but it has been amended that the ratio could be set higher.

5.1.3 Medical Equipment Maintenance in Nagaland State

In recent years, the maintenance of medical equipment in public medical facilities in India has been outsourced to private companies based on the Biomedical Equipment Management and Maintenance Program (BEMMP) of the National Health Mission, with each state selecting and contracting with a company to outsource.

In Nagaland, outsourcing of maintenance was also implemented, with a five-year contract signed in 2016 with Sindoori Faber, a private company headquartered in Chennai, but the contract was terminated after three years due to failure to perform the tasks stipulated in the contract since the company was not able to allocate enough skilled engineers. Since then, Biomedical Engineers have been hired to perform in house maintenance in the two districts of Kohima and Dimapur.

Currently, outsourcing to a private company, Trimmed Solution (a Hyderabad-based company), for the entire state has been considered again, but this time on a temporary basis for a period of six months, with a performance evaluation to determine if a full contract will be introduced. This company has made a trial contract agreement for six months from December 2022 to June 2023 allocating 7 engineers for the maintenance of medical equipment for 179 health facilities including 11 District Hospitals in Nagaland State and allocated seven engineers in Nagaland City, and currently one year extension of the contract is under the process. However, outsourcing issues surfaced like there are still not enough number of skilled engineers allocated due to difficulties of recruitment to cover the whole state, furthermore, the staff in health facilities are not very well aware of the system of outsourcing and does not know how to contact the company in case some maintenance or repair is needed.

The scope of works required of the engineers or technicians employed by the outsourced private company are as follows:

- Defect handling and repair of general medical equipment, excluding CMC equipment,
- Periodic inspections (quarterly) of general medical equipment, excluding CMC equipment, including replacement of parts,
- Management of periodic inspections of equipment by manufacturers and distributors of CMC-covered equipment, as well as handling of malfunctions and breakdowns.

One of the challenges in maintaining medical equipment in India is that it is difficult for in-house engineers or technicians (individuals) to handle the mandatory accuracy checks of equipment. However, individual

Biomedical Engineers certified by the National Accreditation Board for Test and Calibration Laboratories (NABL: a certification to control and check the accuracy of general medical equipment, including laboratory equipment) or the National Accreditation Board for Radiology, X-ray, CT, C-arm quality assurance Radiology (NABL: a certification to check the accuracy of radiology equipment) might conduct such works.

5.2 Contents of the Medical Equipment Planning

5.2.1 Plan of Medical Equipment

At the initial stage of the Survey, a list of the proposed medical equipment was provided by DHFW. Through the field surveys and series of discussion between Stakeholders in Nagaland and the JICA Survey Team, the list of medical equipment to be installed in NMCH has been finalised.

The list is divided into the NMCH, which is to be constructed through a Yen Loan Project, and the MCH, which is being constructed based on the government funds (Appendix 3). The unit cost of each equipment used to calculate the procurement cost is based on the market price, although some equipment is priced in accordance with the standard price published by the National Health System Resource Centre (NHSRC: <https://nhsrindia.org/>). The prices were set after taking into consideration the cost of CMC / AMC for the equipment with advanced technology and requires quality control.

The equipment list is planned to include equipment needed for the departments listed in Table 5-1. The bed capacity for NMCH and MCH will be 400 and 100 beds, respectively.

Table 5-1 Department/Section Listed in the List of the Proposed Medical Equipment

	Department / Section	Major Equipment
Equipment for NMCH		
1	Diagnostic Imaging	General X-ray, fluoroscopy, mobile X-ray, CT, MRI, X-ray protection gloves and aprons, etc.
2	Outpatient Consultation Internal Medicine, Surgery, ENT, Eye, Dental, Dermatology and Venerology, Psychiatric, Orthopaedics	Internal Medicine: Electrocardiogram (ECG), ultrasound, stress test system (treadmill, ECG, etc.), pulmonary functioning analyser, etc. Surgery: Instrument set, etc. Dermatology and Venerology: Equipment for outpatient clinics ENT: Examination unit and chair, etc. Eye: Examination unit and chair, etc. Dental: Dental unit and chair, autoclave, etc. Orthopaedics: Gypsum cutter, instrument set, etc. Psychiatric: Equipment for outpatient clinics
3	Outpatient Consultation Tuberculosis and Chest Department	Equipment for outpatient clinics
4	Operating Theatre - General Surgery-2 - ENT-1, - Eye-1, - Orthopaedics-1, - Septic-1	Operating light, operating table, anaesthesia machine, vital sign monitor, C-arm X-ray, operating microscope, etc.
5	Anaesthesia	Anaesthesia machine, laparoscope, ventilator, etc.
6	Surgical Instruments	Assorted operating instrument set
7	CSSD	Autoclave, ultrasonic cleaner, etc.
8	ICU	Vital sign monitor, ventilator, infusion pump, syringe pump, etc.
9	Dialysis Unit	Dialysis machine, bed, etc.
10	Endoscopy	Upper and lower gastrointestinal fiberscopes, etc.
11	Blood Bank	Refrigerated centrifuge, refrigerator, freezer, etc.
12	Laboratory (Biochemistry, Pathology, Microbiology, Immunology, etc.)	Haematology analyser, biochemistry analyser, immunology analyser, etc.
13	Physiotherapy	Short wave diathermy, electrotherapy machine, muscle stimulator, electronic traction device (cervical and lumbar spine), etc.
14	Post Mortem Room	Autopsy table, mortuary refrigerator, etc.
15	Emergency	Mobile X-ray, resuscitator, ventilator, defibrillator, ECG, etc.
16	Oxygen Supply	Oxygen plant

	Department / Section	Major Equipment
17	Others	Equipment for laundry, kitchen, patient wards, general offices, auditorium, etc.
Equipment for MCH		
18	Obstetrics and Gynaecology Department	Cardiotocogram (CTG), infant incubator, infant warmer, gynaecological examination table, etc.
19	Labour Room	Bed, delivery bed, CTG, etc.
20	Operating Theatre (2 Rooms) for Obstetrics and Gynaecology	Operating light, operating table, anaesthesia machine, vital sign monitor, etc.
21	Paediatric	Equipment for outpatient clinics
22	Neonatal Intensive Care Unit (NICU)/ Special Newborn Care Unit (SNCU)	Infant incubator, infant warmer, ventilator, vital sign monitor, infusion pump, syringe pump, etc.
23	Immunisation Room	Equipment for outpatient clinics
24	Others	Equipment for laundry, kitchen, patient wards, general offices, auditorium, etc.

Source: DHFW, Nagaland

5.2.2 Maintenance and Management of Medical Equipment

For the maintenance of medical equipment for the new medical college and hospital, outsourcing to a private company is an option, but in addition, collaboration with the National Institute of Electronics and Information Technology (NIEIT) could be considered. In-house maintenance of medical equipment is considered difficult due to the large variety of medical equipment and the need to deal with precision management by licensed technicians and institutions.

Regarding the improvement of medical equipment maintenance capacity through soft components, etc., the maintenance of medical equipment would be outsourced to private companies. Since the outsourcing company may change every few years, and since soft components, etc., targeting private companies are not suitable as a scheme, daily maintenance by doctors, nurses, etc., who are the users of medical equipment would be considered as soft components from the viewpoint of preventive maintenance.

5.2.3 Procurement of Medical Equipment

As mentioned above, basically India has its own procurement system, however, after the discussions and in consultation with the India side, the “Guidelines for Procurement under Japanese ODA Loans” has been agreed. As for the method of bidding, International Competitive Bidding (ICB) shall be considered for the ODA loan portion.

As for the packaging of the bidding, there would be a single package and multiple packages, and Table 5-2 shows the comparison between the two.

Table 5-2 Comparison of Procurement Package

	Single Package	Multiple Packages
Candidates	• International trading firms • Joint ventures of agents	• Sole local agents • Joint ventures of local agents.
Management of the Project	• There is only one bidding. • Client and PMC only deal with one contractor.	• There are multiple biddings. • Client and PMC need to deal with multiple contractors.
Competitiveness	• Companies with certain size (amount) of procurement experience and financial capabilities could participate in the bidding. • Bidding price may include trading firms' management cost.	• Smaller companies including local agents could participate in the bidding. • Bidding price might be lower than single package.
Technical Issues	• One contractor shall be responsible for the whole equipment in the package and need to arrange the construction and IT packages.	• Arrangement between the medical equipment contractors is essential during the installation stage besides the arrangement with the construction and IT packages.

Source: JICA Survey Team

5.2.4 Maintenance for Medical Equipment

(1) Maintenance Contract

For the maintenance of medical equipment for the NMCH, outsourcing to a private company is an option, but in addition, collaboration with NIEIT could be considered. In-house maintenance of medical equipment is considered difficult due to the large variety of medical equipment and the need to deal with precision management by licensed technicians and institutions. However, it is preliminary considered by the DHFW to hire in-house maintenance engineers and technicians considering the issues of outsourcing and for sustainable maintenance.

At present, it is not identified the scope of the In-house Biomedical Engineer's responsibilities, it seems to be required to have following capabilities for medical equipment management works¹⁶:

- 1) Quarterly basis update of medical equipment inventory (brand name, model number, serial number, local distributor, operational status, etc.)
- 2) Periodical preventive maintenance (by quarterly basis). Target equipment is common medical equipment which is not covered by Comprehensive Maintenance Contract (CMC) / Annual Maintenance Contract (AMC).
- 3) Handling of the medical equipment which is not functioning properly or malfunctioning. Target equipment is common medical equipment which is not covered by CMC / AMC.
- 4) Management of manufacturers and local distributors / service agents of medical equipment. Target equipment is common medical equipment which is not covered by CMC.
- 5) Disposal of aged equipment that has exceeded its useful life which will also be specified in inventory or when the instrument becomes redundant.

For some of the high-end and expensive medical equipment such as shown in the table below, CMC/AMC shall be added in the project since it is not in the scope of in-house engineers or technicians to conduct maintenance for such equipment but the scope of manufacturers or manufacturer's agents (Table 5-3).

Table 5-3 Equipment with CMC/AMC (Proposal)

Name of Equipment		
MRI	Ventilators	Haematology Analyzer
CT scan	Autoclave	Cystoscope
X-ray machine	Laparoscope	ECHO Cardiography Machine
X-ray machine mobile	Endoscope	
Ultrasound machine	Bronchoscope	
Mammography unit	Anaesthesia Machine	
Dental X-ray machine	Blood Gas Analyzer	
C-arm X-ray machine	Biochemistry Analyzer	

Source: JICA Survey Team

(2) Soft component

To utilise the medical equipment properly and for a long period, daily maintenance at site by users and engineers/technicians is essential. Therefore, as technical assistance soft component for the medical equipment maintenance, which aims to improve the capacity of maintenance skills and to utilise the medical equipment for a long period by learning preventive maintenance shall be included. Maintenance of medical equipment shall be categorised into maintenance by the user, by the biomedical engineers/technicians and by the manufacturers/agents. Maintenance by the manufacturers/agents shall be covered by CMC/AMC mentioned above while by the users and biomedical engineers/technicians shall be covered under the soft component.

Proposed contents of the soft component are presented in Table 5-4.

¹⁶ All the equipment/ instruments will be subjected to this proposal once CMC/AMC expired or equipment which are not under CMC/AMC if not functioning properly. Biomedical engineer shall be invited on need basis till NIMSR starts fully functioning. Appointment on hiring feasibility shall be determined once NIMSR starts functioning fully.

Table 5-4 Contents of Soft Component (Proposal)

Item	Target	Contents	Method
Daily maintenance Preventive maintenance	User of medical equipment (Doctors, nurses, other medical personnels)	Daily checking, cleaning, etc., before/after the usage of medical equipment.	By manufacturers' training at site and manufacturer's facilities.
Daily maintenance Preventive maintenance Periodical maintenance	Staff of maintenance department (Bio-medical engineers, technicians)	Daily maintenance and periodical maintenance to prevent the defects.	By manufacturers' training at site and manufacturer's facilities.
Data management	Staff of maintenance department (Bio medical engineers, technicians)	To keep the record of usage and maintenance for proper budget allocation and procurement of consumables, spare parts, etc.	By PMC at site.

Source: JICA Survey Team

Chapter 6 ICT Planning

6.1 Current Situation

6.1.1 ICT Related Policies

(1) The National Health Policy (2017)

The National Health Policy, 2017, aims to enhance digital health technologies and establish a digital health ecosystem in India. In this policy, the broad deployment of digital tools is advocated to improve the efficiency and outcomes of the healthcare system and to create an integrated health information system to meet the needs of all stakeholders and improve efficiency, transparency, and convenience for citizens. The goal of this policy is to provide better healthcare in terms of accessibility, quality, affordability, reduction of disease burden, and efficiency of monitoring healthcare coverage for citizens. The policy proposes to use "Aadhaar" (national identification number in India) for identification of patients/citizens. The creation of registries (patients, healthcare providers, services diseases, documents, events, etc.) to enhance public health and big data analysis, the creation of health information exchange platforms and national health information networks, the use of national fibre optic networks, and the use of smartphones and tablets for real-time data acquisition are the main strategies of the national health information architecture [58].

(2) National Digital Health Mission

The National Health Policy, 2017, has the following goal; “The attainment of the highest possible level of health and wellbeing for all at all ages, through a preventive and promotive healthcare orientation in all developmental policies, and universal access to good quality healthcare services without anyone having to face financial hardship as a consequence.¹⁷”

To achieve the goal, an initiative by Government of India (GoI) called the National Digital Health Mission (NDHM) launched in six union territories in India. In NDHM, it is aimed that “to create a national digital health ecosystem that supports universal health coverage in an efficient, accessible, inclusive, affordable, timely and safe manner, that provides a wide-range of data, information and infrastructure services, duly leveraging open, interoperable, standards-based digital systems, and ensures the security, confidentiality and privacy of health-related personal information.¹⁷”

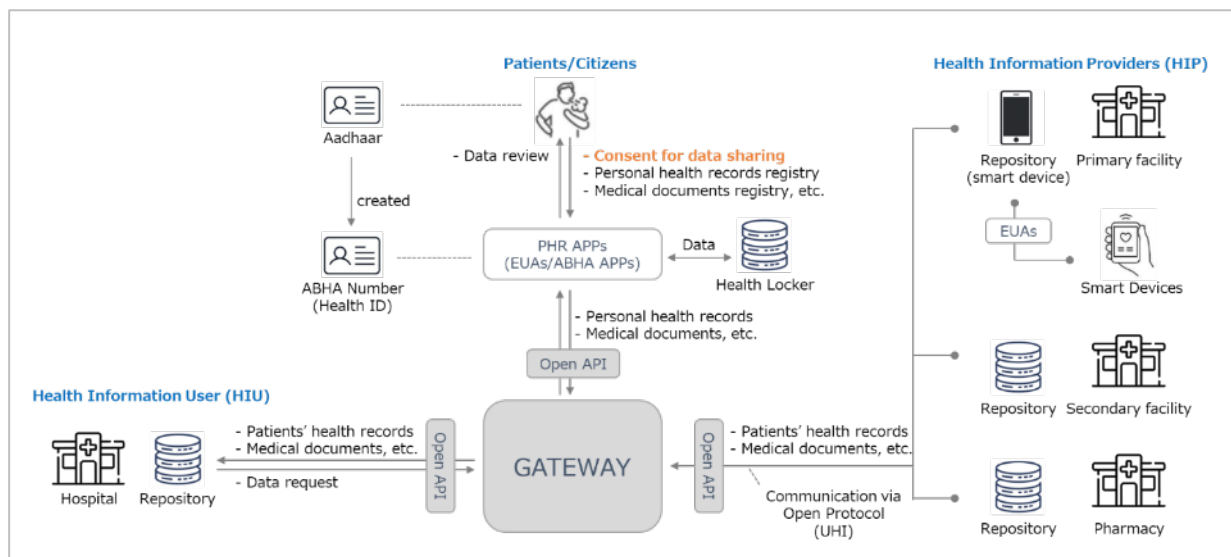
NDHM aimed at developing the backbone for a unified digital health infrastructure. Among other objectives, NDHM sought to bridge the gap amongst multiple stakeholders that are a part of the healthcare ecosystem. A unique Health ID will be provided to every citizen which will contain details of their diseases, diagnoses, report, medication etc., in a common database through a single ID. This will essentially be a digitised version of all their health records. This digital database will be linked to the registry of doctors and health facilities across the country. Digital data/records will help medical college professors conduct/public quality research articles, secure funding from national bodies and improve their professional knowledge through submission of research papers in national and international conferences. The implementation of NDHM is expected to significantly improve the efficiency, effectiveness, and transparency of health service delivery overall. Patients will be able to securely store and access their medical records (such as prescriptions, diagnostic reports, and discharge summaries), and share them with healthcare providers to ensure appropriate treatment and follow-up.

NDHM does not store any of a patient’s health records, and there is no centralised repository¹⁷. The health records are stored at point of care or closest possible location such as the medical facility where the patient visited and the records were created, as per their retention policies and are shared over the NDHM network with encryption mechanisms only after the patient’s expression of his/her consent. Anonymous records can be used by the government to make data driven public policy decisions. However, no individual’s information and health data shall be shared without their consent. Records will be shared with the doctor or health facility only after patient consent. In patient consent one can customise and edit the permissions in terms of duration and type of records visible.

¹⁷ Strategy Overview of National Digital Health Mission, National Health Authority, https://www.niti.gov.in/sites/default/files/2021-09/ndhm_strategy_overview.pdf (accessed 24 October 2020), India

(3) Ayushman Bharat Digital Mission

From September in 2021, the Ayushman Bharat Digital Mission (ABDM) took over the initiative of NDHM to establish the nation-wide digital health infrastructure to secure the interoperability and accessibility of medical data in India. ABDM is also expected to establish a comprehensive ecosystem to support national public insurance scheme by GoI. The concept of ABDM is shown in Figure 6-1.



Source: JICA Survey Team

Figure 6-1 Concept of ABDM

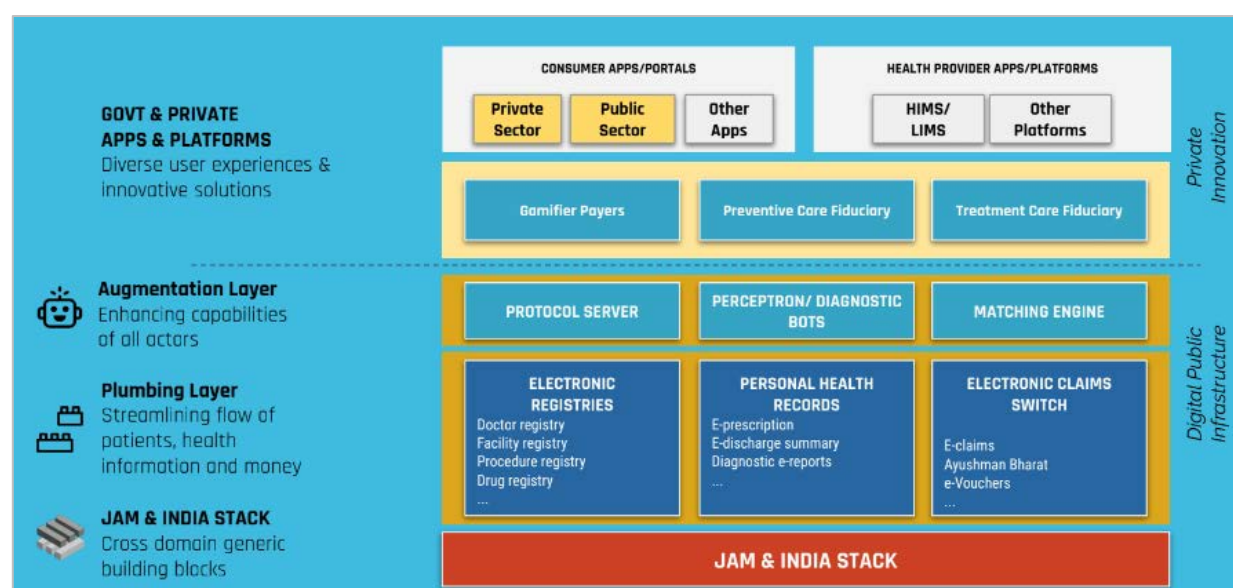
*Abbreviations and pronouns on Figure 6-1.

- Health Information Provider (HIP): any entity that creates health information pertaining to a user and is ready to share it digitally with users by adopting to compliant software.
- Health Information User (HIU): any entity that intends to view health records of an individual, with their informed consent using compliant software.
- Aadhaar: national ID in India
- Ayushman Bharat Health Account (ABHA) number: a unique Health ID for the patient created based on Aadhaar.
- End User Application (EUA): digital health applications at the point of record by the patient and/or at the point of care by medical staffs.
- Health Locker: data repository for only the patient to store the patient's medical records, e-prescriptions, etc.
- Unified Health Interface (UHI): GoI's open protocol with which relevant parties such as HIP and HIU can communicate and share a patient's records based on the patient's consent.

ABDM is an initiative built on a technology foundation called India Stack and India Health Stack. based on a set of relevant open Application Programming Interfaces (API) and digital architectures that enable relevant parties such as citizens including patients, medical practitioners, medical facilities, private companies, government etc. to implement interoperable and efficient data sharing, operation procedures such as consent, claim insurance, payment, etc. in the health sector of India.

India Stack is a set of cross-domain open APIs composed for 4 main purposes of consent, cashless, paperless, and presence-less. With this technical foundation, the relevant parties can digitally share data, authorize data utilization, cashless payment, sign documents, etc. with unique national ID or registry ID. India Health Stack is also a set of health-domain open APIs established upon the architecture of India Stack. With India

Health Stack, the relevant parties can share medical data etc. based on patients' consent and so forth (Figure 6-2).



Source: website of iSPIRIT

Figure 6-2 India Health Stack Overview

(4) Nagaland Vision 2030

In Nagaland, Nagaland Vision 2030 refers to the utilisation of Information and Communication Technologies (ICT) for healthcare sector. In Nagaland Vision 2030, it is said that “possibility of information technology should be harnessed to circumvent the gap of physical inaccessibility and shortage of skilled manpower. As the IT infrastructure makes its inroads into even the remote areas of the state, the possibility of telemedicine, can become a possibility.” Furthermore, regarding the ICT utilisation for such issues/challenges in Nagaland, Nagaland Vision 2030 also refers that “lack of specialist doctors in the short run can be mitigated if there is high speed internet and electricity in the remote areas with tie up with some big hospitals of metro cities.” The following area of ICT utilisation in healthcare sector in Nagaland is mentioned in Nagaland Vision 2030.

eHEALTH

“Adoption of eHealth will provide a better and faster way of using health resources for information dissemination, interaction and collaboration among health professionals, health providers and the public. There is need to expand telemedicine to 11 District Hospitals and whichever can be gradually upgraded to telehealth which include computer assisted telecommunications to support management, surveillance, literature and access to medical knowledge.”

mHEALTH

“The problems of limited human resources and inaccessibility can be mitigated to a large extent by taking advantage of high mobile phone penetration in remote areas and the growing smart phone culture through adoption of mHealth. mHealth will bring services to the under-served areas through SMS, mobile videos, and interactions on health and collection of vital health data. With wider usage by the general public, it can increase public wellness and bring down healthcare expenditures. Considering lack of infrastructure and limited capacity in rural areas mHealth is no longer an option – it is a must, if equitable society is to be ensured.”

6.2 Status of ICT in Nagaland: Findings from the 1st and 2nd Field Survey

The following is a summary of ICT utilisation status based on the results of the field surveys conducted by the Japan International Cooperation Agency (JICA) Survey Team in September - October 2022 (the 1st field survey) and in January 2023 (the 2nd field survey). In particular in the summary, three perspectives will be

addressed to describe the current situation; facility level (the status of system deployment within the primary and secondary medical facilities), state level (the status of data linkage among medical facilities, and the status of telemedicine implementation in Nagaland), and nation level with particular consideration given to digitisation and digitalisation.

Digitisation here refers to the transition from analogue to digital (e.g., digitisation of paper medical records, etc.). Digitalisation refers to the integration, management, and secondary use of the digitised data and systems (e.g., integrated management of digital data using HIMS, automatic payment calculation of medical fees, secondary use of data using AI, etc.). Through these digitisation and digitalisation, it is necessary to improve the efficiency of existing operations and systems.

6.2.1 Facility Level: System Deployment within the Primary and Secondary Medical Facilities in Nagaland

(1) Secondary Medical Facilities: District Hospitals

District hospitals, which are the secondary-level medical facilities, are currently on top of the referral system in Nagaland. With the support by Nagaland Health Project (NHP) funded by the World Bank, and also with the technical support by Tattva Foundation, which is a non-profit organization, the District Hospitals are in the process of system deployment in a part of its medical departments. Each hospital is eventually integrating those systems to establish a Hospital Information Management System (HIMS) in the future, by which various medical data in each department in those hospitals will be integrated and managed under a unique patient account. (The NHP-supported systems in District Hospitals are hereinafter referred to as the “NHP System.” NHP System is customized and developed by Tattva Foundation based on an open-source HIMS called “Bahmni¹⁸.”). According to the interviews with the Department of Health and Family Welfare (DHFw) an information and communication technologies (ICT) consultant from NHP, and Tattva Foundation, the NHP System currently consists of the following modules as its system component in Table 6-1.

Table 6-1 System Components of the NHP System

#	Module	Purpose	In Use
1	Registration Module	The purpose of the registration module is to create a new EMR record or initiate a follow-up visit for the patient. The registration module captures the patient’s name, age, gender, address, education, and occupation, among other basic information. At the conclusion, the patient receives a registration slip containing all the necessary information for consultation, billing, pharmacy, or laboratory. Documents such as x-rays and prescriptions can also be added to the visit at this stage.	Yes
2	Clinical Module (Doctor’s Module)	The purpose of this module is to document patient encounters, capture clinical data, and manage patient health information. It includes features such as clinical note-taking, order management, medication management, diagnosis, and treatment planning.	No
3	Laboratory Module	Laboratory Information System is integrated with EMR application to provide facility for conducting laboratory tests – it includes sample collection, entering, and validating the results.	Yes
4	ERP Module (for Pharmacy and Billing)	The ERP module is built over Odoo/ Open ERP and allows users to manage an integrated billing, pharmacy, and stock management system. Currently the following sub-modules are being used by the various District Hospitals to manage their Billing and Pharmacy sections: i. Accounting Configuration – ii. Pharmacy Configuration (used only in Pharmacy section) iii. Billing and Pharmacy App iv. Inventory Management System v. Quotation and Invoices	Yes

¹⁸ Bahmni has 2 different packages of “Bahmni Standard” and “Bahmni Lite.” Bahmni Standard is for a hospital with approximately less than 100-bed capacity. On the other hand, Bahmni Lite is for a primary medical facility such as clinics. NHP System has been developed based on the customization of Bahmni Standard. Bahmni is developed by ThoughtWorks Inc.

#	Module	Purpose	In Use
5	Patient Documents Module	This feature is used to receive and capture patient data in the form of documents (scanned patient paper records, X-Ray images, and other external documents). Bahmni permits uploading these documents and associating them with specific patient visits. All of these files are attached to the patient's record and are accessible via the Visit dashboard.	Yes
6	Order Fulfilment and Procedures	Order Fulfilment is responsible for handling any and all orders that may arise during a hospital scenario, including those for the laboratory, radiology, procedures, and drug orders.	Yes
7	In-patient Management Module	The In-Patient Management Module (IPD) is used to manage the admission, discharge and transfer of patients. It includes ward management and bed allocation.	Yes
8	Bed Management Module	This module allows creation of wards and management of beds through an interactive visual interface.	Yes

Source: Tattva Foundation

According to Tattva Foundation, in addition to the above modules, the system functions can be expanded in the future with the deployment of Radiology Information System (RIS) and Picture Archiving and Communication System (PACS). However, the contract between Tattva Foundation and NHP is expiring in June 2023. Therefore, further system implementation is expected to be in the scope after the contract is renewed.

(2) Primary Medical Facilities: CHC, PHC, SC

In most of the cases, the primary medical facilities in Nagaland are not digitised and digitalised. The statistical data such as the number of patients visiting the facilities, and the number of disease cases in the facilities, etc., are managed using Microsoft Office and shared with DHFW via e-mail. Within the primary healthcare facilities, there are administrative staffs called Low Division Assistants (LDAs), and the LDAs collect, integrate, and manage statistical data monthly on an annual basis and prepare reports.

In addition, a part of the reporting systems led by GoI has been partially introduced, but these government systems introduced to the primary medical facilities are independent from each other, and the data is not linked. The examples of the systems deployed to medical facilities under GoI's initiative are Drug and Vaccination Database Management System (DVDMS) and Equipment Maintenance Management System (EMMS). Both systems were developed by the Centre for Development of Advanced Computing, India (C-DAC) of GoI and have been deployed in medical facilities across India. DVDMS has been implemented in the pharmacy department of each medical facility. In Nagaland, equipment such as PCs for the abovementioned GoI systems are supplied to each medical facility by the Government of Nagaland, and EMMS is similarly designed for proper inventory management of equipment in the context of the coronavirus disease 2019 (COVID-19) pandemic. In addition, it was also observed in the field survey that smartphones with such reporting applications have been supplied to medical facilities temporarily for the government to track the number of patients with specific diseases such as COVID-19 (Table 6-2).

Table 6-2 Status of Digitisation/Digitalisation in Primary and Secondary Medical Facilities in Nagaland

Primary Medical Facilities		System	eSanjeevani (Telemedicine)
District Hospital		NHP systems DVDMS, EMMS	eSanjeevani (referred from Sub-centre)
Community Health Centre		DVDMS	N/A
Primary Health Centre	Urban	DVDMS	N/A
	Rural	DVDMS	N/A
Sub-centre		DVDMS	eSanjeevani AB-HWC (refer to District Hospitals)

Source: JICA Survey Team

6.2.2 State Level: Data Linkage among Medical Facilities in Nagaland

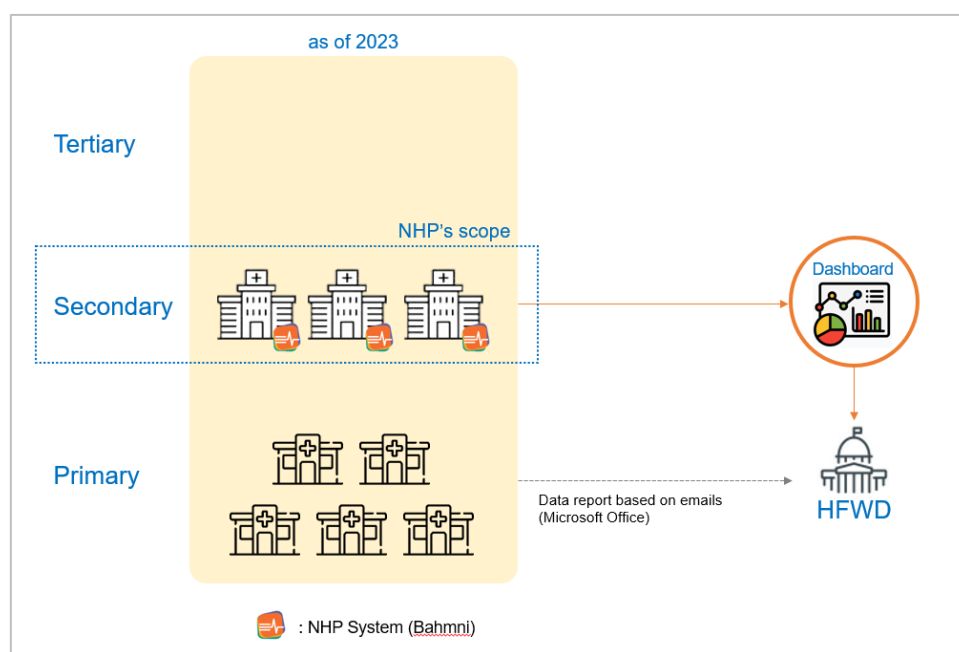
(1) Linkage of the NHP System

All 12 District Hospitals in Nagaland have deployed the NHP System in each facility. As the NHP System is a stand-alone system based on on-premise server (local server), a patient's medical record generated at each facility is collected and stored in the local server of each hospital. The NHP System has been already compliant with ABDM, which technically enables HIU to refer a patient's medical records provided from HIP with the approval of the patient (Figure 6-3).

The NHP System also equipped with data warehouse (DWH) and web-based dashboard, wherein DHFW can centrally monitor and manage the use of NHP System, refer to data sets collected, and sort through the NHP System in each District Hospital. The web-based dashboard updates itself on six-hourly basis and fetches data remotely from each District Hospital. The dashboard is hosted on NHP cloud.

According to Tattva Foundation, the following are the key objectives of the NHP System. The dashboard aims for an "increased adoption of screening programs and preventive health measures." The dashboard is expected to be utilised for the establishment of appropriate healthcare policies, public health measures, and interventions based on the actual data through the NHP System, which may contribute to evidence-based policy making in Nagaland.

- Improve hospital health service delivery, effectiveness, and efficiency by digitising and integrating data collection, processing, reporting, and use of the information.
- Improve clinical decision making through provision of patient history and by standardising and integrating International Classification of Diseases (ICD-10) and laboratory test orders and results (LOINC).
- Reduce duplication of diagnostic testing, imaging, and history taking through electronic medical records.
- Improve medication management.
- Increased adoption of screening programs and preventive health measures.



Source: JICA Survey Team

Figure 6-3 Status of State-level Data Linkage in Nagaland (as of 2023)

Because the primary medical facilities in Nagaland are not fully digitised and digitalised, the data linkage among the medical facilities in Nagaland is limited to the secondary level. As described in Section 6.2.1,

the data report from the primary medical facilities to DHFW is conducted through e-mails based on Microsoft software (Excel, etc.).

According to Tattva Foundation, the dashboard is technically scalable to tertiary and primary level by deploying the different types of NHP Systems to the different levels of medical facilities according to the necessary customisation. For example, although the current NHP System has been developed for District Hospitals, the NHP System for tertiary level would require further modules such as RIS/PACS, operation theatre scheduling module, etc. For the primary level, Bahmni Lite, which is another Bahmni solution as an open-source HIMS designed for clinic level, may be customised and deployed to those primary medical facilities.

(2) Telemedicine in Nagaland: eSanjeevani

In Nagaland, a telemedicine program called Naga TeleHealth had been implemented by the United States Agency for International Development (USAID). A new telemedicine program called eSanjeevani, which is GoI's nation-wide telemedicine initiative, has taken over the role of telemedicine in Nagaland starting from August 2022. According to the interviews with DHFW, the reason for switching to eSanjeevani was not because of any serious problems with Naga TeleHealth's scheme, but because eSanjeevani had been launched and the switch to GoI's initiative was made.

eSanjeevani offers two types of telemedicine scheme. One is a Doctor-to-Doctor (D2D) solution, which is called eSanjeevani Ayushman Bharat-Health and Welfare Centre (eSanjeevani AB-HWC), and another is a Doctor-to-Patient (D2P) solution, which is called eSanjeevani OPD. Naga TeleHealth provided D2D telemedicine by connecting Primary Health Centres (PHC) and Community Health Centres (CHC), where Medical Officers are staffed, with Sub-Centres where no Medical Officer is available. On the other hand, in eSanjeevani AB-HWC, only the District Hospitals provide online consultation as telemedicine services to Sub-centres, where only a nurse called a community health officer (CHO) is staffed.

The operation and necessary information of eSanjeevani AB-HWC is as follows. For patients visiting a sub-centre in Kohima, if the CHO considers it necessary, the CHO will send a request to a general practitioner or a specialist in some of District Hospitals or CIHSR in Nagaland for an online consultation through eSanjeevani AB-HWC. The main data to be entered to eSanjeevani AB-HWC is shown below. Once the data entry is completed by the CHO at the sub-centre, the CHO will confirm the availability of the medical doctor in the secondary-level hospitals and then request an online consultation.

- Ayushman Bharat Health Account (ABHA) number
- Patient information (name, parents' name, age, sex, address, blood type, marital status, and contact info (mobile, e-mail))
- Medical information (medical records, reports, general examination, allergy, problem, diagnosis (manual selection of typical diseases), and query)



OPD (Sub-Centre)



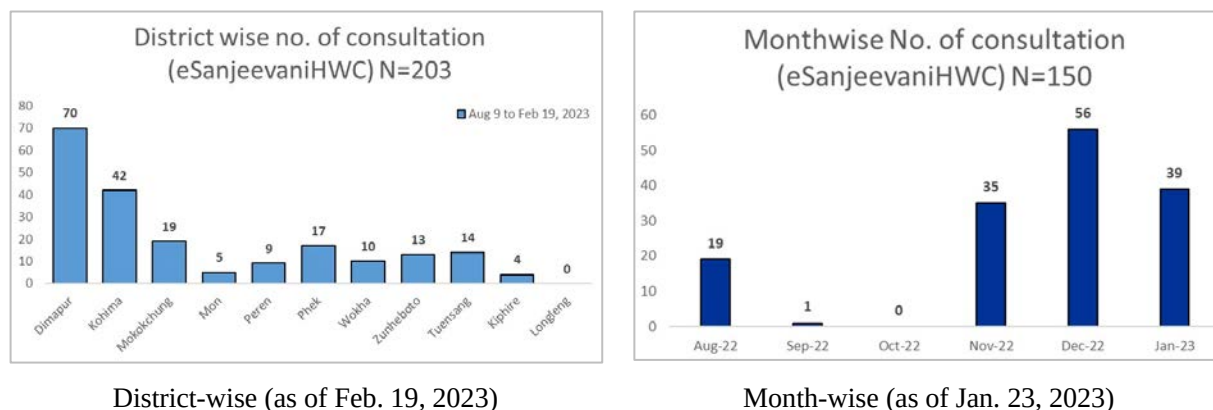
Screen of eSanjeevani AB-HWC (Sub-Centre)

Source: JICA Survey Team

Photo 6-1

IT Equipment in Health Facilities

eSanjeevani AB-HWC is principally a hub and spoke program. However, according to Jhpiego, an administrative and implementation organisation of eSanjeevani program, there is no hub hospital and clear telemedicine referral system in Nagaland. Some of the secondary-level hospitals share the role as hub hospitals and take a rotation system of doctors. Those hospitals allocate empanelled doctors, who are supposed to provide the online consultations approximately twice a week from Monday to Saturday to implement online consultations. The number of online consultations in Nagaland as of January and February in 2023 is indicated in Figure 6-4¹⁹. One reason for the outstanding number of Dimapur is the high contribution by CIHSR's doctor in Dimapur in the aforementioned rotation system.



Source: Jhpiego

Figure 6-4 Number of Online Consultations in Nagaland

On the other hand, eSanjeevani OPD is a service for individual patients and local citizens to remotely access medical consultation with the patients' personal devices such as smartphones and PCs. Although DHFW has done advertisement to get the population know about eSanjeevani OPD, and that eSanjeevani OPD has been in service, patients and citizens have not used the service as of January 2023, based on the statistics from Jhpiego. The reasons are due to lack of personal devices and network especially in rural areas, low awareness of the D2P telemedicine program among the rural population according to Jhpiego.

Regarding the telemedicine referral system with the other states, eSanjeevani AB-HWC does not allow telemedicine requests from primary medical facilities in Nagaland to secondary and tertiary healthcare facilities in other states. That is because eSanjeevani program does not technically support the inter-state referral. When a CHO in the primary medical facilities requests for an online consultation with a doctor at a District Hospital, the CHO can only select a doctor in the same state who are empanelled in the eSanjeevani program when the CHO selects a doctor to refer to on the screen. On the other hand, after the online consultation with a doctor in a secondary-level hospital in the same state, if the doctor determines that the patient needs to be referred to a hospital in another state, the doctor will make the referral by contacting a doctor at a hospital in another state by phone call or referral letter as in the conventional way, rather than through eSanjeevani AB-HWC.

Similarly, eSanjeevani OPD basically limits the availability of online consultation for individual patients using its services within a state. If a patient wishes to take online consultation with a doctor outside the state, the patient needs to re-register the personal information such as phone number and resident address in another state.

According to the analysis by Jhpiego, in the first place, eSanjeevani program is a gateway of the telemedicine referral from primary level to secondary level, and there is no high demand on referrals to other states because there are few severely ill and/or injured patients at the primary level of care.

(3) Telemedicine in Nagaland: 10 Bed ICU Project

In Nagaland, remote ICU project called "10 Bed ICU Project" supported by eGovernments Foundation has been launched. 10 Bed ICU Project was started in 2021 and is a public-private partnership (PPP) program

¹⁹ eSanjeevani program started in Nagaland in August 2022. There is a gap between the total number of the 2 figures due to differences in the period over which the data was collected.

between DHFW and eGovernment Foundation and its donors. eGovernments Foundation provides the following scopes ²⁰:

- Providing and installing state-of-the-art ICU medical equipment at Taluka level government hospitals.
- Deploying award-winning CARE software for delivering improved healthcare outcomes.
- Deployment of the TeleICU system in a hub and spoke model, with TeleICU Hubs in government medical colleges connecting specialists to remote 10 Bed ICU hospitals.
- Basic and advanced critical care training and standardising ICU protocols.
- Community participation to maximise the impact and sustainability of the project.

The 10 Bed ICU Project has created over 200 remote ICUs in eight states in the whole India. In Nagaland, 10 Bed ICU Project installed remote ICUs in all District Hospitals. Since 10 Bed ICU is a hub and spoke system, NHAK takes the role as the hub hospital, and the other 11 District Hospitals are spoke hospitals. NHAK has deployed a hub centre to monitor and manage the remote ICU beds in the other spoke hospitals.

10 Bed ICU is based on CARE, another open-source clinical system. According to eGovernments Foundation, CARE can work with any hardware with comparative specifications and is not restricted to any one brand or model. According to Tattva Foundation, although it has not tried any connection between the NHP System and CARE, the connection would be technically possible if those systems are open-source and provide open Application Programming Interface (API²¹). This technical matter would require further study from both systems in the phase of detailed design.

6.2.3 National Level: Health Management Information System

The medical information collected in the state level is reported to the GoI through the Health Management Information System (HMIS) ²¹ as a national initiative of the GoI. There are prescribed data sets of medical information based on forms. The data can be referred to a web-based portal of HMIS with allocated account and log-in password.

Currently, there is no linkage between HMIS and the NHP System, and the DHFW separately reports statistical figures to HMIS on the forms such as Excel files. Although specific policies and plans for future linkage between the systems was confirmed in this survey, according to Tattva Foundation, there is a technical possibility of some kind of the linkage between the systems in the future in line with policies such as ABDM led by the GoI. It is because the NHP System is an open-source system and relatively more flexible about customisation than systems by private system vendors.

6.2.4 Summary of Healthcare ICT in Nagaland in Digital Architecture

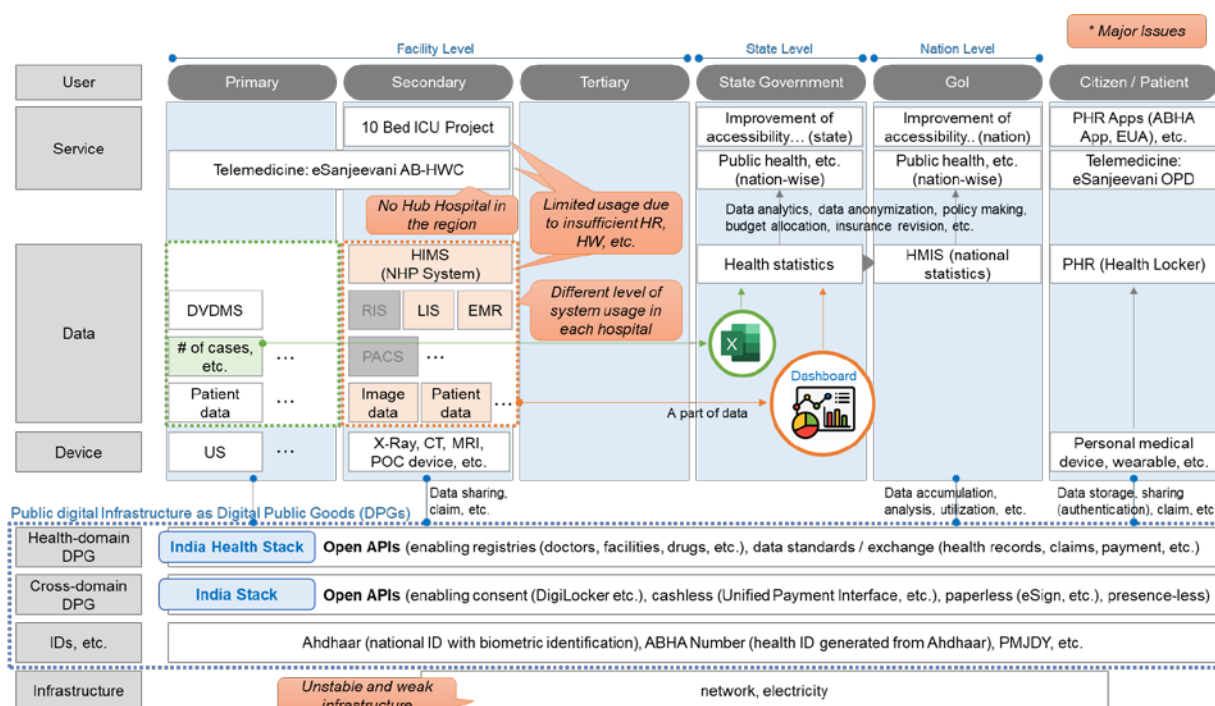
Through the overview of the ICT deployed for the healthcare sector in Nagaland from the perspectives of facility level, state level, and national level, the summary of the healthcare ICT in Nagaland is described in the following figure based on digital architecture (Figure 6-5).

Starting from the NHP system of District Hospitals, the digital environment is being developed to collect medical information within Nagaland from the secondary facility level to the state level. In addition, the information collected at the state level is indirectly utilised up to the nation-level health statistics.

In addition, the NHP system is already ABDM-compliant, and because it is an open-source system, it can be flexibly customised based on the ownership of the Government of Nagaland, establishing a digital architecture that can flexibly respond to future changes in the digital environment and digital policies.

20 10 Bed ICU (Online) (Accessed: 2023-3-31.) <https://10bedicu.org/>

21 It is noted that HMIS is different from a HIMS (Hospital Information Management System) in facility level.



Source: JICA Survey Team based on material by JICA STI/DX Chamber

Figure 6-5 Summary of Healthcare ICT System in Nagaland and Major Issue (Digital Architecture)

6.3 Major Issues and Challenges of ICT in Nagaland

Although the system such as NHP System, ABDM, eSanjeevani, etc. are already deployed in Nagaland to introduce digitization and digitalization for healthcare service following with the GOI's initiative, and the current digital architecture can be drawn as the figure above, the existing ICT is not fully utilized as expected due to several issues and challenges. Based on what was identified during the field survey, major issues and challenges of ICT in Nagaland will be summarised from the perspectives of the facility level, state level, and national level same as the aforementioned perspectives for the ICT situation in Nagaland.

6.3.1 Facility Level: Issues and Challenges of System Deployment in the Medical Facilities in Nagaland

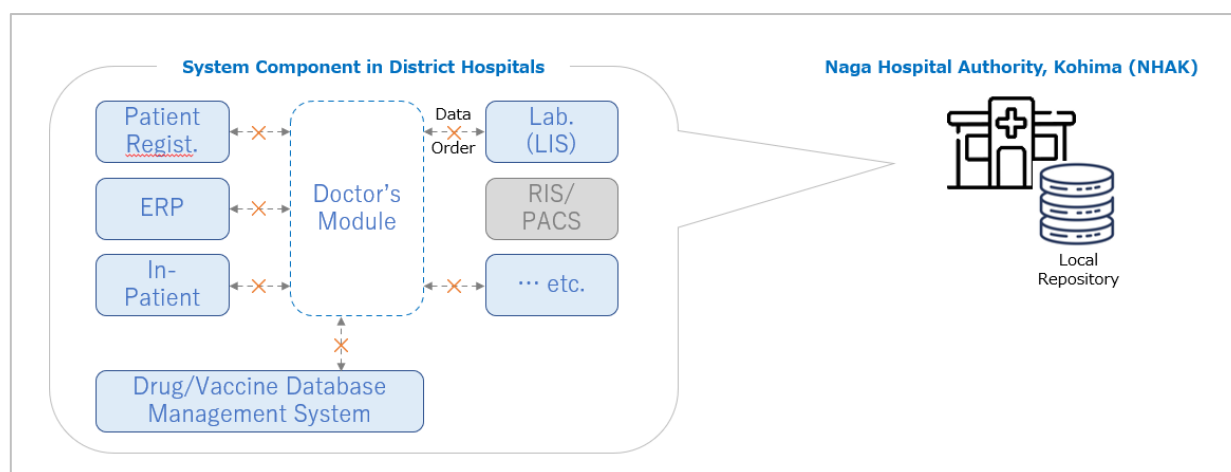
While the NHP System has deployed in the District Hospitals across Nagaland, because there are gaps of digitisation/digitalisation in each District Hospital, the gap has resulted in limited data integration among the departments and modules in the facilities (Figure 6-6). That is due to the lack of data integration infrastructure such as not enough ICT devices in those hospitals, lack of sufficient budgets, lack of understanding and cooperation from medical staffs in the facilities, and so forth. Even in the District Hospitals, currently in top referral hospitals in Nagaland, it is taking time to promote such digitisation and digitalisation. In particular, the Doctor's Module, the backbone of NHP System, has not yet been deployed in some District Hospitals, and data linkage between the department systems composing the NHP System and already in place has not yet been implemented.

In particular, the lack of understanding and cooperation for digitisation/digitalisation from doctors, who are the main users of the NHP System, has been a major barrier to future digitisation/digitalisation of facility level as the digital architecture. The doctors have especially opposed to the deployment of Doctor's Module²². The reason for this is that although the current operation for recording and storing medical records in District Hospitals has been paper-basis²³, if the operation is digitised and digitalised, the medical

²² The Doctor's Module, shown in the centre of "System Component in District Hospitals" in the Figure 6-6, is a system that enables the input of the electric medical record, the input of orders to each department system, and the reference of test data/reports from each department. The Doctor's Module plays the core role in the expected HIMS functions of NHP System.

²³ The original copies in physical paper forms are handed to patients, and the patients store the medical records by themselves. It is mandatory for the District Hospitals to store the hardcopies of the medical records for ten years.

doctors concern is that there would be both paper-basis and system-basis operation for the same operation procedure at the same time, which would also cause an increase of work burden for the medical doctors.



Source: JICA Survey Team

Figure 6-6 Situation of NHP System in a District Hospital in Nagaland

At the facility level, in order to develop an environment in which hospital operations can be conducted more efficiently and effectively, in addition to the resolution of the abovementioned issues in the deployment of the current basic module package of the NHP System, it is necessary to deploy additional modules that are not included in the basic package. For example, digitisation and digitalisation of the radiology domain, which take a major part of the whole hospital operations in a hospital, through PACS/RIS is essential for more efficient hospital operations.

6.3.2 State Level: Issues and Challenges of Data Linkage among Medical Facilities in Nagaland

(1) Issues and Challenges of Linkage of the NHP System

Although dashboard has been deployed for the NHP System, as for data linkage between medical facilities in Nagaland, the scope of data linkage is limited due to insufficient digitisation and digitalisation at the facility level. Facility-level digitisation and digitalisation are critical to state-level digitisation and digitalisation because even if data linkage environment is in place to connect data, the environment cannot be fully utilised without the data itself, which is generated at the facility level. Therefore, in order to utilise the dashboard, it is essential to first resolve the facility-level issues to address state-level challenges. For example, since there are penetration gaps in the whole NHP System's module package among the District Hospital, promotion of the full package deployment at each hospital should be undertaken. In addition, even if the NHP System is deployed in a District Hospital, data cannot be obtained unless the system is properly used, so it is also necessary to establish and stabilise appropriate system operation in the whole hospital operation. Relevant countermeasures such as securing budgets, establishing robust implementation team, persuading doctors to use system, etc., are important.

Furthermore, for the primary medical facilities, at least digitisation from paper-basis operation to digital-basis operation to some extent would be required to generate data at the point of care at the primary level, so that DHFW will be capable of properly capturing reliable data across Nagaland.

In addition, as the technical aspect of necessary infrastructure, network connectivity within Nagaland, especially within the Kohima Region, is unstable, and according to the interviews with DHFW and the medical facilities visited during the field survey, the network may be unavailable for several days, and power outages occur frequently. The development of a stable infrastructure for data linkage between medical facilities based on network connectivity is recognised as a priority challenge²⁴.

²⁴ According to the interviews with DHFW, the Government of Nagaland has tried to establish network base stations in the past to improve network connectivity in the state. However, the land acquisition for the base stations did not go smoothly. It was

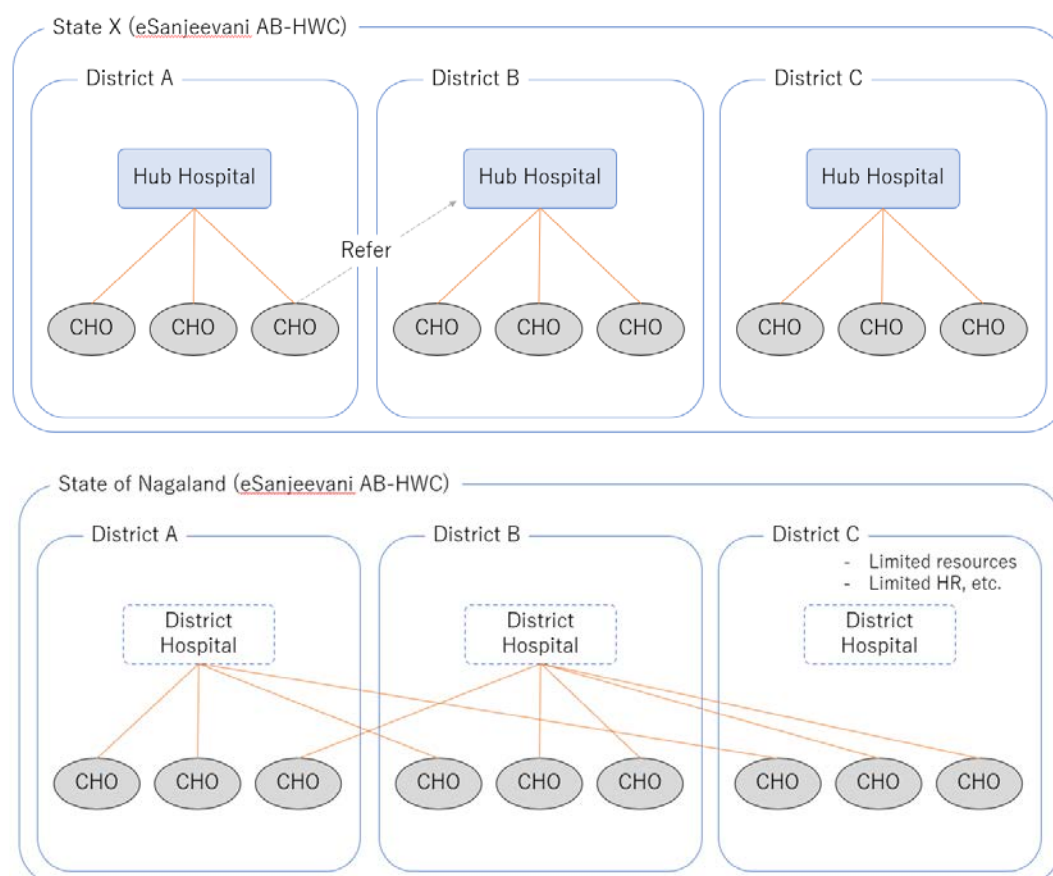
After resolving those challenges and establishing the appropriate environment for the state-wise data linkage in Nagaland, in order to utilise the dashboard for statistical analysis, evidence-based policy making, provision of public health services, etc., setting up appropriate and effective datasets at the dashboard is also important. Those datasets will be designed based on the availability of the data through DWH and dashboard, demands of DHFW as a public health service provider, etc.

(2) Issues and Challenges of Telemedicine in Nagaland: eSanjeevani

Although eSanjeevani is a telemedicine program by GoI, its functions and operation may not necessarily be in line with the realities of the healthcare sector in Nagaland. Regarding eSanjeevani AB-HWC, which principally requires hub and spoke structure among District Hospitals, the implementation structure has not been established yet in Nagaland (Figure 6-7). Although it may be because eSanjeevani program has only been started in Nagaland in August 2022, according to Jhpiego, there are other several backgrounds of the challenges as shown below.

- **Limited infrastructure**
Some of the areas in Nagaland are not accessible to stable network, necessary devices, etc., which are necessary for the telemedicine program. Even some of the District Hospitals, the referral hospitals in eSanjeevani program, have difficulties to obtain such infrastructure.
- **Limited human resources**
There is no empanelled doctor dedicated to eSanjeevani AB-HWC. Most of them have their own patients in their District Hospitals. Due to the daily OPD consultation, the time slot between 10 A.M. to 1 P.M. is the busiest time for the empanelled doctors in their medical facilities, and it is difficult for CHO in a sub-centre to catch a doctor in a District Hospital through eSanjeevani AB-HWC at that time slot. Only two to three doctors actively take care of patients on eSanjeevani AB-HWC, although 13 doctors are registered in eSanjeevani AB-HWC in Nagaland.
- **Limited ICT literacy among the users**
The current empanelled doctors are not very tech savvy and do not pick up tele-consultation calls. CHOs are also not very familiar with those technologies.
- **Technical challenges on eSanjeevani program's side**
eSanjeevani AB-HWC is not very user-friendly in terms of system operation, user interface, etc. According to some of the primary medical facilities, the JICA Survey Team interviewed during the field survey, Naga Telehealth, the former telemedicine program in Nagaland, was easier to use because the program did not limit the tele-consultation from a sub-centre to only a District Hospital. This operation had enabled CHOs to coordinate more flexibly tele-consultation services. Furthermore, eSanjeevani AB-HWC does not have the function to schedule appointments with doctors in the District Hospitals, so a patient and a CHO must wait at a sub-centre until a doctor in a District Hospital becomes available. According to the interviews with a sub-centre's CHO, the average waiting time in normal time is about two to three hours, and in the case of longer waiting times, several days are required.

because the lands owned by the local community and citizens are usually for agricultural-purpose, and it was difficult to convert to commercial-purpose, which is required for the use of the land for the base stations. (*5G network has been in service in whole India from October 2022. DHFW expects Jio, one of the major network service providers in India, to provide its 5G network services in Nagaland in the future.)



Source: JICA Survey Team

Figure 6-7 Situation of eSanjeevani AB-HWC in Nagaland

Those backgrounds have caused burden of telemedicine in some of the District Hospitals and CIHSR as the secondary-level medical facilities, where relatively stable infrastructure and human resource are available.

Regarding eSanjeevani OPD, which is a D2P telemedicine program, the infrastructure such as the availability of network and necessary personal devices at the point of the patients' side should be approached. Further promotion of the D2P telemedicine program, development of ICT literacy of the patients, and citizens including their families, etc., are also necessary for them to be aware of such telemedicine program.

(3) Issues and Challenges of Telemedicine in Nagaland: 10 Bed ICU Project

Although eGovernments Foundation provides medical equipment, ICT equipment, CARE as ICU system, trainings for both clinical and ICT technical matters, etc., provision of human resource such as doctors and infrastructure including high-speed internet are part of the scope of the Government of Nagaland. As for the same challenges about eSanjeevani AB-HWC, human resource and infrastructure would also be the challenges for the establishment of the remote ICU program.

From the perspective of ICT system and hardware, because 10 Bed ICU Project offers comprehensive coverage of state-of-art ICU package as mentioned above, the demarcation of the software / hardware procurement between the NHP System and 10 Bed ICU Project would need to be considered to avoid any interface risks. According to Tattva Foundation, the NHP System may be technically connected with CARE as open-source systems through open APIs, although the organisation needs further study about the connection between the different systems.

6.3.3 National Level: Issues and Challenges of Health Management Information System

How efficiently and effectively DHFW can collect and analyse information in the state and organise the content of its reports to HMIS would be a challenge from now on. For such environment, digitisation and digitalisation of the facility level and state level is necessary to establish the robust digital architecture.

In addition, as ICT is rapidly developing, and India's nation-wise digital health initiatives, policies, and relevant laws and regulations are likely to frequently change, it is also important to consider a digital architecture that can flexibly respond to such changes in the external environment. For example, digitisation and digitalisation at the facility level is essential for the digitisation and digitalisation at the state level and the national level, and measures such as deployment of a flexible system that can be easily customised and fit into the future changes in the surrounding environment can be considered at the time of digitisation and digitalisation at the facility level, as the foundation of the digital architecture.

The NHP System is an open-source system that is relatively independent of specific system vendors/developers, specifications of software/hardware, environment, etc., and thus, should be able to accommodate future changes as described above. In line with the digital architecture of ICT in Nagaland, which has already been studied and under establishment by DHFW, NHP (The World Bank), and Tattva Foundation, it is necessary to promote necessary measures for each direct or indirect issue and challenge of ICT to enable smoother collaboration among the facility level, state level, and the national level.

6.4 ICT Proposal for Nagaland Medical College Hospital

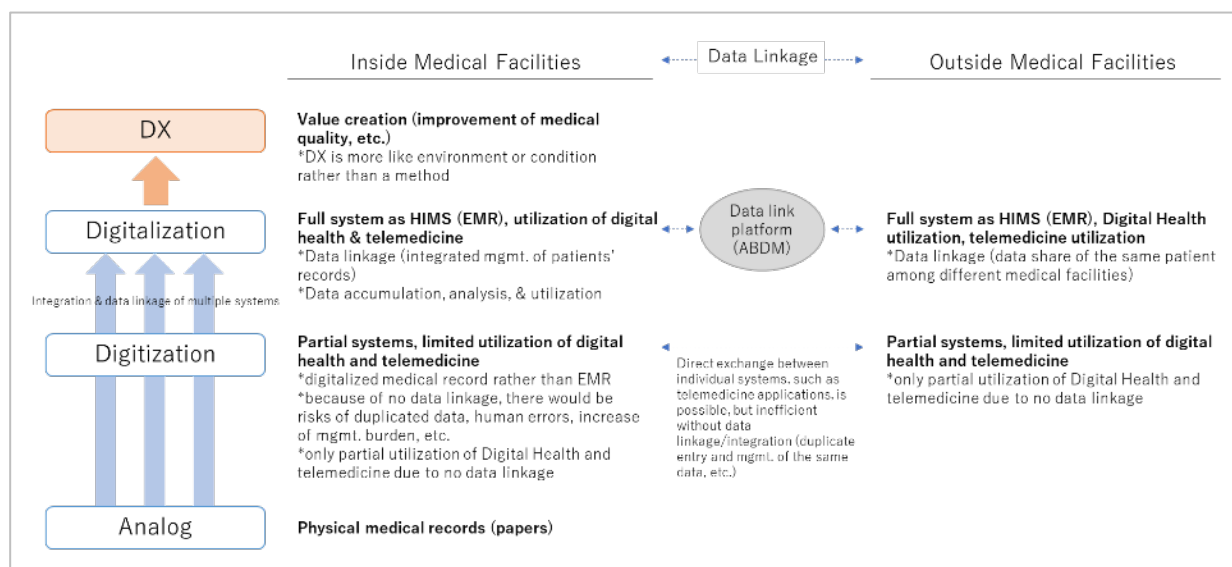
The purpose of the Project is to develop an ICT plan for the new Nagaland Medical College Hospital (NMCH) with a view to the medical digital transformation (DX). Based on the findings, issues, and challenges identified in the first and second field surveys, a proposal for the ICT plan of the new medical hospital is summarised as follows. The proposals will be addressed after confirming the general steps and forming a common understanding toward medical DX. The proposals will also be considered based on a digital architecture and from the three perspectives of facility level (system deployment and maintenance in NMCH), state level (data linkage between NMCH and the other medical facilities, and telemedicine), and national level (HMIS).

6.4.1 Confirming General Steps and Forming Common Understanding toward Medical DX

First, medical DX in the Project means a condition or environment in which new value creation, such as improvement of the quality of medical care, is possible as a result of the realisation of operational efficiency, etc., through digitisation and digitalisation. For example, new value would be created as a result of increased work efficiency through digitisation and digitalisation, which would promote medical doctors' self-improvement by giving them more time to spare, and as a result, the level of medical care would be improved (Figure 6-8).

In order to achieve medical DX, it is necessary to establish an infrastructure through appropriate steps, such as the development (or compliance) of relevant laws and regulations for effective data collection and utilisation (secondary use), data standardisation, development and implementation of data integration and collaboration infrastructure, data aggregation and management, etc.

In India, the legal and technical infrastructure required for data integration and linkage has been already in place through initiatives such as ABDM. Therefore, barriers to digitisation and digitalisation are not considered to be very high. On the other hand, considering the actual situation in Nagaland, digitisation within medical facilities in the state has been under development to some extent. In addition, the NHP System, which has been already deployed in all District Hospitals to varying degrees in the state including NHAK along with NHP, will be integrated among the modules in each facility in the future as a result of further promotion of the rest of the modules and establishment of system operation in each hospital.

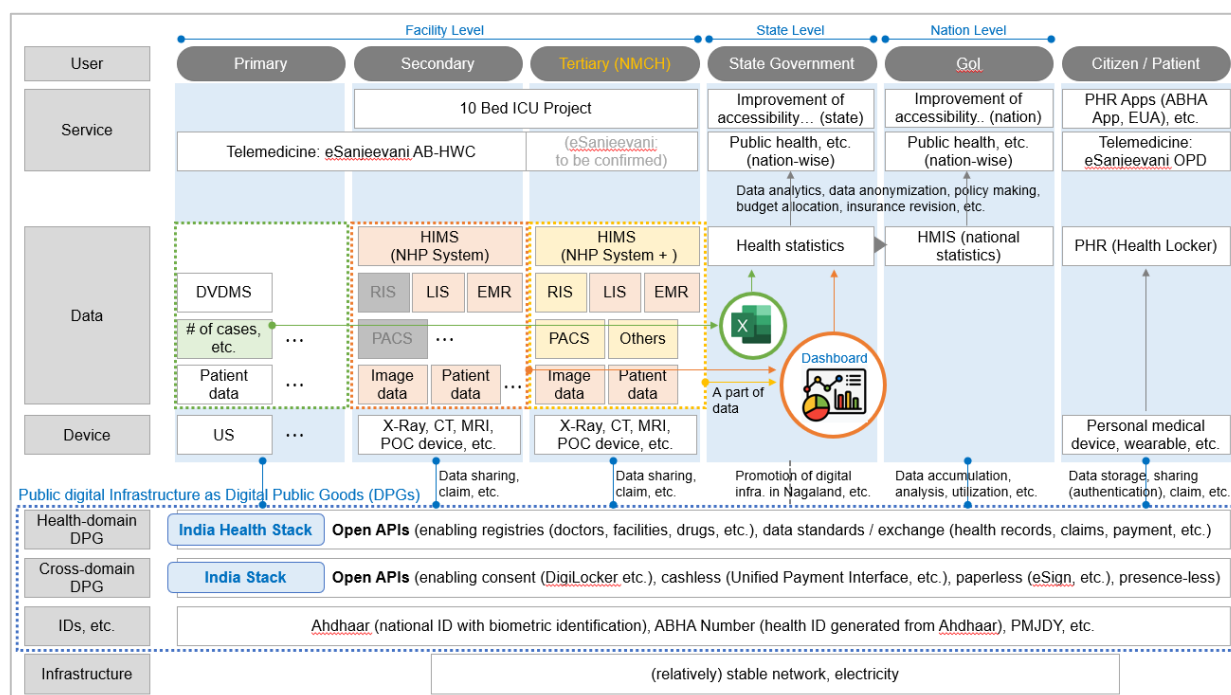


Source: JICA Survey Team

Figure 6-8 General Steps for Medical DX

6.4.2 Proposal of Digital Architecture in Nagaland

The JICA Survey Team proposes a digital architecture for Nagaland as a whole, including facility level with NMCH as the tertiary medical facility, state level, and national level, by adding NMCH to the current digital architecture in Nagaland described in Section 6.2.4 and illustrated in Figure 6-8. The details of the concept of each level will be described in the later part of this chapter.



Source: JICA Survey Team based on material by JICA STI/DX Chamber

Figure 6-9 Digital Architecture toward Medical DX in Nagaland

6.4.3 Proposal at the Facility Level: System Deployment and Maintenance Inside NMCH

The current NHP System has been considered and developed for the District Hospitals through the discussion over the existing issues and challenges such as insufficient infrastructure, the shortage of human resources, etc., that the entire state of Nagaland faces. Therefore, it would be realistic and reasonable to follow the current NHP System in the Project and deploy the NHP System into NMCH, considering such

study history (the NHP System to be deployed into NMCH is hereinafter referred to as the “NHP System+” to distinguish it from the one currently deployed into the District Hospitals). In addition, the JICA Survey Team has confirmed in the field surveys and the following communication with DHFW that DHFW also intends to deploy the same NHP System in NMCH. It would also be necessary to highlight that the deployment of the NHP System to NMCH is important in terms of the data linkage and compatibility among the medical facilities in Nagaland based on the same types of HIMS and in terms of scalability to state level and national level in the digital architecture by such smooth communication between the systems. However, on the other hand, the current module functions of the NHP System may require additional modules for the medical college hospital with 400-bed capacity. For example, as mentioned above in this chapter, RIS/PACS are essential, and some other modules should also be deployed. Further study should be conducted together with Tattva Foundation in the detailed design phase. The necessary additional modules should include but not limited to the following:

- RIS
- PACS
- Appointment scheduling
- Operation theatre scheduling

In addition, as mentioned above in this chapter, the current challenges in ICT deployment at the facility level may also be considered as challenges in terms of the ICT deployment in NMCH. Therefore, appropriate countermeasures should be considered also in the context of NMCH.

(1) Approach to the challenge: Lack of ICT budget

At NMCH, the types and the number of ICT-related equipment, sub-equipment such as UPS, network costs, etc., necessary for a medical college hospital will be considered, and the necessary budget will be secured. Furthermore, it is also essential for DHFW to prepare for mid- to long-term operational expenditure of the software/hardware including the renewal costs. The costs should be assumed in the ICT budget in the life-cycle-cost of the hospital and accumulated before and/or during the hospital operation period.

(2) Approach to the challenge: Lack of infrastructure

Considering system renewal and equipment replacement in the future, ICT for NMCH should be planned to keep the number of equipment as infrastructure to the minimum types and number. In particular, assuming that the NHP System+ will be cloud servers rather than on-premise servers, the number of required physical servers on the ground can be reduced. On the other hand, since the network in Nagaland is unstable, the ICT plan for NMCH will be proceeded with both types at this planning phase, and the actual choice will be determined at the detailed design phase.

In addition, the network infrastructure in Nagaland influences the current NHP System. In response to this situation, 5G network services have been available throughout India from October 2022, and a high-speed and stable 5G network would be also expanded to the state of Nagaland in the future. In order to use the 5G network at the NMCH, it is also an option for DHFW to attract antennas for the 5G network at the site of the medical college in advance. If the antennas are located in the site of the college, DHFW may avoid the difficulties it has faced in the past, such as the land acquisition for antenna installation and revisions to the land-use conditions.

(3) Approach to the challenge: lack of understanding by system users (doctors)

Medical doctors in the District Hospitals are opposed to the deployment of Doctor's Module, which forms the basis of the NHP System, because they are concerned about the increased workload. This is due to two issues in particular: the chronic shortage of medical doctors at the District Hospitals, and the increased workload caused by the combination of analog operation using paper medical records and digital operation using a system.

On the other hand, since NMCH will be a newly established hospital, there is no existing hospital staffs and operation flows, etc., as of now. Therefore, hospital operations and its flows can be established based on the NHP System+, and the doctors and other medical staffs in NMCH will be instructed to follow that operation flows. After establishing such hospital operations in NMCH, however, the abovementioned challenges will be approached to secure stable hospital operations.

Regarding the chronic shortage of medical doctors, it is necessary to secure a sufficient number of those doctors in NMCH, taking into consideration the human resource development plan for NMCH. In addition, task shifting, in which a doctor's work is transferred to other positions of staffs, would be an effective measure. For example, instead of doctors entering data into the system, it may be possible to consider having doctors' assistants (doctor clerks) enter data on behalf of the doctors.

In addition, from the viewpoint of digitisation and digitalisation, the following solutions can be considered for deployment. Those solutions are expected to improve work efficiency and reduce workload even with limited manpower.

➤ Medical interviews with electric medical interview application, automatic draft EMR preparation

Patients follow guidance and enter patient information, reasons for visit, symptoms, etc., via a medical interview application on the patients' or facilities' tablets/smartphones. Electronic medical records are automatically generated based on the entered data. This solution can reduce the workload required by receptionists and nurses. For medical doctors, the time required to create electronic medical records can be significantly reduced, which can be expected to increase the amount of time spent on consultation for each patient, improve the quality of medical care provision, and reduce waiting room congestion, etc.

However, the additional solution must be compatible with Doctor's Module. In addition, when using a solution by a vendor from outside of India, the support for ABDM compatibility, localisation, customisation, and maintenance of the solution should be confirmed.

➤ Utilisation of AI technologies, etc., for the support of decision making by medical doctors

After consultation of a patient, Artificial Intelligence (AI) will suggest possible diseases, recommended medical tests, and possible treatment details to the medical doctor in the procedure of assessing symptoms, making a diagnosis, and creating a future treatment plan. By displaying reference books on related diseases, the medical doctor can access special knowledge and formulate appropriate diagnoses and treatment plans, which is expected to maintain the quality of medical care.

In the case of AI image diagnosis support for radiological images and pathological images, AI is expected to maintain the quality of medical care by displaying possible disease locations and possible diseases based on examination results and image data from each department.

However, it must be able to link with related systems such as Doctor's Module. It will also be necessary to introduce and link with additional systems such as RIS and PACS, which should be planned in the NHP System+ for NMCH. In addition, when using a solution by a vendor from outside of India, the support for ABDM compatibility, localisation, customisation, and maintenance of the solution should be confirmed.

To address the second issue of increased workload due to analog and digital operations, NMCH will first consider digital operations as much as possible to avoid the double standard of analog and digital at the same time at the same place. Currently, in general in India, the hard copies of the medical records are stored at the Medical Record Division in a hospital. Although medical records are required to be stored for ten years in medical facilities in India for the purpose of tracing back past records in the event of a lawsuit by a patient, a method of digitising such records in principle and outputting and storing hard copies would be considered as the digital operation. By doing so, medical doctors do not necessarily need to fill out paper medical records, which would contribute to reducing their workload. In addition, digitising the records will also reduce the risk of medical errors due to misidentification of handwritten letters, as a secondary effect of the digital operation.

If the system for NMCH is to be the NHP System+, it is recommended that the necessary functions and module components be studied and developed in detail with Tattva Foundation. If the NHP System+ is developed together with Tattva Foundation, which understands the contents of the current digital architecture and system development in Nagaland, duplication of discussions, interface risks between the NHP System, and the NHP System+, etc., can be avoided.

Regarding the system maintenance during the hospital operation, it will be necessary to establish a maintenance team structure in NMCH based on a stable network, from the perspective of providing safe medical care. Although the regular and emergency maintenance and response to problems can be handled by Tattva Foundation and/or its implementation partners, because those vendors are not located on the ground of Nagaland, NMCH's in-house ICT team shall be well-established. In NMCH, it will be necessary to assign ICT personnel with sufficient knowledge and skills to contribute to the development of the necessary system updating and maintenance management plans, and to establish a team organisation that can provide the necessary primary response in the event of a system or other technical problems inside NMCH. The regular maintenance of the system will be handled by Tattva Foundation and/or the in-house IT department in NMCH. Emergency maintenance/problem resolution will be classified as minor, medium, and major, and also be handled by Tattva Foundation and/or the in-house IT department, depending on the degree of the issues. For example, minor system problems are handled by the in-house IT department of NMCH as a primary response, and if the problem is still unsolved, Tattva Foundation will respond remotely. If the problem remains unresolved, Tattva Foundation or its implementation partner will visit the hospital and respond to the problem.

Tattva Foundation will provide necessary trainings to such ICT team in NMCH prior to the hospital opening and support to establish an implementation system that enables the in-house ICT team to handle the abovementioned tasks.

Regarding the digitisation and digitalisation at primary facility level, the scope of the digitisation is very broad, and considerable research and discussions with the relevant counterparts are required to analyse the gaps between the current situation and the ideal situation. Therefore, it should be separated from the scope of the Project as the establishment of a 400-bed medical college hospital. Meanwhile, the kind of collaboration and/or support is possible from the Japan side would be discussed from now on.

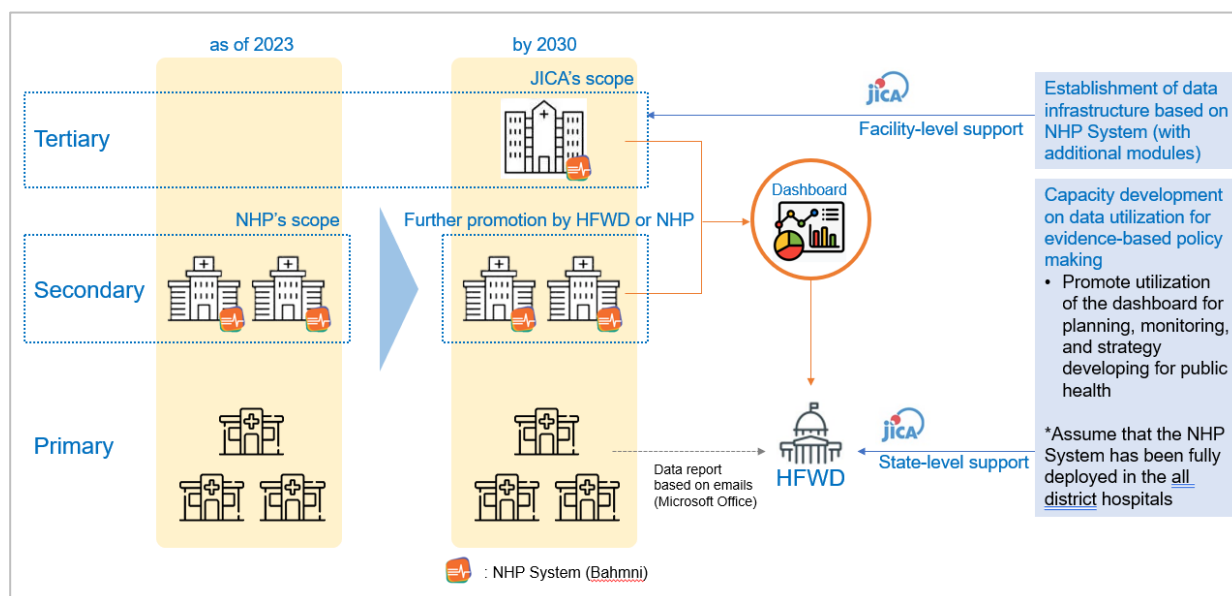
6.4.4 Proposal at the State Level: Data Linkage between NMCH and Other Medical Facilities

(1) Linkage of the NHP System and NHP System+

Since the current NHP System has been already ABDM compliant, and the NHP System+ will also be compliant with ABDM, sharing of medical data among District Hospitals and NMCH will be possible through ABDM. It will be ensured that the systems will be compliant with India Stack and India Health Stack to establish the technology foundation of data linkage among medical facilities in Nagaland. A non-vender-lock-in data sharing platform may be also considered based on such technology foundation in the future in Nagaland (Figure 6-9).

On the other hand, regarding the data linkage through the dashboard among the medical facilities in Nagaland, the challenges at the facility level will be necessary to be resolved first. The approaches to the challenges mentioned in “6.4.3 Proposal at Facility Level: System deployment and maintenance inside NMCH” may be effective as possible resolution for budgeting, infrastructure, human resource, etc. However, especially for the approach to the challenges in the District Hospitals, since the digitisation and digitalisation of those District Hospitals have been the scope of DHFW and NHP, those parties are expected to promote such digitisation and approach the relevant challenges in those facilities. Once the NHP System is fully in place in the District Hospitals, this JICA project would like to discuss with DHFW and the relevant counterparts about the kind of collaboration and/or support can be offered for, such as the kind of public health policy would be necessary, the kind of datasets are required for such evidence-based policy making, and the kind of datasets required for such approaches.

In addition, in order to promote digitization and digitalization, it is strongly recommended that measures be taken aligning with India's national digital initiatives such as ABDM, India Stack, India Health Stack, etc. or any future initiatives, to establish and develop a robust data-linkage ecosystem in Nagaland.



Source: JICA Survey Team

Figure 6-10 Idea of Data Linkage Development in Nagaland

(2) Telemedicine in NMCH: eSanjeevani

Telemedicine is considered effective as a means of correcting disparities in access to medical care in Nagaland, where topographical and geographical factors are significant. Because eSanjeevani AB-HWC and OPD are both the initiatives by GoI, those telemedicine programs would continue to be used in Nagaland.

The utilisation of eSanjeevani OPD as a D2P solution would be limited due to the lack of medical equipment and other relevant resources on the patient side and the fact that face-to-face consultation by a medical doctor or other healthcare provider would be required in many cases. On the other hand, eSanjeevani AB-HWC as a D2D solution, which connects a primary medical facility to its upper-level medical facilities, enables a patient/CHO in sub-centre to request online consultation from a general practitioner or a specialist from a District Hospital, and is expected to improve access to general and specialised medical care in remote areas. In order to promote eSanjeevani AB-HWC as the target of public health, although this scope is separated from the scope of the establishment of NMCH, it is suggested that DHFW approaches the challenges described in Section 6.3.2.

➤ Approach to limited infrastructure

*eSanjeevani AB-HWC itself is not a very complicated system, and most importantly required infrastructure is a stable network and sufficient types and number of ICT devices such as PC and tablet. The 5G network service has started in October 2022 so penetration of 5G network across Nagaland will be expected. The challenges related to the relevant devices shall be approached through the appropriate planning of budgeting for the primary and secondary medical facilities by DHFW.

➤ Approach to limited human resources

According to Jhpiego, DHFW and the organisation have worked on this challenge and were going to empanel more doctors on duty in the rotation system as of January 2023. Fifteen doctors are going to join as additional empanelled doctors soon. Those new doctors have already been trained and registered (Table 6-3).

Table 6-3 Number of Empanelled Doctors for eSanjeevani in Nagaland

Types of eSanjeevani	# of Empanelled Doctor (as of)	# of Empanelled Doctor (to be)
eSanjeevani AB-HWC	13	28
eSanjeevani OPD (*no consultation yet)	12	12
TOTAL	25	40

Source: Jhpiego

➤ Limited ICT literacy among the users

Most of the new empanelled doctors are junior doctors, who are relatively tech-savvy than the doctors currently empanelled. They are expected to contribute in resolving the challenges not only on human resources shortage but also the technical accessibility of the doctors.

➤ Technical challenges on eSanjeevani program's side

This is the issue of eSanjeevani side, which is an initiative led by GoI, and further improvements are expected through changes in specifications and operations in the future while improvements in terms of infrastructure and human resources shortage are required at the facility and state levels.

If new telemedicine-related solutions or equipment are required for NMCH, the solutions and technologies that can contribute to improving access to medical care especially in the primary medical facilities in the remote area will be considered and discussed with DHFW and other counterparts in the future, while taking into account the solutions' and technologies' compatibility for eSanjeevani AB-HWC. The following are examples of D2D solutions that would be deployed to telemedicine services between NMCH and primary healthcare facilities in Nagaland at this time. These are also expected to be used as mobile solutions for Doctor-to-Doctor (Nurse)-to-Patient, where medical doctors and nurses provide home medical care and/or health camps.

➤ Examination application / equipment for specific medical department (expected to be deployed to primary medical facilities where a medical doctor and/or a specialist is not available)

✧ Mobile CTG (Cardiotocogram) for perinatal check-ups

* Mobile ultrasound could be installed together to cover not only the perinatal period but also regular antenatal check-ups from the early stages of pregnancy.

✧ Mobile slit lamp for ophthalmologic tests

* Front and/or back part of the eyes

➤ D2D remote training

✧ Virtual reality technology, etc., for remote trainings

* Quality improvement of medical care provision by capacity building for medical service providers in remote areas, etc.

In addition, physical methods for physical patient referral and for provision of medical resources such as drugs to patients in remote areas by using drone technology, etc., would also be considered in parallel with the consideration of telemedicine in Nagaland in the future.

It should be highlighted that the role of NMCH in eSanjeevani AB-HWC in Nagaland needs to be clarified. As the principle of eSanjeevani AB-HWC, the program is between the Sub-Centres and District Hospitals while NMCH is a tertiary medical facility. If NMCH will be a part of eSanjeevani AB-HWC in Nagaland, enough number of doctors shall be secured for the smooth implementation of the telemedicine program.

Regarding the system integration between eSanjeevani AB-HWC and the NHP System and the NHP System+, because both systems provide open APIs, the integration may be technically possible in the future, although Tattva Foundation may need to be studied further, according to Tattva Foundation.

(3) Telemedicine in NMCH: 10 Bed ICU Project

Through the communication with DHFW and 10 Bed ICU Project in this survey, it is suggested from both parties that NMCH would also deploy a hub centre in the hospital, and there would be two hub centres in Nagaland in NMCH and NHAK. The current monitoring of the spoke ICUs in the District Hospitals would be divided and managed by the two hub centres.

In line with the current situation and challenges of 10 Bed ICU Project as aforementioned, it would be suggested that the procurement of ICU-related ICT software and hardware for NMCH should be procured by 10 Bed ICU Project's side, so that the interface risks between 10 Bed ICU Project and the NHP System+ and other devices, etc., will be minimised.

Regarding the system integration between CARE and the NHP System+, as the same situation as the integration between eSanjeevani AB-HWC and the NHP System+, the latter can be technically connected with CARE through open APIs to smoothly communicate about medical data, patient data with single ID, etc. This matter also requires further study by Tattva Foundation in the future.

6.4.5 Proposal at the National Level: Health Management Information System

As mentioned above in this chapter, in order to flexibly respond to the changes in the external environment and digital situation in India, flexible system should be deployed at the facility level. The NHP System+ would be able to respond to such changes based on its feature as an open-source HIMS. By deploying the NHP System as the foundation of the digital architecture in Nagaland, the state and national level of digitisation, digitalisation, and medical DX would be realised.

Chapter 7 Hospital Management

7.1 Current Situation

7.1.1 Hospital Operation

A survey on the hospital management was conducted from the viewpoints shown in Table 7-1. The right side lists the items which the Japan International Cooperation Agency (JICA) Survey Team has described in the Inception Report regarding hospital management, while the left side summarises what the JICA Survey Team found in the field survey and the remarks.

Table 7-1 Items for Consideration for Hospital Management

Hospital Operation and Management Points		Findings / Remarks
Improvement of the level of medical care at the medical college and hospital and in the community		
1.	Support for introduction of hospital clinical paths and referral system for each disease	Needs to introduce Japanese regional referral function and emergency medical function
2.	Support for building clinical trials and clinical research networks	Needs to introduce Japanese clinical training function
Human resource development		
3.	Support for clinical training and introduction of professional nurse system	Needs to introduce Japanese clinical training function
Department management		
4.	Operating room and central sterilisation room operation plan (operation method)	Referring to National Quality Assurance Standard (NQAS) and introducing draft of the departments' scope
5.	Support for planning of operation manual of emergency department, outpatient department, health check-up department, dialysis department, chemotherapy department, etc.	Referring to NQAS and introducing draft of the departments' scope
6.	Support for management of ward department and bed control operations	Referring to NQAS and introducing draft of the department's scope
7.	Support for planning of food service operation (Nutrition Support Team (NST) establishment, Hazard Analysis and Critical Control Point (HACCP) compliance, etc.)	Food services are not provided for patients in the public hospitals in Nagaland
8.	Support for medical equipment and medical material supply management (standardisation of drugs and medical supplies, inventory control, 5S improvement, etc.)	Referring to NQAS and introducing draft of department's scope
Overall hospital operation		
9.	Developing manuals of overall hospital operations	Referring to NQAS and introducing draft of selected department's scope
10.	Support for introduction of various guidelines (nosocomial infection, medical information management, medical safety, BCP, etc.)	Referring to NQAS. Nagaland State Disaster Management Authority had prepared Disaster Management Plan.
11.	Support for establishment of personnel and education systems	Found good example in Christian Institute of Health Science and Research (CIHSR)
12.	Support for improving patient services (hospital amenities, public relations, etc.)	Patient waiting time shall be considered, National Accreditation Board for Hospitals & Healthcare Providers (NABH) can be introduced.
13.	Support for formulating labour management manuals, organisation, committee, etc.	Found good example in CIHSR
14.	Consideration for introduction of outsourcing or partial PPP scheme	Lack of sufficient private medical service providers in Kohima and checking other examples in India

Source: JICA Survey Team

By clarifying the organisational structure and the scope of work of each main department, the management systems and chain of command can be clear, and it is important to establish an operational system and plan in which medical professionals can work with a sense of responsibility and in which all departments

cooperate with each other to provide high quality tertiary medical care. Also, it is essential to prepare operational manuals and related documents regarding hospital management including the bed management system, each department management system, proper management system of equipment and medical materials and logistic system plan so that the medical college hospital can provide safe and patient centred medical care without any problems in the new building and can be managed in a stable manner.

Moreover, the site survey conducted by the JICA Survey Team in January 2023, a meeting was held with the Dean cum Director and Medical Superintendent of NIMSR and she explained that the NMC inspector had pointed out the following issues of the current Naga Hospital Authority Kohima (NHAK):

- 1) The Central Sterile Supply Department (CSSD) is not operated by 24/7 and it's condition needs to be improved. ⇒ See photo below.
- 2) Necessary to build 30 beds in the Emergency Department ⇒ Renovation work completed. See photo below.
- 3) Necessary to install four demonstration rooms with 50 persons capacity ⇒ Area has been allocated in the hospital. Equipment will be installed.
- 4) Needs to have an educational area in each department ⇒ To be developed
- 5) Queue control system at out-patient departments ⇒ To be developed
- 6) Patient registration system and introduction of electrical medical records system ⇒ Still in pilot phase
- 7) Medical waste management ⇒ To be developed
- 8) Labour rooms at OB-GYN need to be improved ⇒ See photo below
- 9) Needs dietician ⇒ To be hired
- 10) Need staff call system(intercom) ⇒ To be introduced

These points are mainly regarding hospital facilities, IT system, and human resources issues, but are also closely related with the hospital operation and management. The Dean mentioned the necessity to set up a preparation team for hospital management. Currently, such team has not been set up but after each department staff of NIMSR is assigned, the preparation team for hospital management shall be set up. Then, preparation of each department operation plan and manual can be supported by the scheme of soft component.



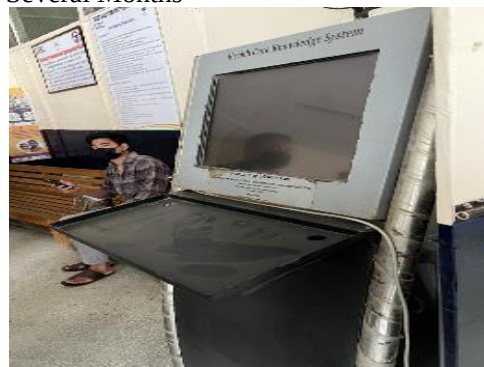
Entrance to the Central Treatment Building



Bed Control Issues



CT Scans : Out of Order for Several Months



Medical Material Management



CSSD (inside)



CSSD (outside door)



Photo 7-1 Naga Hospital Kohima

Source: JICA Survey Team

(1) Support for Introduction of Hospital Clinical Paths and Referral System for Each Disease

Item 1: Support for introduction of hospital clinical paths and referral system for each disease

Regarding item 1, the JICA Survey Team found that outpatient department (OPD) of Guwahati Medical College Hospital was so crowded, and patients are waiting in long queues. In India, hospitals are categorised as tertiary hospitals, district and secondary hospitals, and primary care providers. However, any patient can have access to tertiary hospitals directly without referral letters from lower categorised facilities. Therefore, the Guwahati Medical College Hospital is always very congested. Moreover, it was observed that the entrance area of NHAK was stacked by many vehicles, and it seems very difficult to operate the emergency department efficiently. As a new medical college hospital, in order to focus on and provide tertiary care to the people in Nagaland State, it is necessary to consider measures such as securing ambulances to enter and exit the medical college hospital, reducing congestion in the hospital, and establishing effective referral systems. The JICA Survey Team shall show some examples in Japan in the next chapter in Section 7.2 concerning those issues.

Item 2: Support for building clinical trials and clinical research networks

Item 3: Support for clinical training and introduction of professional nurse system

For item 2 and 3, the JICA Survey Team found some training function such as demonstration room and conference rooms that are under construction in NHAK. The JICA Survey Team shall introduce examples of Japanese clinical training function in the following section.

Item 11: Support for establishment of personnel and education systems

Item 13: Support for formulating labour management manuals, organisation, committee, etc.

For items 11 and 13, the JICA Survey Team found a good example in Christian Institute of Health Sciences and Research (CIHSR) for human resource evaluation system. The following table shows the main contents of the human resource evaluation (Table 7-2).

Table 7-2 Human Resource Evaluation System in CIHSR

1.	Job Knowledge/Skills
2.	Job Delivery - Technical/Functional expertise
3.	Job Delivery - Technical/Functional knowledge
4.	Skill Upgrade and Knowledge
5.	Quantum of Work
6.	Quality of Work
7.	Safety Compliance and Risk Management
8.	Documentation: Online/ Manual Documents
9.	Flexibility/ Multi-tasking
10.	Reliability/ Dependability
11.	Self-motivated and Initiative Driven
12.	Timely Completion/Time Sensitivity
13.	Computer Proficiency
14.	Internet Proficiency
15.	Communication Skills
16.	Dignity and Respect
17.	Courtesy and Receptivity
18.	Teamwork and Collaboration
19.	Creative Thinking and Problem-solving
20.	Mentoring and Developing Others
21.	Strategic Planning
22.	Empathy and Awareness
23.	Delegation and Sharing Responsibilities
24.	Ownership of Responsibilities
25.	Embracing CIHSR Culture
26.	Community Life Participation
27.	Specify Major Achievements during the Assessment Period
28.	Any Other Comments/Feedback/Suggestions?
29.	Any Training Needs Suggestion?
30.	Publication Details (if applicable) (only for employee to comment)

Source: CIHSR

CIHSR uses this system for not only administrative staff but also for medical staff including doctors. Actually, evaluation of doctors' performance is not so simple, but CIHSR has succeeded in such difficult challenge. As a concept of team medicine, doctors are evaluated by other medical staff such as nurses and paramedical staff. Such evaluation system can be discussed and considered with human resource development planning in the upcoming stages.

Moreover, from the JICA Survey Team's interviews at NHAK and Guwahati Medical College Hospital, the JICA Survey Team found that there is no clear organisation chart for the whole hospital. The NMC guidelines for medical college mention the professors' position and so on, but the organisation chart was not clearly defined. Generally, Organisation chart can describe an order line, decision-making process, and responsibility of each department. For example, in NHAK, they have just one computed tomography (CT) system, but this CT has been out of order for several years. As a District Hospital, it is very difficult to provide with proper medical services without CT. The reason of this issue was not just a lack of budget to repair it; however, such situation needs to be avoided in the new medical college hospital by clarifying responsibilities of each department and in the decision-making process. Also, high-level team medical care is very important for tertiary medical services, so clarification of order flow and various committees' functions are required to coordinate among several departments smoothly. The JICA Survey Team shall show some examples of organization structure of university hospitals in Japan in Section 7.2.

Table 7-3 shows the NHAK's management structure. Table 7-4 also shows NHAK's committees. This information can be used as a reference when considering the organisational structure of the medical college hospital.

Table 7-3 Management Structure, NHAK

Managing Director				
↓				
Medical Superintendent				
↓				
Administration	Nursing	School of Nursing	Hospital Departments	Others
• Administrative staff • Ministerial staff • Accounting section • IT cell • Engineering cell • TCCC cell, etc.	• Nursing staff • ANM • GNM • B. Sc. Nursing	• School of nursing staff and students	• Medicine • Orthopaedic • Paediatric • Surgery • ENT • Ophthalmology • Dermatology • Oncology • Palliative care • Dental • Psychiatry • Geriatric • Critical Care (ICU and SNCU) • AYUSH • Radiology • Microbiology • Pathology • Biochemistry • Obstetrics and Gynaecology • Counselling • Blood Bank • Immunisation • Drug and Rehabilitation • ART Centre • Dialysis unit	• Paramedic staffs • Sanitation staff • Medical attendants • Electricians • Plumbers, etc.

Source: NHAK

Table 7-4 Naga Hospital Kohima (NHAK) Committees

Chairperson
Vice Chairman
Member Secretary
Planning
1. Hospital Upkeep Committee
2. Sanitation and Hygiene Committee
3. Support Services Committee
4. Waste Management/ BMW Committee
5. Infection Control Committee
6. Hygiene Promotion Committee
7. Beyond Hospital Boundary Committee
8. Accounts Committee
9. Store Keeper Committee
10. Clinical Capacity/ Nursing Tutors for Training Committee
11. Quality Team
12. Eco Friendly Facility

Source: NHAK

Item 4: Operating room and central sterilisation room operation plan (operation method)

Item 5: Support for planning of operation manual of emergency department, outpatient department, health check-up department, dialysis department, chemotherapy department, etc.

Item 6: Support for management of ward department and bed control operations

Item 9: Developing manuals of overall hospital operations

For items 4, 5, 6, and 9, the National Quality Assurance Standard (NQAS) requires defining all procedures for each department. The following are the summary of the requirements from NQAS for District Hospitals. The JICA Survey Team found that NHAK is not NQAS accredited. Also, the JICA Survey Team are checking if other District Hospitals in Nagaland are NQAS accredited or not, and could not find any accredited District Hospitals in Nagaland.

Table 7-5 lists some items for the District Hospital part of NQAS.

Table 7-5 Items from NQAS

Area of Concern – G: Quality Management	
Standard G1	The facility has established organisational framework for quality improvement.
Standard G2	The facility has established system for patient and employee satisfaction.
Standard G3	The facility has established internal and external quality assurance programs.
Standard G4	The facility has established, documented implemented and maintained Standard Operating Procedures for all key processes and support services.
Standard G5	The facility maps its key processes and seeks to make them more efficient by reducing non-value adding activities and wastages.
Standard G6	The facility has defined mission, values, quality policy and objectives, and prepared a strategic plan to achieve them.
Standard G7	The facility seeks continually improvement by practicing quality method and tools.
Standard G8	The facility has defined, approved, and communicated risk management framework for existing and potential risks.
Standard G9	The facility has established procedures for assessing, reporting, evaluating, and managing risk as per Risk Management Plan.
Standard G10	The facility has established a clinical governance framework to improve the quality and safety of clinical care processes.
Area of Concern – H: Outcome Indicator	
Standard H1	The facility measures Productivity Indicators and ensures compliance with the state/national benchmarks.
Standard H2	The facility measures Efficiency Indicators and ensure to reach the state/national benchmark.
Standard H3	The facility measures Clinical Care and Safety Indicators and tries to reach the state/national benchmark.
Standard H4	The facility measures Service Quality Indicators and endeavours to reach the state/national benchmark.

Source: NQAS

NQAS is a standard for District Hospitals and other lower categorised facilities, and the JICA Survey Team did not find such standard for public university hospitals in India. However, this NQAS can be utilised to prepare a new medical college hospital's operation manuals. For example, in NHAK, the JICA Survey Team found many patients beds were vacant and not operated efficiently. Such issues can be discussed and improved by preparing ward operation, referral system, and efficient management methods.

Item 7: Support for planning of food service operation (NST establishment, HACCP compliance, etc.)

For item 7, the JICA Survey Team found that food services are not provided in public hospitals in Nagaland. Patients' families bring meals to hospitals, and this is very common practice in Nagaland. However, for some patients who need dietary control, the new medical college hospital may need to provide with food services. The JICA Survey Team shall consider such food services and assignment of nutritionist in future stages.

Item 8: Support for medical equipment and medical material supply management

For item 8, currently there is no information management system of inventory and order control for medicines and medical materials in NHAK. Therefore, it seems difficult to control those inventory records and ordering materials properly in a timely manner. In the next chapter in Section 7.2, the JICA Survey Team shall show the scope of medical material control in hospitals.

Item 10: Support for introduction of various guidelines

For item 10, Nagaland is located in seismic level V zone and NQAS requires to prepare disaster measures. The Nagaland State Disaster Management Authority (NSDMA) issued “Incident Response System (IRS) Guidelines”. This guideline defines how each department and organisation shall act when disaster happens, but the hospital’s role is not clearly defined. NSDMA also issued “Nagaland State Disaster Management Plan.” This plan refers “Sendai Framework for Disaster Risk Reduction 2015-2030”. And this plan mentioned priorities to increase the number of hospitals certified as “Safe Hospitals”. “Safe Hospital” is described by the World Health Organization (WHO) by defining structural, non-structural, and functional indicators (<https://www.who.int/publications/i/item/9789290614784>). Many of them are related with facility and equipment planning, and those criteria can be covered by Japanese standard which is shown in the next chapter in Section 7.2.

Item 12: Support for improving patient services

For item 12, patients waiting time shall be a major concern for a new medical college hospital. One of major challenges can be introducing an online appointment system. Also, introducing referral systems for tertiary hospitals can be another solution for this issue. By such referral system, the hospital can focus on providing with tertiary medical care. Therefore, as described above, the JICA Survey Team shall introduce referral systems in Japan as example for consideration in the next section.

Other than patients’ waiting time, the overall patient service and healthcare quality can be improved by introducing the National Accreditation Board for Hospitals & Healthcare Providers (NABH). This hospital accreditation programme started in 2005 in India. The main subjects of this accreditation are the following:

- a) Access, Assessment and Continuity of Care (AAC)
- b) Care of Patients (COP)
- c) Management of Medication (MOM)
- d) Patient Rights and Education (PRE)
- e) Hospital Infection Control (HIC)
- f) Patient Safety and Quality Improvement (PSQ)
- g) Responsibilities of Management (ROM)
- h) Facilities Management and Safety (FMS)
- i) Human Resource Management (HRM)
- j) Information Management System (IMS)

These criteria are covered by NQAS as well but this accreditation focuses on the quality of services. In India, less than 1% of hospitals have got this accreditation so far and mainly private hospitals are accredited. Even for public hospitals, introducing such accreditation can be a good opportunity to improve their services. However, firstly, there is a need to focus on setting up new hospital organisation and management system by introducing NQAS. Then, after the hospital opening and realising smooth operation, introduction of NABH and improvement of services can be considered as a next step in the future.

Item 14: Consideration for introduction of outsourcing or partial PPP scheme

For item 14, the JICA Survey Team could not find medical service companies such as diagnosis services or laboratory services in Nagaland. However, there are some examples of public-private partnership (PPP)

scheme as described in the next chapter in Section 7.2. So, the JICA Survey Team shall continue to study any candidate or models to utilise PPP scheme for the new medical college hospital.

7.1.2 Number of Beds

Table 7-6 shows the number of beds of NHAK. NHAK is currently expanding from 250 beds to 280 beds with the support of the World Bank. Based on the medical functions that NHAK will assume in the future, it is important to consider the functions to be performed at NHAK based on the NMC guidelines.

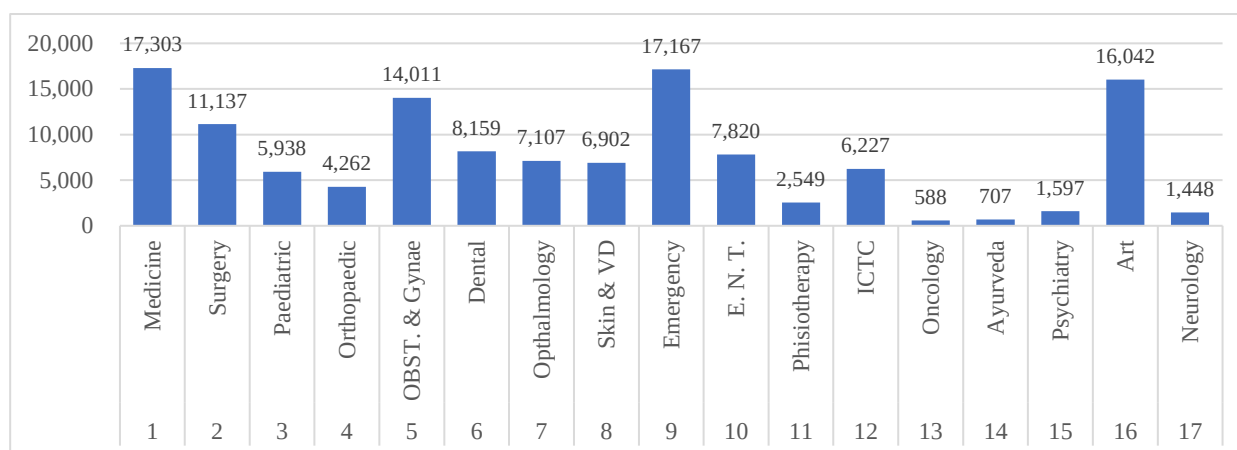
Table 7-6 NHAK Bed Arrangements

	Number of Beds	Departmental Units
a) General Medicine	72	3
b) Paediatrics	18	1
c) Tuberculosis and Chest	6	1
d) Skin V. D	6	1
e) Psychiatry	6	1
Total (A)	108	7
a) General Surgery	68	3
b) Orthopaedics	24	1
c) Ophthalmology	10	1
d) ENT	10	1
Total (B)	112	6
a) OB-GYN and ANC	20	1
b) Gynaecology	10	1
Total (C)	30	2
Others	30	1
Grand Total	280	16

Source: NHAK

7.1.3 Patients Statistics

Figure 7-1 shows patients statistics of outpatients at NHAK. In order to provide with high level medical care as a tertiary hospital, it is necessary to project the number of patients and examinations, and the number of medical equipment needed at the medical college hospital. Such information is necessary for financial planning as well.



Source: NHAK

Figure 7-1 Department Wise Statistical Data of OPD Attendance of NHAK (2019)

For the number of inpatients at the new medical college hospital, “Minimum Standard Requirement for the Medical College for 100 Admissions Annually Regulations” requires 75% bed occupancy at the time of inspection for the third renewal and thereafter for subsequent renewals and recognition. Therefore, there is a need to set the target of inpatient numbers as 400 beds x 75% = 300 inpatients per day. Then, the total number of inpatients shall be 300 x 365 days = 109,500.

Regarding the number of outpatients including emergency patients, this can be referred to the inpatient/outpatient ratio of NHAK. For the last three years (2019, 2020, and 2021), the ratio (including emergency patients in outpatient) is 2.95 (2019), 2.51 (2020), and 2.70 (2021). In 2020 and 2021, the COVID-19 pandemic might have affected the number of patients. So, information can mainly be referred to the data in 2019 before the COVID-19 pandemic and can use the ratio 2.95 as the target for inpatient/outpatient. Then, the number of outpatients including emergency patients can be $109,500 \times 2.95 = 323,025$.

<Bed occupancy rate>

JICA Survey Team mentioned the target bed occupancy rate as 75% above. The current NHAK hospital's bed occupancy rate is shown in Table 7-7.

Table 7-7 Bed Occupancy Rate at NHAK			
YEAR	2019	2020	2021
(%)	50.3	34.2	39.6

Source: NHAK

In 2020 and 2021, the bed occupancy rates were quite low due to COVID-19 pandemic. However, the rate in 2019, which was before COVID-19 pandemic, was also low level compared with the target level, 75%.

That is, for new medical college hospital, attracting enough number of patients can be one of main challenges. Then, strengthening referral system, development of public transportation from major points in Nagaland, recruitment of esteemed doctors and other attracting patients methods needs to be planned in upcoming phases.

<Severity of Illness>

As JICA Survey Team have mentioned several times, tertiary medical services needs to be provided in this new medical college hospital, that is, in order to use the limited medical resources such as medical staff, material, medicine, equipment, infrastructures efficiently and effectively in Nagaland, this new medical college hospital shall provide their services with the patients with severe diseases mainly, and other patient shall go to secondary level hospitals or primary level facilities.

At emergency departments and for COVID-19 patients, triage system or severity evaluation scale are commonly used, however, JICA survey team found that any evaluation scale for severity of illness of each patient are currently not used in Nagaland. Therefore, in order to manage the medical resources' efficient usage, evaluation scale for severity of illness can be introduced in the upcoming stages. In next chapter, JICA Survey Team will show the sample evaluation scale of severity of illness in Japan.

7.1.4 Committees in Medical College Hospitals in India

Table 7-8 shows the current committees of Guwahati Medical College Hospital.

Table 7-8 Committees in Guwahati Medical College Hospital
1. Medical Education Unit
2. The Institution Ethics Committee
3. Internal Complaints Committee, Sexual Harassment
4. Anti-Ragging Committee
5. Anti-Ragging Squad
6. Local Research Advisory Committee of Multi- Disciplinary Research Unit, Guwahati Medical College Hospital

Source: Guwahati Medical College, Annual Report (2021-2022)

The types of committees are relatively limited compared with the university hospitals in Japan. The organisational structure and committee structure need to be carefully considered with the Nagaland government because these are closely related with the functions of new medical college hospital and its staffing plan. Those will be discussed and considered in the upcoming phases.

7.1.5 Introduction of Public-Private Partnership (PPP) - Case Studies -

In India, there are some cases in which public hospitals are outsourcing services to private companies in the form of PPP. For now, the JICA Survey Team could not find any cases which Japanese private

companies has invested in PPP hospital projects in India but found that a Japanese medical equipment company has sold their medical products to some hospital PPP projects in India.

The JICA Survey Team found some examples of PPP implementation in India as summarised in Table 7-9.

Table 7-9 Healthcare PPP Projects in India

Type of PPP and NHM Component		States and Contents
I.		
	1. PPPs in Management of PHCs	
	2. PPPs for Mobile Medical Units	A total of 23 states and Union Territories (UTs) have MMUs – Tamil Nadu, Madhya Pradesh, Rajasthan, Assam, and Jharkhand seem to have over 100 of such units
	3. PPPs for Emergency Ambulance Services	At the time of launch of NRHM in 2005, such ambulances networks were non-existent. Now 33 states/UTs have the facility where people can Dial 108 or 102 telephone number for calling an ambulance. A total of 5,499 empanelled vehicles are also being used in some states to provide transport to pregnant women and children, e.g., Janani express in MP, Odisha, Mamta Vahan in Jharkhand, Nishchay Yan Prakalpa in West Bengal and Khushiyo ki Sawari in Uttarakhand. (Source: NHM MIS)
	4. Institutional Delivery under EmOC	In several states – Gujarat, Maharashtra
	5. Strengthening of Diagnostic Services of H&WC through PPP	Bihar, Haryana, Maharashtra, Assam (boat clinics, charitable hospitals and tea garden hospitals), Jharkhand, Manipur, West Bengal
	6. Pradhan Mantri National Dialysis Programme - (Haemodialysis) has been implemented at District Level - State Government and Private Players	PPP for Haemodialysis services - 21 states/ UTs- are operating in PPP Mode - Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Rajasthan, Telangana and Uttar Pradesh, Chhattisgarh, Lakshadweep, Madhya Pradesh, Odisha, Tripura, Uttarakhand, and West Bengal
II. PPPs in Health Programmes		
	7. RMNCH+A (mostly in family planning services)	Mamata (Delhi); Voucher Schemes and Social Franchising – Uttar Pradesh, Assam, Chhattisgarh, Madhya Pradesh, Orissa and West Bengal), Merrygold (UP)
	8. PPPs in Disease Control Programmes	
	i. RNTCP	A total of 33 partners with the centre – multilateral and bilateral. As per 2018 data, 685 partners are involved with state and district health societies, with Delhi (51), Kerala (52), Gujarat (63), Rajasthan (90) and West Bengal (179) having maximum collaborations
	ii. NVBDCP – Malaria	-
	iii. NLEP	Delhi, Karnataka, Maharashtra, Meghalaya, Telangana, Odisha, Assam, Chhattisgarh, Kerala, West Bengal
	9. PPPs in NCDs	
	i. Blindness Control Programme	NPCB receives more funds than any other programme – maximum partnerships under category of reimbursement for cataract operation for NGO and private practitioners – in all states
III. PPPs in non-clinical services		
	i. Bio-waste management, health information systems management, hospital maintenance and security, dietary and laundry services	Many states have outsourced non-clinical services at the secondary and tertiary level hospitals to private players. Bihar, Maharashtra, West Bengal, Gujarat and so on.
	ii. National Biomedical Equipment Management and Maintenance Program	Medical devices are crucial for efficiency and sustainability of health systems as they aid in prevention, diagnosis and treatment of illness and disease.

Type of PPP and NHM Component	States and Contents
	To ensure the timely availability and proper functioning of medical equipment in public health facilities, the Ministry of Health and Family Welfare launched the Biomedical Equipment Management and Maintenance Program in the year 2015 for comprehensive maintenance and management of medical equipment in public health facilities from Primary Health Centre to District Hospital level. This program aims to ensure upkeep time for medical equipment in PHC/ CHC/DH at 80%, 90%, and 95%, respectively.

Source: Public-Private Partnerships in Health are under the National Health Mission in India: A Review

7.2 Introduction and Preliminary Proposal for Hospital Management

According to the findings from the field survey and discussion in the previous section, the JICA Survey Team hereby introduces some operational guidelines and standards from Japan. These contents are just draft samples for future discussions and shall be modified to be applicable in the new medical college hospital in the upcoming phases.

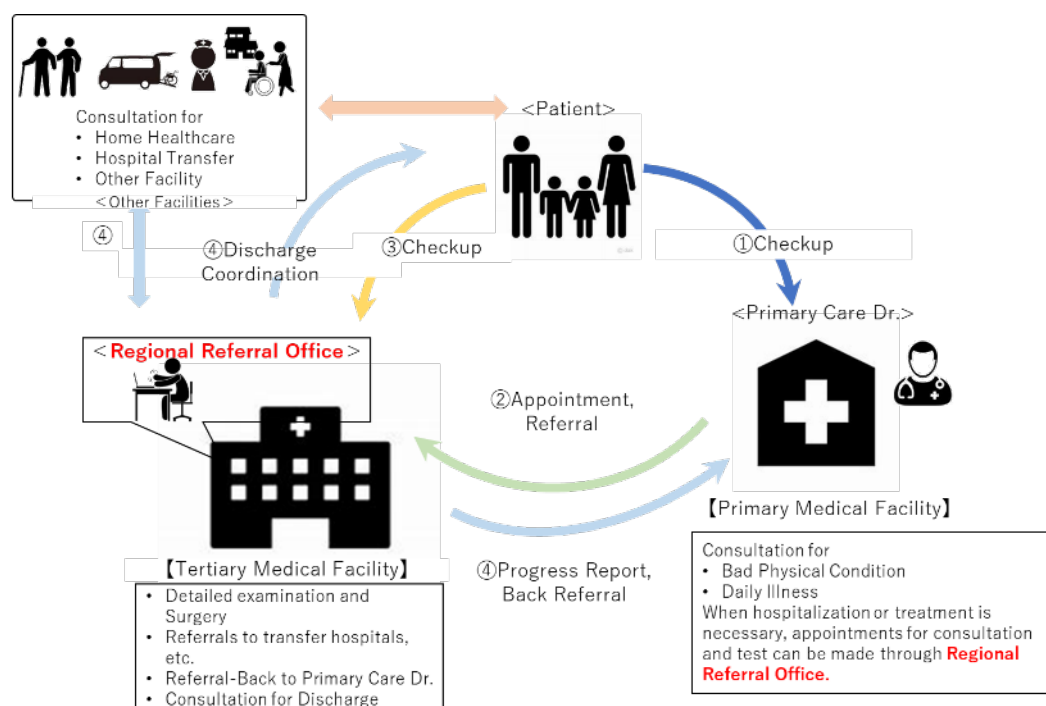
7.2.1 Regional Referral Function and Referral System

As discussed above, in order to avoid congestion and to provide with high level medical care as a tertiary hospital, development of a referral system in the region will be a key item. This new medical college hospital may need to take a leading role for the community referral system in Kohima, so the JICA Survey Team shall introduce a Regional Referral Office (tentative name) function of Japan. The main functions are summarised in Table 7-10 and Figure 7-2.

Table 7-10 Function of Regional Referral Office

Scope	
Regional Referral Services	Contact point for referral patients
	Appointment for consultation and examination (for referred patients)
	Consultation and support for home medical care and nursing care coordination
	Discharge support and coordination
	Referral back to home nursing and home rehabilitation
	Providing information to local medical facilities and patients, public relations activities
Admission and Discharge Receptionist Services	Admission and discharge receptionist services
	Confirmation of medication to be brought, medicine management
	Nutritional guidance, allergy interview
	Admission procedures on the day of admission
Various Counselling Services	Patient counselling services
	Cancer counselling

Source: JICA Survey Team



Source: JICA Survey Team

Figure 7-2 Image of Regional Referral

Primary medical facilities and secondary hospitals can make appointments with the Regional Referral Office for their patients as referral patients. Also, when patients are discharged from the new medical college hospital, Regional Referral Office can support the patients after-discharge care such as coordination with the nursing home, primary care centres, and so on. The Regional Referral Office shall control all referral patients and referral procedures in the community in Kohima.

Furthermore, in Japan, if patients go to tertiary medical facility without referral letter from secondary or primary care facilities, patients should pay an additional charge. Such additional charge needs to be considered if it is applicable in a legal framework and social custom perspective in Nagaland, and it may be possible to consider other incentives ways such as fast-track reservation at the outpatient department (OPD) and so on (Table 7-11).

Table 7-11 Image of Referral Letter System in Japan

With/Without a referral letter	Total Fee for Patients	Image
With a referral letter	Medical fee (Treatment, surgery, etc.)	
Without a referral letter	Medical Fee + Additional Charge (※) (※In case of Japan, the charge is approx.\$50)	

Source: JICA Survey Team

7.2.2 Emergency Medical System Function

Kohima is in a mountain region and the population is around 200,000. For such region, the following Regional Emergency Medical Service Centres' standard in Japan can be introduced (Table 7-12). The detailed contents need to be discussed in the upcoming phases.

Table 7-12 Example of Emergency Medical Service Centre

Development standards
(1) Emergency Medical Service Centres shall have a considerable number of dedicated beds (generally ten or more) directly managed by the person in charge of the Emergency Medical Service Centre, and shall have advanced medical treatment functions for all serious emergency patients in critical conditions and across multiple medical specialties on a 24-hour basis.
(2) The Emergency Medical Centre shall be staffed with necessary personnel to ensure a 24-hour treatment system.
(3) Facilities and equipment
(A) Facilities
(a) The emergency centre shall have an appropriate number of dedicated beds and dedicated intensive care units (ICU) directly managed by the person in charge of the emergency centre. In addition, dedicated cardiac care units (CCU) and dedicated stroke care units (SCU) shall be provided as necessary to receive emergency patients with acute and serious cardiac diseases and strokes.
(b) Exclusive examination rooms (emergency resuscitation room), emergency examination rooms, radiography rooms, and operating rooms, etc., shall be provided as necessary for an emergency medical centre.
(c) If necessary, a heliport shall be provided at an appropriate location.
(B) Equipment
(a) The emergency centre shall be equipped with the necessary medical equipment and supplies for severe burn patients. In addition, if necessary, dedicated medical equipment for the treatment of emergency patients with serious heart diseases and strokes in the acute stage shall be provided.
(b) The hospital shall have a doctor's car, if necessary.
(c) In principle, it shall be equipped with an electrocardiogram receiver so that necessary instructions can be given to the paramedics.
(Note) A doctor car is an ambulance equipped with medical equipment such as patient monitoring equipment and accompanied by a doctor, nurse, etc., and dispatched to the location where the patient is being transported.

Source: JICA Survey Team

7.2.3 Clinical Training Function

Table 7-13 shows the example of clinical training function in Japan. The level and contents shall be discussed and considered with human resource planning.

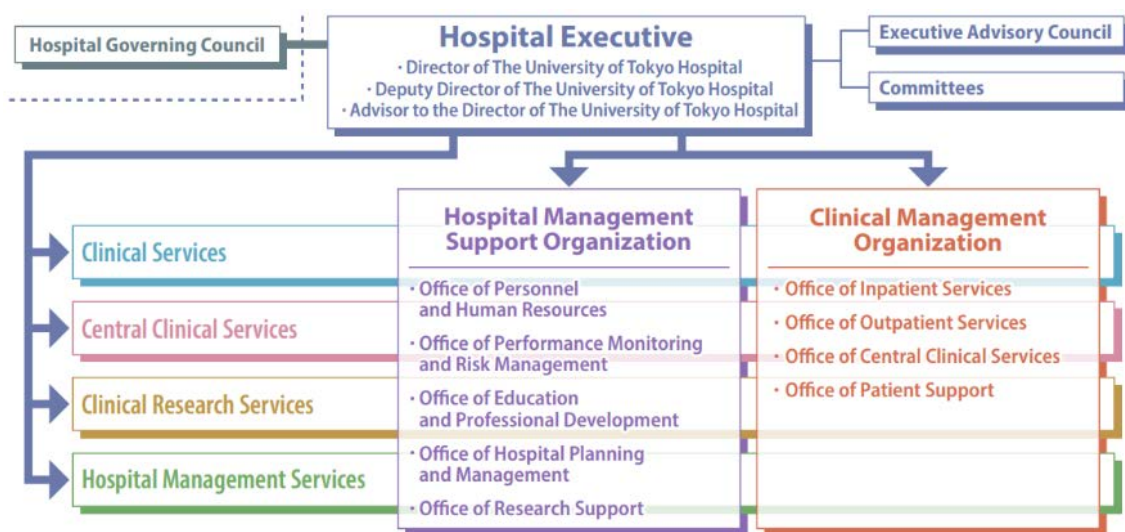
Table 7-13 Example of Clinical Training Function

Clinical Training Hospitals (1) Clinical training hospitals are designated as stand-alone clinical training hospitals, supervising clinical training hospitals, or cooperative clinical training hospitals. (2) A group of clinical training hospitals consists of a supervising clinical training hospital, a cooperative clinical training hospital, and a cooperative clinical training facility. (3) Criteria for designation as a clinical training hospital ○ The hospital must have a training program to achieve the training objectives. • The duration of training must be at least one month for each of the following subjects: internal medicine, surgery, emergency medicine (including anaesthesiology), paediatrics, obstetrics and gynaecology, psychiatry, and community health and medical care. In principle, the first 12 months of training must be in internal medicine, surgery, and the emergency department (including anaesthesiology). • In principle, the initial 12 months of training must be in internal medicine, surgery, and emergency medicine (including anaesthesiology). (For internal medicine, it is desirable to have at least 6 months of training. (For example, the initial 12 months may be divided into 6 months of training in internal medicine, 6 months in surgery and emergency medicine, and 3 months each in paediatrics, obstetrics and gynaecology, psychiatry, and community health and medical care.) • For community health and community medical care, the trainees should select and receive training at clinics in remote areas and islands, small and medium-sized hospitals and clinics, health centres, geriatric healthcare facilities, social welfare facilities, Red Cross blood centres, and facilities that provide various medical examinations and health check-ups (cooperating facilities for clinical training). • The objectives consist of behavioural objectives that define the basic attitude and attitude required of medical personnel, and experience objectives that define the examination methods, procedures, symptoms, pathological conditions, and diseases to be experienced. ② Stand-alone clinical training hospitals must meet the following requirements: • In principle, the hospital must have departments of internal medicine, surgery, paediatrics, obstetrics and gynaecology, and psychiatry, and must have the cases and guidance system necessary to acquire basic primary care medical skills. • The training program must have a training management committee that manages and evaluates the training program and residents, and a program director must be assigned to the program. • The program must have a clinical pathology review committee (CPC) that is appropriately organised. • Full-time supervising physicians must be assigned to each department of internal medicine, surgery, paediatrics, obstetrics and gynaecology, and psychiatry, as a general rule. The supervising physicians must, in principle, be physicians with at least seven years of clinical experience and have sufficient ability to provide guidance with a focus on primary care.

Source: JICA Survey Team

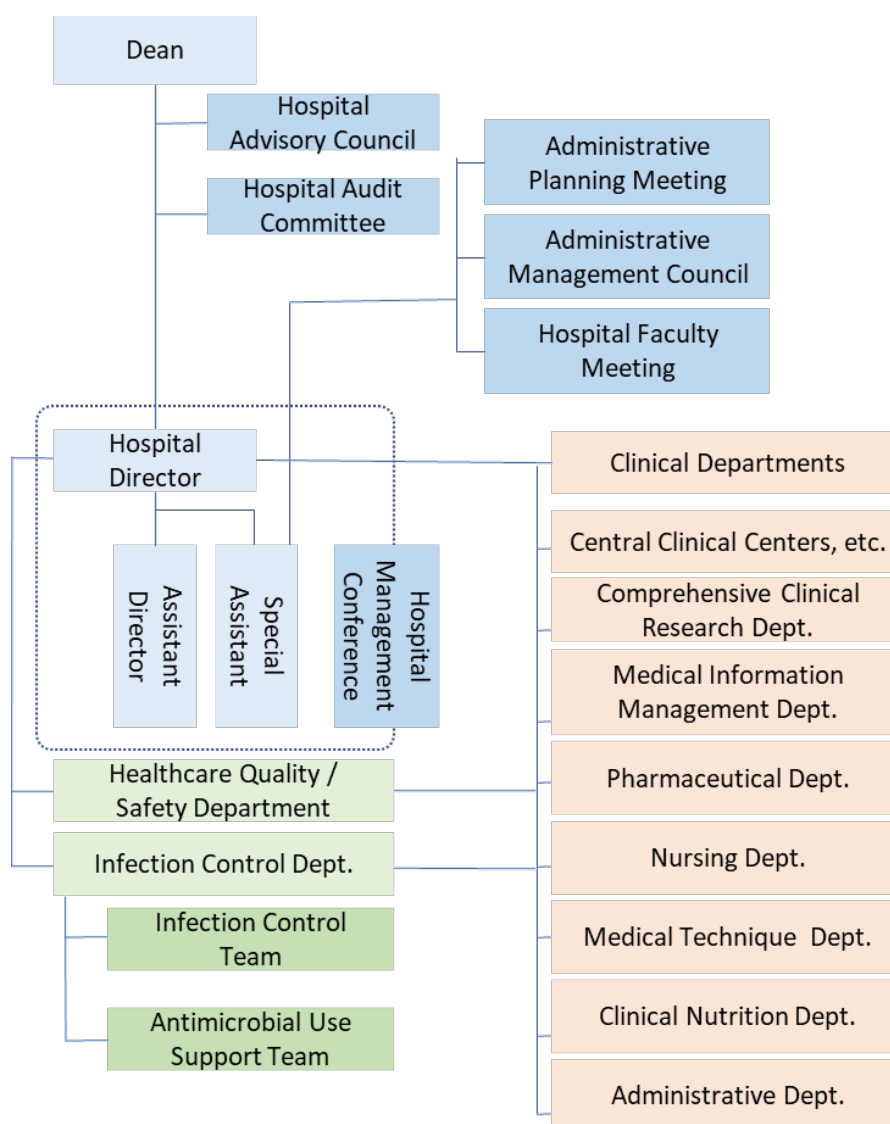
7.2.4 Example of Organisation Chart and Committees in Japan

Figure 7-3 is an example of an organisation chart of Japanese medical university hospitals. The first one is the “matrix” type organisation of the University of Tokyo hospital, which expresses the importance of team medical care. Figure 7-4 and Table 7-14 are examples of another university hospital in Japan, which show the organisation structure and committees of a university and hospital.



Source: [59]

Figure 7-3 Samples of University Hospital Organisation Structure-1



Source: JICA Survey Team

Figure 7-4 Samples of University Hospital Organisation Structure-2

Table 7-14 Committees' Samples in University Hospital in Japan

No	Committee Name	No	Committee Name
1	Medical Safety Management Committee	27	Medical Record Disclosure Review Committee
2	Medical Safety Working-level Conference	28	Medical Information Committee
3	Personal Information Protection Committee	29	Community Medical Support Liaison Committee
4	Insurance Guidance Conference	30	Central Radiation Department Management Committee
5	Medical Service Committee	31	Radiation Safety Committee
6	Volunteer Committee	32	Training Management Committee
7	Safety and Health Committee	33	Foreign Physician Training Committee
8	Medical Waste Disposal Management Committee	34	Staff Training Committee
9	Medical Gas Safety Management Committee	35	Library Committee
10	Committee for Prevention of Nosocomial Infection	36	Research Committee
11	Decubitus Ulcer Control Committee	37	Clinical Engineering Management Meeting
12	Team Medicine Promotion Committee	38	Sterile Care Unit Management Committee
13-1	Pharmaceutical Affairs Committee	39	Future Planning Committee
13-2	Anticancer Drug Appropriate Use Review Committee	40-1	Doctor Helicopter Management Committee

Source: JICA Survey Team

7.2.5 Introduction of Department-wise Management

Table 7-15 shows an example of the scope of work for a major department (outpatient department, diagnostic imaging department, emergency department, surgical unit department, laboratory department, ward department). It is particularly important for a new medical college hospital's operation plan to be consistent with facility plans and medical equipment plans.

Table 7-15 Scope of Department (Example)

Department	Scope of Treatment	
Outpatient Department	Reception and accounting services	Reception of outpatients, information registration
	Outpatient medical services	• Medical interview • Blood pressure, height and weight measurement
		Outpatient consultation
		Treatment
		Request for various tests
		Chemotherapy
		Medication
	Patient consultation services	Various consultation services
		Reception for hospitalisation and discharge
		Referral to other medical institutions
Diagnostic Imaging Department	Patient reception	
	Pre-treatment	
	Radiology (General X-ray, Fluoroscopy, Angiography, CT, MRI, Bone densitometer, Portable X-ray)	
	Nuclear medicine	
	interpretation of radiograms	
	Radiotherapy	
	Others (Safety measures, PACS)	
Emergency Department	Patient reception and triage	Acceptance of patients transported by ambulance
		Reception of patients coming to the hospital on their own (on foot, by private car, etc.)
	Emergency care	Initial treatment, observation
	Surgical management	Surgical schedule management

Department	Scope of Treatment	
Surgical Unit Department		Pre- and post-operative patient condition management
		Explanation to patients
	Surgical operations	Perform surgeries
	Perioperative management	Perioperative anaesthesia, intraoperative and postoperative management
	Supplies management	Management of medical supplies and pharmaceuticals
		Management of surgical equipment
	Cleaning, sterilisation, and supply of equipment	Cleaning, reproduction, sterilisation, and dispensing of equipment
Laboratory Department	Specimen testing	
	Bacteriological tests	
	Physiological examination	
	Pathology, pathological dissection	
	Blood transfusion	
Ward Department	Bed control	Management of hospital beds, including adjustment of beds to which patients are admitted
	Medical care	Wards, diagnosis, treatment, etc.
	Discharge support services	Follow-up after discharge (referral of patients to other medical facilities, outpatient visits, etc.)

Source: JICA Survey Team

7.2.6 Medical Material Management

Table 7-16 shows the sample of medical material management department's scope. There are so many materials to be used in the hospital, so such organised management for materials are crucial for efficient and effective operation of a new medical college hospital.

Table 7-16 Sample Scope of Medical Material Management Department

Categories	Tasks	Activities
Management of Medical Supplies (Including general consumables)	Purchasing management	Purchase planning
		Statistics and analysis
		Ordering and inspection
		Selection of goods to be handled (adopted)
		Support for Medical Supplies Committee
Drug Management Services	Inventory Control	Receiving preparation
		Receiving and storage
		Supply preparation
		Returned goods receipt
		Shelving
		Operating Room operations
Sterilisation Equipment Management	Reception duties	
	Cleaning and disinfection	
	Regeneration and sterilisation	Sorting, washing, and drying
		Assembly and packaging
		Set assembly
	Preparation for supply	
	Inventory control	
Linen and Other Management Services	Laundry services	In-hospital laundry
		Out-of-hospital laundry
	In-hospital bedding management duties	Bedding exchange
		Supply, replenishment and collection
		Checking the number of staff, acceptance and inspection of goods
		Accounting
	Disinfection of linen, etc., for infectious diseases	
Delivery Management	Items: Medical materials (medical supplies, etc.), general consumable supplies, pharmaceuticals, recycled sterilised materials, medical records/films, slips/forms, collected specimens, etc. Medical records/films, slips/forms, specimens collected, etc.	

Source: JICA Survey Team

7.2.7 Example of Disaster Measures

As discussed in the previous Section 7.1, Kohima is at seismic level V region and the new medical college hospital needs to prepare for disaster measures. In Japan, many actual lessons from natural disasters were reviewed and those experiences can be a good practice for the new medical college hospital. In case of disaster, hospitals need to continue its medical services for public as a “Disaster Base Hospital” which is a medical institute for the enhancement of whole emergency medical care system in disasters. Table 7-17 is the standard for disaster measures for hospitals in Japan. These items need to be considered with budgetary perspectives to decide which function can be realised in the new medical college hospital.

Table 7-17 Sample of Disaster Base Hospital Standard

A. Facilities As a base hospital for disaster medical care, the hospital shall have the following medical facilities: ○ The hospital should have wards (hospital rooms, ICU, etc.), treatment wards (examination rooms, laboratories, X-ray rooms, operating rooms, dialysis rooms, etc.), and other departments necessary for emergency treatment, as well as a medical facility that is capable of providing emergency treatment when a large number of patients occur during a disaster. ○ It is also desirable to have a space that can accommodate a large number of patients at the time of a disaster (about twice the normal number of inpatients and about five times the normal number of outpatients) and a space for storing cots and other supplies. ○ Facilities with medical treatment functions should have earthquake-resistant structures, and all facilities necessary to maintain hospital functions should have earthquake-resistant structures. ○ Private power generators, etc., with a generating capacity of about 60% of the normal hospital operation capacity should be owned, and stock fuel for about three days should be secured. If city gas is used as fuel for the private generator, it should have another power system that can be switched in an emergency. In addition, it must be verified that the facilities necessary to maintain the basic functions of the hospital are powered by private power generators, etc., and that they can be used in an emergency. It is desirable to examine the location of private power generators, etc., with reference to local hazard maps, etc. ○ Water supply to maintain hospital functions for at least three days in the event of a disaster should be secured. Specifically, it is desirable to have a water tank with a capacity of at least three days, or to have groundwater facilities (including well facilities) that can be used even during power outages. However, it is also acceptable to secure necessary water by concluding priority water supply agreements, etc., if necessary. B. Equipment As a base hospital for disaster management, the hospital should have the following equipment. ○ Satellite telephones and any infrastructures by which satellite Internet access is available. It is desirable to have multiple means of communication. ○ Participate in the wide-area disaster and emergency medical information system (EMIS) and have a system in place to input information in the event of a disaster. In other words, multiple persons in charge of inputting information should be designated in advance, and training and drills should be conducted on the content of inputting information and how to operate the system. ○ Medical treatment equipment necessary to provide life-saving medical care for critical emergency patients who frequently occur in disasters, such as multiple traumas, contusion syndrome, and extensive burns. ○ Cots for the occurrence of a large number of patients. ○ Portable emergency medical equipment and materials, emergency medical supplies, tents, generators, drinking water, food, daily necessities, etc., that can be used for self-contained medical care in the disaster area. ○ Triage tags C. Others Stockpile about three days' worth of food, drinking water, medicines, etc., as the amount needed until they can be properly supplied through distribution. It is advisable to assume that a large number of patients will visit the hospital and that staff will have difficulty returning home in the event of a disaster. In addition, a system and general agreement should be in place to ensure that food, drinking water, medical supplies, fuel, etc., are preferentially supplied in the event of a disaster through agreements with related local organisations and vendors. D. Transportation In principle, the hospital must have a helicopter take-off/landing area on the hospital grounds.
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If it is difficult to secure a take-off/landing site within the hospital grounds, the hospital shall secure a take-off/landing site in the vicinity of the hospital that can be used in an emergency with the cooperation of the prefectural government as necessary and shall have emergency vehicles for transporting patients.

In principle, the site should have emergency vehicles necessary for dispatching Disaster Medical Assistance Team (DMAT) and medical teams. The vehicle should be able to carry emergency medical equipment, tents, generators, drinking water, food, daily necessities, etc.

Source: JICA Survey Team

7.2.8 Severity of Illness, Necessities of Medical Care

As discussed in previous chapter, medical resources need to be used efficiently and effectively in the new medical college hospital. That is, the new medical college hospital shall provide the patients with severe illness with their advance medical services mainly. Table 7-18 shows the example of Japanese “Severity of illness, necessities of medical care” in general hospitals and these criteria can be modified according to Nagaland situation in the upcoming stages.

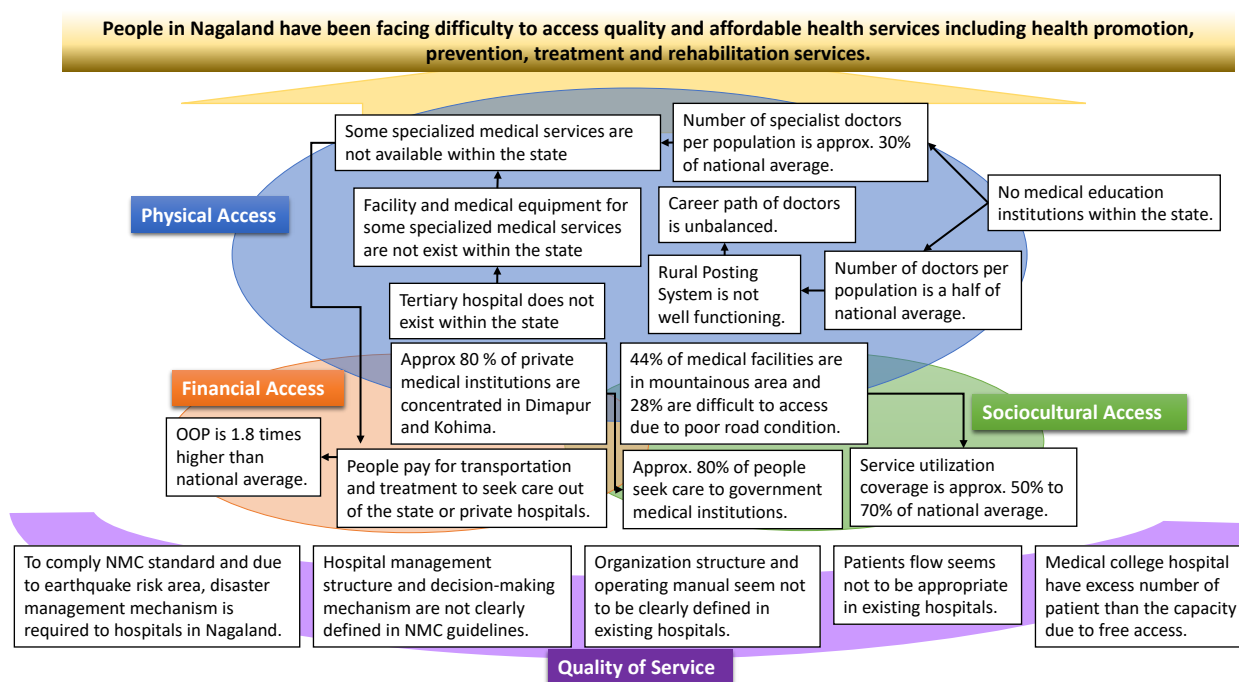
Table 7-18 Sample of Severity of Illness, Necessity of Medical Care in Japan

A	Monitoring and Treatment	B	Patient condition
1	Treatment of wound care and bedsores	8	Self-roll-over
2	Respiratory care (excluding sputum suction only)	9	Necessity for transferring to stretcher
3	Management of 3 and more injectable medicine	10	Oral cleaning care
4	Management of syringe pumps	11	Self-feeding
5	Management of blood transfusion and blood products	12	Self-dressing
6	Specialized treatments/procedures 1) Use of antineoplastic agents (injection only), 2) Management of oral antineoplastic agents, 3) Use of narcotics (injection only), 4) Management of oral narcotics, patch, suppositories, 5) Radiation therapy 6) Management of immunosuppressive agents (injection only), 7) Use of hypertensive agents (injection only); 8) Use of antiarrhythmic agents (injection only) 9) Use of continuous infusion of antithrombotic agents, 10) Management of drainage, 11) Treatment in aseptic room	13	Oral medical communication
		14	Hazardous behaviour
		C Situation of medical surgeries	
		15	Open head surgery
		16	Open heart surgery
		17	Open abdominal surgery
		18	Thoracoscopic and laparoscopic surgery
		19	Whole body anaesthesia, spinal anaesthesia surgery
		20	Internal medicine treatment for emergency care 1) Transcutaneous endovascular treatment 2) Transcutaneous cardiac cautery surgery 3) Invasive digestive organ therapy
7	Hospitalization after emergency transport		

Source: JICA Survey Team

Chapter 8 Technical Assistance

Based on the survey results, relevant challenges to the project are illustrated in Figure 8-1. Those are analysed in accordance with the four factors of universal health coverage (UHC), namely; physical access, financial access, sociocultural access, and quality of service. Because of the absence of a medical college and a teaching hospital, capacity to provide specialised care is not sufficient in terms of facility, equipment, and human resources. In addition, the geographical condition of Nagaland also hinders people from affordable medical services.

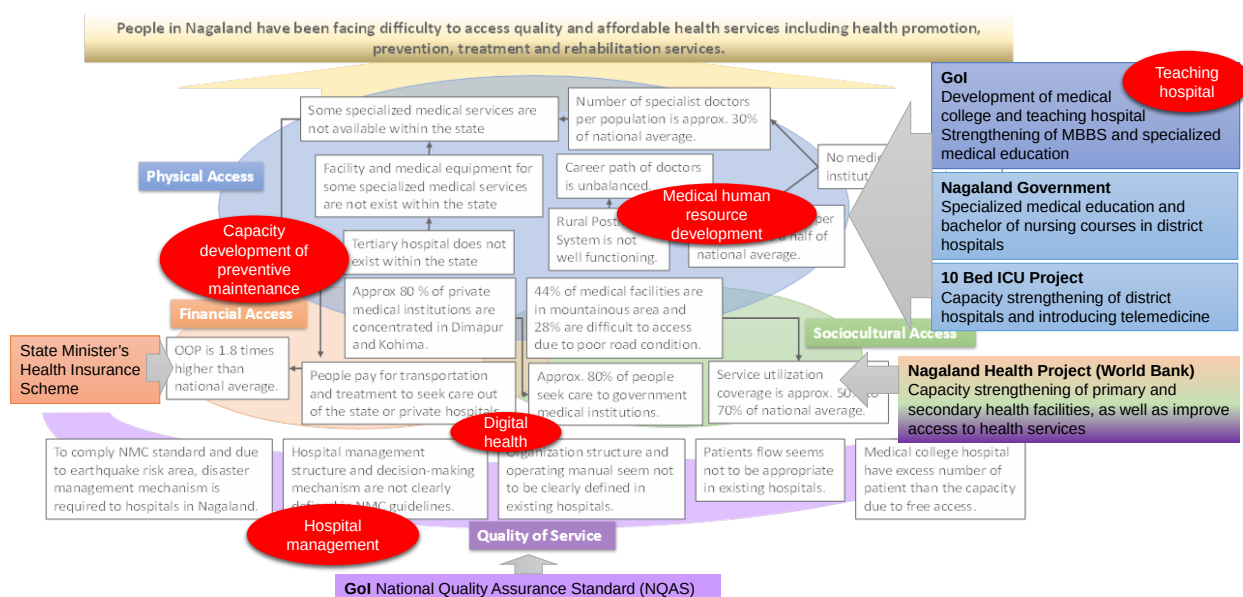


Source: JICA Survey Team

Figure 8-1 Relevant Challenges of Health System in Nagaland

Figure 8-2 presents possible solutions and relevant existing efforts against the challenges. The Government of India (GoI) has been taking various efforts to increase the quantity of medical doctors. The Government of Nagaland has been trying to increase the quality of health personnel through strengthening of specialised education. Post-graduate courses for nurses and specialised doctors are being introduced into the three District Hospitals: NHAK, Dimapur Hospital, and Mokokchung Hospital. The Nagaland Health Project (NHP) funded by the World Bank supports to strengthen the capacity of primary and secondary health facilities like electricity and water supply, improvement of facility and medical equipment, health management information system, trainings for health personnel, etc. These efforts could contribute to the improvement of the quality of health services and access to health services. In terms of financial access, the state health insurance scheme has been launched in December 2022. However, less investment for specialised or tertiary medical services have been made.

As the Project covers the tertiary level, it could contribute to supplement the existing effort towards UHC. Through the comprehensive development of the first tertiary and teaching hospital in Nagaland, the quantity and quality of specialised medical care could be improved. Also, the teaching hospital could be a hub of medical human resource development. In addition, to overcome geographical difficulty, digital transformation could be utilised.



Source: JICA Survey Team

Figure 8-2 Possible Solution Against the Challenges and Existing Efforts

In this chapter, two different schemes are assumed for technical assistance application, i.e.; soft component and technical cooperation scheme. The soft component will be implemented as a part of the project to enhance effectiveness and sustainability of the project in close combination with facility and equipment development. The technical cooperation scheme of JICA will be designed and implemented separately from but liaise with the project to support sustainability of outcomes of the soft component or bring positive impact to the effort for UHC in Nagaland. However, it should be reminded that the technical cooperation scheme will require different official procedure between the Indian and Japanese governments from the project.

8.1 Soft Component

The proposed soft component activities are listed in Table 8-1 and the proposed schedule is presented in Figure 8-3. Assuming the hospital opening will be three months after the completion of the construction works, the soft component will be continued a year after the completion of the construction work to train staff of the new hospital.

The soft component aims to enhance the capacity of concerned institutions to the project including, Department of Health and Family Welfare (DHFV), Nagaland Institute of Medical and Science Research (NIMSR), Nagaland Medical College Kohima (NMCK) Hospital, and Naga Hospital Authority Kohima (NHAK). The main objective is to establish readiness for the new teaching hospital.

Four sub-components are proposed: medical human resource development, hospital management, medical equipment and maintenance, as well as hospital information management system. Each component includes study tour to learn from experiences and good practices relevant to each topic. Then, based on learning from these visits, sustainable mechanism could be developed. In addition, staff training on medical equipment maintenance and hospital management information system (HMIS) will be implemented by the contractor of each component because the contractors have practical knowledge on medical or IT equipment and information management system to be installed to the NMCK Hospital.

In planning the details of the soft component activities, the activities and achievements of other donors such as the World Bank and USAID should be taken into account. As described in Chapter 6 (ICT Planning), the plan of the sub-component of hospital information management system will be consistent with the support provided at the national, state, and facility levels, and based on the status of capacity building.

Table 8-1 Outline of the Proposed Soft Component

Sub-components	Proposed Activities	Objectives	Implementers	Targets
Medical Human Resource Development	Study visits on good practice	To learn from relevant experiences on effective clinical training, medical intern system, and distance technical support by specialist doctors	Soft Component Contractor	- DHFW officers - NIMSR faculties - NHAK managers
	Development of distance technical support system and contents among primary, secondary, and tertiary health facilities in collaboration with the 10 Bed ICU	To establish sustainable distance technical support system from specialist doctors in NIMSR and major District Hospitals to doctors working in remote areas and primary health facilities		- NIMSR faculties - NHAK specialist doctors
	Development of clinical training curriculum for the medical college hospital including rural posting	- To establish attractive clinical training mechanism for under-/post- graduate medical students through utilising simulator and virtual programmes - To ensure implementation of rural posting to develop well-balanced carrier between general medicine, public health, and specialised care		- NIMSR faculties - NHAK supervisors
Hospital Management	Study visits on good practice	To learn from relevant experiences on medical college hospital management including quality management and disaster preparedness	Soft Component Contractor	- DHFW officers - NIMSR faculties
	Development of management structure and guidelines of the hospital/ each department, infectious prevention and control (IPD) manual, and disaster management manual of the medical college hospital, as well as training of trainers (TOT)	- To establish sustainable hospital management mechanism including preparedness for health emergency - To train new hospital managers as trainers on the developed mechanism and manuals - To develop induction training programme and material		NIMSR faculties
	Induction training for new staff of NMCK Hospital	To facilitate the trainers to train hospital new staff		NMCK Hospital staff
Medical Equipment Maintenance	Study visits on good practice	To learn from relevant experiences on preventive maintenance of major medical equipment	PMC	- NIMSR faculties - NHAK managers
	Development of guidelines on preventive daily operation and maintenance for users of the major medical equipment and TOT	- To establish sustainable preventive maintenance mechanism for end-users - To train new hospital managers as trainers on the developed mechanism and manual	Medical Equipment Contractor	NIMSR faculties
	Training on preventive maintenance and the developed guidelines	To facilitate the trainers to train end-users in the hospital	Soft Component Contractor	NMCK Hospital staff

[illegible]

Source: JICA Survey Team

8-4

8.2 Technical Cooperation Scheme

Among the technical cooperation scheme of JICA, the following three sub-scheme could be applied: technical cooperation project, development studies program (JICA-DSP), and knowledge co-creation programme (KCCP) as listed in Table 8-2.

Table 8-2 Ideas of Technical Cooperation (Examples)

Sub-scheme	Concept	Possible Activities (examples)
Technical Cooperation Project [59]	To extend impacts of the medical human resource development sub-component to contribute for UHC	• Capacity development of NIMSR staff on patient services such as team approach, medical safety, clinical path, etc. • Capacity development of primary health facilities (basic medical equipment and trainings) • Enhancement of referral system through utilizing eSanjavni
Development Studies Program (JICA-DSP) [60]	To increase leaders for medical human resource development and India-Japan partnership in health sector	• Scholarship for post-graduate education • Long-term training in Universities in Japan
Knowledge Co-creation Programme (KCCP) [61]	To increase leaders for medical human resource development, hospital management, etc.	• Involved in group and region focus programmes • Development and implementation of country focus programmes

Source: JICA Survey Team

Chapter 9 Environmental and Social Consideration

The Japan International Cooperation Agency (JICA) is accountable for the environmental and social considerations (ESC) of the Project, and it is necessary to confirm the implementation of ESC by the project proponents. In addition, JICA provides technical support for ESC-related studies including conducting environmental and social consideration survey during the preparatory survey. The objective of the survey is to avoid significant impact from the Project based on the JICA Guidelines for Environmental and Social Considerations (hereinafter referred to as “JICA guidelines”). The results of assessment together with mitigation measures and environmental monitoring plans need to be reflected to the project implementation planning.

The picture of the project site is shown in Figure 9-1. Buildings under the construction can be seen in the centre. The surrounding areas are green spaces and most of the edge of the green spaces are hilly slope or cliff. According to the state government, nobody lives in the green space, hence, no resettlement occurs.



Source: JICA Survey Team

Figure 9-1 Aerial Photo of the Project Site

9.1 Proposed Project Components Subject to Environmental and Social Impacts

The summary of the Project components that may affect social and natural environment is shown in Table 9-1 (contents of the table are provisional as of April 2023 and to be updated in the final report).

Table 9-1 Summary of the Project Components that may Affect Environment

Category	Project Components
Construction plan	Construction period: 48 months
Key features	<Scale> Main hospital: Approx.49,270 m², Coverage floor area : Approx. 4,480 m² Story: 10 stories + 2 penthouse floors + 3 basement floors Number of beds: 400 beds Structure: Reinforced concrete with seismic isolation Others: Evacuation Ramp from GL to 2F(total floor area 780 m²), Connecting Bridge corridor (Approx. 80 m²)

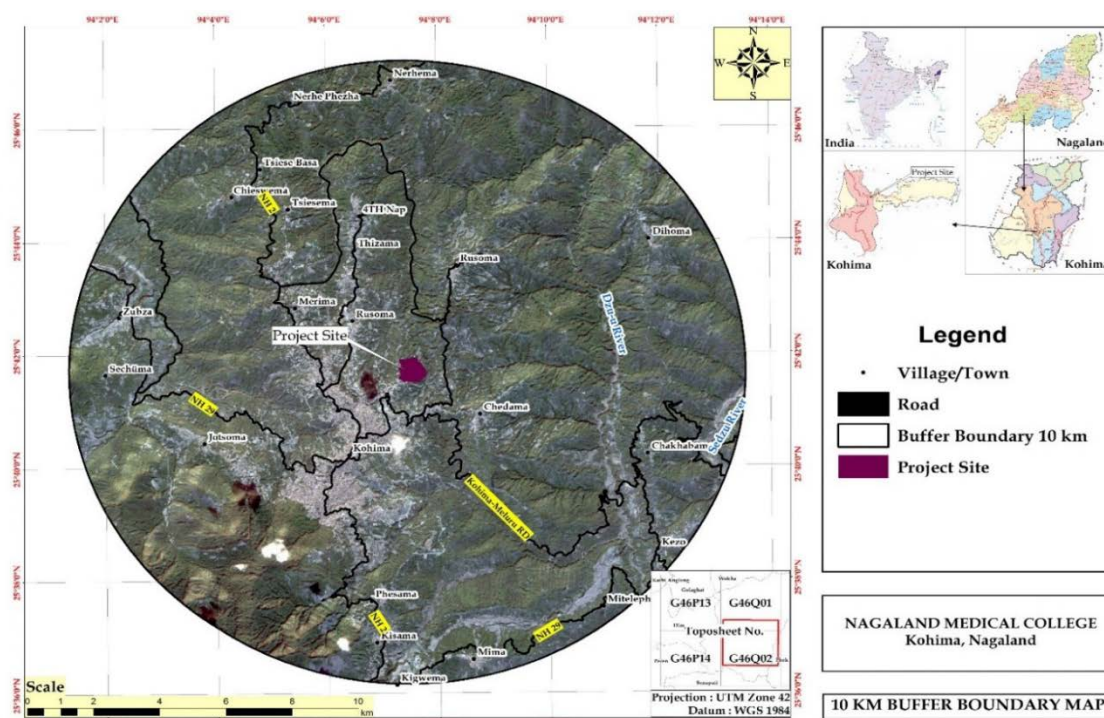
Category	Project Components		
Power supply	Total connected power load is approx. 1,100 kW and Operation Load is 850 kW. Backup DG Set: 150kVA. Others: An overhead 33 kV HT line cuts across the shorter part of the side. Lattice towers have been set up by the Transmission and Generation Department of the Department of Power, Nagaland.		
Water supply	< Municipal Supply in Nagaland> The water supply for the entire campus shall be provided by the Public Health Engineering department (PHED) of Nagaland. As for the drainage system, according to the master layout plan, septic tank will be installed at near each building. In addition, several rainwater tanks will be installed at lower area of the project site. <Ground Water> No ground water abstraction structures are noticed in the Project site, except for shallow ground water structures, which may be feasible in suitable locations of the valley portions.		
Sewage/ drainage	<Sewage/drainage> Sewer will be directly discharged to the outside because of lack of public sewage system due to hilly topography. <Medical effluent> Effluent Treatment Plant shall be installed for pre-treatment of medical effluents		
Air quality	<Medical activities> Contaminated air with biomedical pollutants may be generated from the Project activities.		
Waste Management	<During pre-construction and construction> The excavated solid waste as well as construction-related waste will be the main component of solid waste during the construction phase of the Project, including demolishing existing facilities. These should be maintained inside the proposed project site under the responsibility of the contractor and be disposed in accordance with the relevant norms and rules.		
	<During operation> Waste generated at the Project site will be collected and treated separately as shown below.		
	Waste Type	Contents	Treatment Method
	Bio-medical wastes	Blood product, organ/cell tissue. Needle, syringe with needle, scalpel. Laboratory dish, glass pieces Object used for chemical treatment, etc.	These should be treated in accordance with Bio-Medical Waste (Management) Rules (2016). Segregated at source and collected in coloured boxes and stored safely. Transported separately. Sterilised (by autoclave) and disposed by authorised third party.
	Hazardous wastes (chemical)	Wastes from medical and dental practices during treatment or research activities, which may contain either inorganic or organic constitutions.	These should be treated in accordance with the Hazardous and Other Wastes Management Rules (2016). Segregated at source and collected in containers and stored safely. Transported separately. Handed over to authorised third party. Periodically report to the State Pollution Control Board.
	General wastes	Biodegradable wastes	These can be treated by organic waste converter or bio-gas treatment plant and used as fertiliser.
Transportation of Goods and People	<During construction> Number and type of vehicles may differ based on the type of works going on during the construction period. These may generate noise, vibration, and other impacts to inhabitants of surrounding area.		
	<During operation> Main noise sources during operation phase include the operation of the heating and cooling systems and the increase in road traffic due to operation of the proposed facility.		

Category	Project Components
Disaster Management, Accident Prevention	<Earthquake > The project site is located at high-risk zone (zone V) in terms of earthquake. Project facilities should be constructed in accordance with the state code, and emergency plan in case of earthquake should be developed for construction and operation periods. <Landslide > It is a major factor that keep affecting the project site when heavy down pour is experienced all over the Project Site. Much of the area is very hilly comprising of steep slopes and high relief. Project site is predominantly made up of shale's and sandstones in various combinations. Most of the rocks, particularly the shale's are sheared, fractured, crumpled, and weathered to various extents.

Source: JICA Survey Team

9.2 Baseline Environmental and Social Condition

Baseline survey has been carried out during from December 2022 to January 2023 to provide detailed description of the current condition of the physical environment (air, water, and noise level) and the existing ecosystem around the Project site. The study area was defined as 10 km radial study zone as presented in Figure 9-2, and measurement points for each environmental parameter were set within and around project site.



Source: JICA Survey Team

Figure 9-2 Study Area for Environmental and Social Condition

The summary of results for each item is as follows, and the complete results of baseline survey are presented in ESIA report.

<Air Quality>

For the air quality of the site, PM₁₀, PM_{2.5}, SO₂, NO₂, CO, and NH₃ have been measured at three points for a total of twenty-four hours as presented in Table 9-2. Based on the results of conducted monitoring all parameters are within the national standards.

Table 9-2 Result of Air Quality Measurement

Station	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	CO (mg/m ³)	NO ₂ (µg/m ³)
AAQ1	78	42	8.3	0.69	16
AAQ2	72	36	7.5	0.65	14
AAQ3	66	28	6.1	0.35	11.6
NAAQS Standards	100	60	80	2	80

Source: JICA Survey Team

<Noise>

The noise level has been measured at three locations in the Project site and surrounding residential area for a duration of 24 hours as presented in Table 9-3. Noise level at all points were within permissible limit. For ANQ1, the result of project site, is within permissible limits for residential area set by the Central Pollution Control Board (CPCB), which can be interpreted as acceptable for medical institution.

Table 9-3 Result of Noise Level Measurement

Station	Location	Noise Level (dB(A))		Permissible Limit (dB(A))	
		Day Time	Night Time	Day Time	Night Time
ANQ1	Project Site	49.2	41.4	75	70
ANQ2	Residential	51.8	39.8	55	45
ANQ3	Residential	48.8	38.9	55	45

Source: JICA Survey Team

<Water Quality>

For water quality analysis, ground water from three locations and surface water from one location have been collected and analysed including heavy metals, chemical, and biological features of water. The results are presented in Table 9-4 and Table 9-5. For ground water, alkalinity and total hardness exceeded acceptable limit, but those were within permissible limits. All other parameters were within national standards for water quality set by CPCB for ground water and Bureau of Indian Standards for surface water.

Table 9-4 Result of Ground Water Quality Measurement

No.	Parameter	Unit	GW1	GW2	GW3	Acceptable Limit (Max)	Permissible Limits (Max)
1	pH Value at 25°C	-	7.55	7.0	6.6	8.5	No Relaxation
2	Turbidity in NTU	NTU	1.0	1.0	1.0	1	5
3	Total Dissolved Solids	mg/L	259	264	228	500	2000
4	Barium as Ba	mg/l	<0.05	<0.05	<0.05	0.7	No Relaxation
5	Nickel as Ni	mg/l	<0.01	<0.01	<0.01	0.02	No Relaxation
6	Aluminum (as Al)	mg/L	<0.01	<0.01	<0.01	0.03	0.2
7	Ammonia (as NH ₃)	mg/L	<0.1	<0.1	<0.1	0.5	No Relaxation
8	Anionic Detergents (as MBAS)	mg/L	<0.05	<0.05	<0.05	0.2	1
9	Boron (as B)	mg/L	<0.1	<0.1	<0.1	0.5	2.4
10	Calcium (as Ca)	mg/L	87	60.8	14	75	200
11	Chloride (as Cl)	mg/L	21	26	7.0	250	1000
12	Copper (as Cu)	mg/L	<0.01	<0.01	<0.01	0.05	No Relaxation
13	Fluoride (as F)	mg/L	0.07	0.04	<0.01	1	1.5
14	Iron (as Fe)	mg/L	0.17	0.12	0.06	1.0	No Relaxation
15	Magnesium (as Mg)	mg/L	10.8	16.8	26.4	100	No Relaxation
16	Manganese (as Mn)	mg/L	<0.01	<0.01	<0.01	0.1	0.3
17	Nitrate (as NO ₃)	mg/L	10.4	7.0	<0.1	45	No Relaxation
18	Phenolic Compounds (as C ₆ H ₅ OH)	mg/L	<0.001	<0.001	<0.001	0.001	0.002
19	Sulphate (as SO ₄)	mg/L	100	31	0.8	200	400
20	Alkalinity (as CaCO ₃)	mg/L	372	336	31	200	600
21	Total Hardness	mg/L	437	342	71	200	600
22	Cadmium (as Cd)	mg/L	<0.001	<0.001	<0.001	0.003	No Relaxation
23	Lead (as Pb)	mg/L	<0.01	<0.01	<0.01	0.01	No Relaxation

No.	Parameter	Unit	GW1	GW2	GW3	Acceptable Limit (Max)	Permissible Limits (Max)
24	Mercury (as Hg)	mg/L	<0.001	<0.001	<0.001	0.001	No relaxation
25	Arsenic (as As)	mg/L	<0.01	<0.01	<0.01	0.01	No relaxation
26	Zinc (as Zn)	mg/L	<0.01	<0.01	<0.01	5	15
27	Total Chromium (as Cr)	mg/L	<0.01	<0.01	<0.01	0.05	No Relaxation
28	E.coli	cfu/100 ml	N.D*	N.D	N.D	-	Should not be detected
29	Total Coliform Bacteria	MPN/ 100 ml	N.D	N.D	N.D	-	Should not be detected

Note) *: N.D = Not Detected

Source: JICA Survey Team

Table 9-5 Result of Surface Water Quality Measurement

No.	Parameter	Unit	SW1	IS: 2296 -1992 Tolerance Limits	Test Method
1	pH	-	7.5	6.5 -8.5	IS: 3025 (Pt-11)1983
2	Conductivity	µs/cm	874.0	-	IS: 3025 (P- 14)
3	Turbidity	NTU	42	-	IS: 3025 (P- 10)
4	Free Residual Chlorine	mg/L	<0.1	200	IS: 3025 (P- 26)
5	Total Hardness as CaCO ₃	mg/L	332	600	IS: 3025 (P- 21)
6	Total Dissolved Solids	mg/L	581.0	1500	IS 3025 (Part-16): 1984, RA 2006
7	Calcium as Ca	mg/L	114	-	IS 3025 P-40 (1991)
8	Total Alkalinity as CaCO ₃	mg/L	372	600	IS: 3025 (P- 32)
9	Magnesium (as Mg)	mg/L	11.5	-	IS: 3025 (P-46)
10	Chlorides (as Cl)	mg/L	117	600	IS 3025 (Part-32): 1988
11	Barium as Ba	mg/L	<0.05	-	Amex F of S:13428
12	Ammonia (as NH ₃)	mg/L	<0.1	-	IS 302s P-34 (1e88)
13	Sulphate (as SO ₄)	mg/L	2.75	64.0	IS 3025 (Part-24):1986, RA 2003
14	Nitrate (as NO ₃)	mg/L	1.8	50	IS: 3025 (P- 34) 1986, RA 2003
15	Fluorides (as F)	mg/L	<0.1	1.5	IS: 3025 (P- 60)
16	Iron (as Fe)	mg/L	0.15	1	IS 3025 (Part-53)
17	Chemical Oxygen Demand	mg/L	65.0	250	IS: 3025 (P- 58):2006
18	Biochemical Oxygen Demand (3 days at 27°C)	mg/L	17.0	30	IS 3025 (Part-44): 1993, RA 2009
19	Dissolved Oxygen	mg/L	6.5	> 4	IS: 3025 (P- 44) 1993:RA 2009
20	Aluminum as Al	mg/L	<0.01	-	IS: 3025 (P- 35)
21	Anionic detergents	mg/L	<0.05	1	Annex K of IS:13428
22	Phenolic Compounds	mg/L	<0.001	0.005	IS: 3025 (P- 12)
23	Boron (as B)	mg/L	<0.1	-	IS: 3025 (P- 57)
24	Chromium (as Cr)	mg/L	<0.01	0.05	IS: 3025 (P- 52) 2001
25	Lead (as Pb)	mg/L	<0.01	0.1	IS 3025(Part-47)
26	Copper (as Cu)	mg/L	<0.01	1.5	3110- B, APHA 23nd Ed. 2017 (AAS)
27	Mercury as Hg	mg/L	<0.001	-	IS: 3025 (P- 40)
28	Manganese as Mn	mg/L	<0.01	0.3	IS: 3025 (P-59)
29	Zinc (as Zn)	mg/L	<0.01	15	IS: 3025 (P- 49)
30	Arsenic (as As)	mg/L	<0.01	0.2	IS 3025 (Part-37)
31	Nickel as Ni	mg/L	<0.01	-	IS 3025 P-54 (2003)
32	Cadmium (as Cd)	mg/L	<0.001	0.01	IS: 3025 (P- 41)
33	Total Coliform Bacteria	MPN/100mL	900	-	IS:1622-2013
34	Fecal Coliform	MPN/100mL	130	-	IS:1622-2013

Source: JICA Survey Team

<Flora and Fauna>

Survey was conducted within the project site. The project site is an acquired land with the Nagaland Medical College and Hospital, where already surface vegetation has been modified. Therefore, the project site contains few plants and shrubs species.

The entire area has terrestrial vegetation and agricultural land nearby growing paddy. Core zone doesn't have any rare, endangered, extinct and threatened species. No migratory corridors or breeding grounds for faunal species, nor faunal species were confirmed. The most commonly seen floras in the project site are of Musaceae family (Banana Tree), *genus Pinus*, *Alnus nepalensis*, *Leucoscepttrum canum*, *Docynia indica*. And shrubs like *Eupatorium odoratum* (Siam weed), *Polygonum molle* (Knotweed), *Bidens pilosa* (Beggar Tick). Avi fauna- There are lot of sighting of Sparrows found in the Project Site. Few sightings of Bulbul, Warbler, Cuckoo, Asian Koel were seen near the Project Site.

9.2.1 Biomedical Wastes

All wastes from hospitals are collected, segregated, and transported to authorised third party or in their own internal incinerator. The certified private companies are regulated by the state government to locate every 75 km radius to avoid unnecessary price competition that could cause poor quality service. Biochemical wastes amount is 543 kg/day in Dimapur including Niuland, Chumoukedima and 250–300 kg/day in Kohima. Cooperative waste treatment centre is expected in the state.

Plastic wastes, which consists of more than 30% of wastes from the hospital, are segregated and burned by incinerator in the authorised third party. The incineration temperature is 800 degrees that can prevent dioxin emission. After the incineration, the ash is filled with concrete and transported to the municipal dumping site. If the final dumping amount exceeds the capacity of the municipal dumping site, it will be transported outside of Kohima.



Source: JICA Survey Team

Photo 9-1 Biomedical Wastes Collection Car of Authorised Third Party

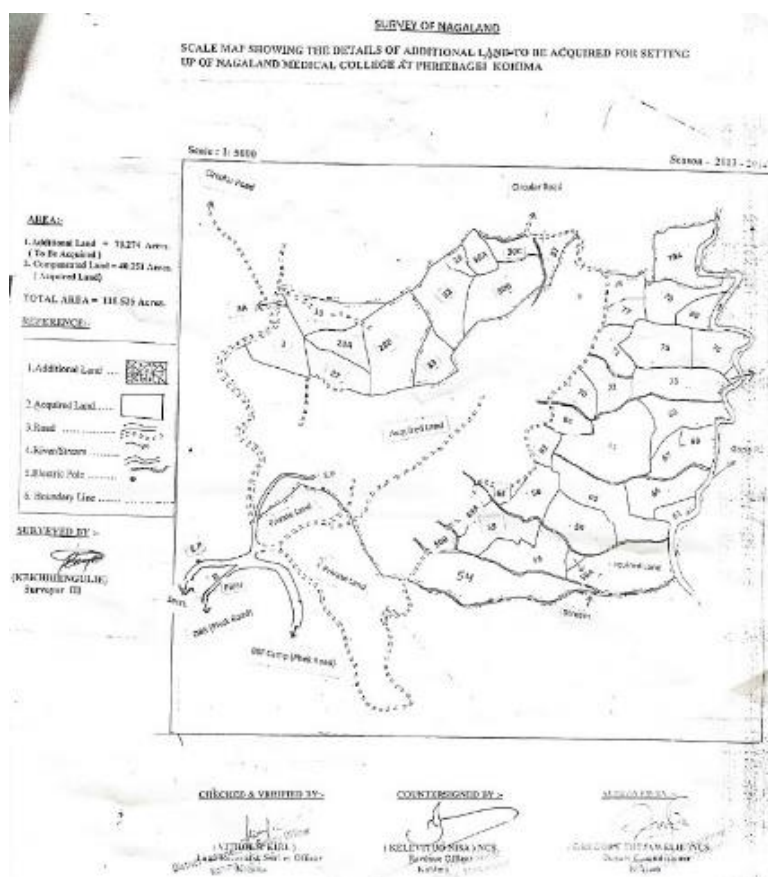
Injection needles are collected and stored in a cylinder inside the hospital. The capacity of the cylinder is more than 50 years. When it becomes full, the cylinder will be filled with concrete and used for construction materials. Around 525 healthcare centres and primary healthcare centres have their own cylinder of injection needle by the assistance of the World Bank.

Although wastewater and sewage water treatment facilities are established since the coronavirus disease 2019 (COVID-19) pandemic, they are not in operation as of 29 September 2022. Four private hospitals have their own wastewater treatment plants; however, in many hospitals, wastewater is discharged without treatment because no public treatment system is available in the area now. The treatment system will start operation at the end of 2022.

9.2.2 Status of Land Ownership and Land Acquisition

The project site is located at the land (centre white space of Figure 9-3) already occupied by Nagaland State, thus, there is no involuntary resettlement associated with project development. On the other hand, the surrounding area regarded as buffer zone belongs to several communities and the land registration process is on the way (see Section 3.1.2 for detail). The surrounding area consists of several blocks, and each of them is private property under the name of “community”. To acquire such area, the state government has to collect permissions from all households of each community with compensation.

Overall, the Project site, an area of 50.251 acres has already been acquired by the state government and completed registration. Currently the area is occupied by the existing maternal and child hospital, and all construction works for the Project will be limited to inside of the area; therefore, no additional land acquisition would be required for implementation of the Project (Table 9-6).



Source: Nagaland Government

Figure 9-3 Land Acquisition Area for the Project

Table 9-6 Progress of Land Acquisition for the Nagaland Medical College Kohima (NMCK) as of May 2023

Project Site	Area (acre)
Acquired land (compensated)	40.251
Yet to be acquired land	70.254
Total project land	110.525

Source: Nagaland Government

9.3 Implementation System and Legal Framework for Environmental and Social Considerations

9.3.1 Institutional Setting

In India, the ministry in charge of environmental and social considerations is the Ministry of Environment, Forest and Climate Change (MoEF), which has institutions in both at the central and state level. Under

MoEF, CPCB is established to formulate the policy, regulations, and guidelines for environmental conservation. They also operationalise international agreements such as Montreal Protocol, Ramsar Convention, and Washington Convention.

At the state level, there are departments responsible for environmental protection and the State-level Pollution Control Board (SPCB), which plays a principal role in pollution control in practice.

The Project falls into category B of JICA Guidelines. The project is not required Environmental Impact Assessment.

9.3.2 Laws and Regulations Related to Environmental Considerations

In India, the central government provides laws, regulations, and institutions to protect and improve the environment in relation to development activities. The key components are as follows:

(1) Environmental (Protection) Act (1986) and its Amendment (1991)

The act provides a foundation for environmental protection and improvement of environment in India and stipulates the role and power of the government, as well as penalties to non-compliance with the act and related rules.

(2) Environment (Protection) Rules (1986)

The rules provide standards for emissions or discharge of environmental pollutants, restrictions on the location of specific industries, and procedures of sample analysis of such pollutants.

(3) Environmental Clearance Notification (2006), and its Amendment (2009)

The notification had been initially established in 1994 followed by the Environmental Protection Act and Rules in 1986. It provides the categorisation of projects based on the scale and type of activities that may cause environmental degradation and specifies the procedures to follow. It also specifies the type of project, which should obtain environmental clearance and conduct environmental impact assessment (EIA). Demarcation between national and state level environmental authorities is covered by the notification. The amendment in 2009 enhanced the obligation of project proponents to disclose information related to project implementation and result of environmental monitoring.

In addition to these key components, Table 9-7 presents laws and regulations related to development and operation of the proposed project.

Table 9-7 Laws and Regulations Related to Environmental Protection

Name of Laws, Rules, etc.		Year
1. Waste Management		
Construction and Demolition Waste Management Rules		2016
Bio-medical Waste (Management and Handling) Rules		2016
Bio-medical Waste Management (Amendments) Rules		2019
Hazardous and Other Wastes (Management and Transboundary Movement) Rules		2015
Hazardous and Other Wastes (Management and Transboundary Movement) Amendment Rules		2017
Municipal Solid Wastes (Management and Handling) Rules		2000
Plastic Waste (Management and Handling) Rules		2011
Plastic Waste Management (Amendment) Rules		2018
Solid Waste Management Rules		2015
E-waste (Management) Rules		2015
E-waste (Management) Amendment Rules		2017
Batteries (Management and Handling) Amendment Rules		2010
2. Ambient Environment Protection		
Water (Prevention and Control of Pollution) Act		1974
Water (Prevention and Control of Pollution) Rules		1975
Air (Prevention and Control of Pollution) Act		1981
Air (Prevention and Control of Pollution) Act, Amendment		1987
Air (Prevention and Control of Pollution) Rules		1982
Noise Pollution (Regulation and Control) Rules		2000
3. Wildlife protection		
The Wildlife Protection Act		1972

Name of Laws, Rules, etc.		Year
The Wildlife Protection Act, amendment		2003, 2006
The Forest Conservation Act		1980

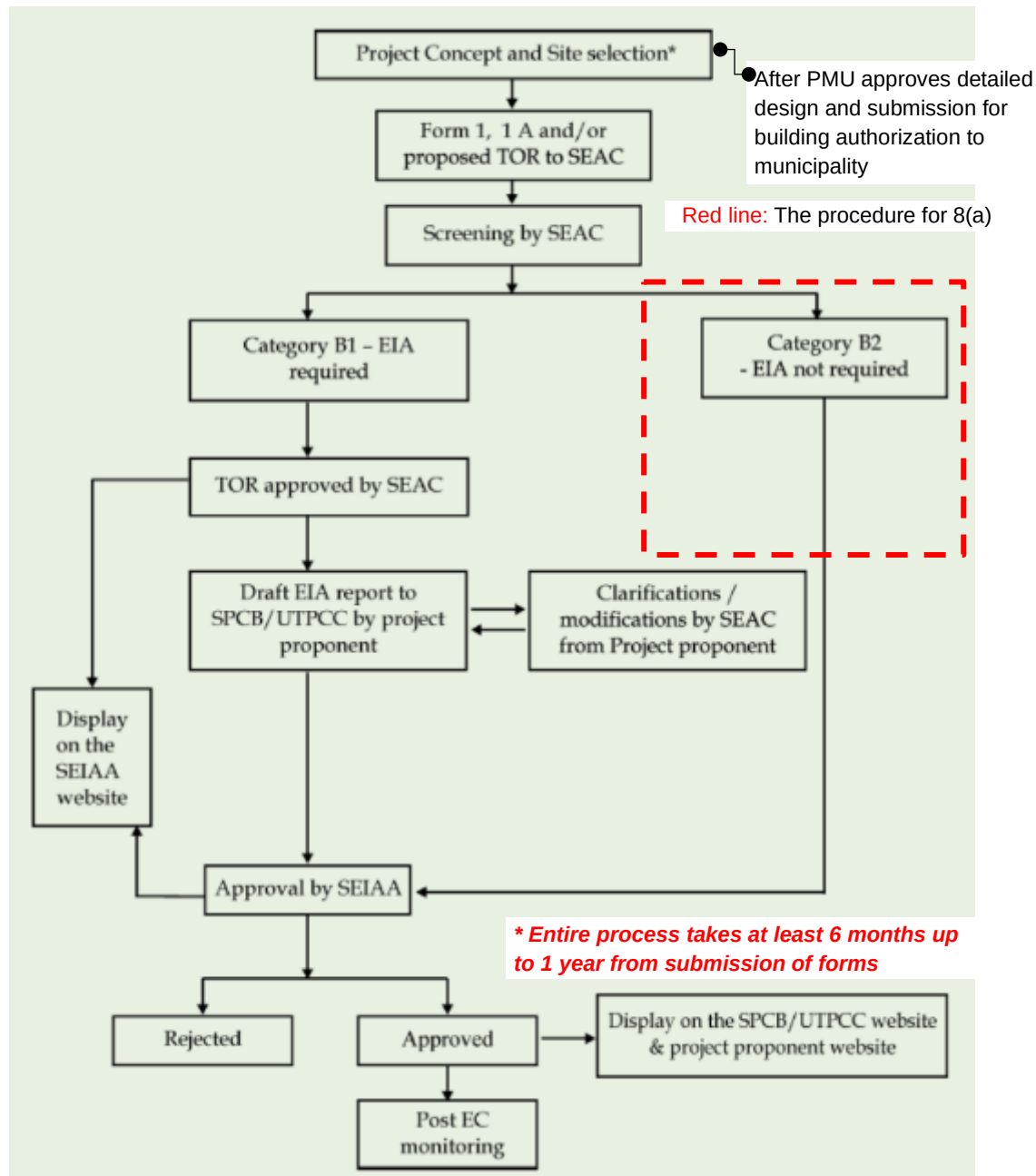
Source: Notifications of each regulation announced by the Government of India

9.3.3 Environmental Clearance and EIA Procedures in India

According to the categorization provided by the Notification, the proposed project falls under category 8(a): Building and Construction projects, built up area between 20,000 and 150,000 m², which requires Environmental Clearance by State Level Environment Impact Assessment Authority (SEIAA). Figure 9-4 presents the flow of Environmental Clearance (EC) application. It should be noted that the category of the project may differ and needs to be updated on the latest project contents at the detailed design stage.

The procedure needs to be initiated by the project proponent after detailed design is approved by PMU and submitted for building permit to the municipality. At first, the project proponent submits the project concept and forms to State Expert Appraisal Committee (SEAC), then they will review the contents of submitted documents, and invite the project proponent for detailed explanations if required. After approval of project contents, SEIAA in consultation with SEAC issues an EC indicating the required environmental management specifications to be followed by the project proponent.

It is estimated that the entire process from application of project concept and forms to the acquisition of EC may take around six months up to one year from the submission of the forms, and additional explanations to SPCB may be required. These need to be incorporated into implementation schedule of the Project and ToR for the consultant.



Source: EIA Guidance Manual, Ministry of Environment and Forests (2010)

Figure 9-4 Flow of Environmental Clearance Process

9.3.4 Gap Analysis Between National Laws and JICA Guidelines

This section provides the gap between the JICA Guidelines for Environmental and Social Considerations (2010) and relevant laws in India. Overall, there is no fundamental gap between them; nonetheless, some minor issues emerged such as: 1) timing of conducting EIA study, 2) target of information disclosure, and 3) criteria for public consultation. The result of gap analysis is presented in Table 9-8.

Table 9-8 Gap Analysis between Indian Laws and JICA Guidelines

JICA Guidelines	Relevant Law in India	Gap between JICA Guidelines and Government Law/Actions to be Taken
Underlying principles		
Environmental impacts that may be caused by the projects must be assessed and examined in the earliest possible planning stage. Alternatives or mitigation measures to avoid or minimise adverse impacts must be examined and incorporated into the project plan.	EIA Notification (2006) The objectives are to impose certain restrictions and prohibitions on new projects or activities, or on the expansion or modernisation of existing projects or activities based on their potential environmental impacts as indicated in the schedule to the notification.	- There is no gap between underlying principles, with minor gaps as follows: - Timing of EIA study assumed in JICA GL is during basic design stage; whereas, EIA study for the projects categorised to area development should be conducted after the detailed design phase in India. <Actions to be/have been taken> - EIA survey should be conducted during the preparatory survey and the results should be reflected and incorporated into the following phases of project implementation especially in the EIA study to be undertaken after detailed design.
Disclosure of Information		
- EIA reports (which may be referred to differently in different systems) must be written in the official language or in a language widely used in the country in which the project is to be implemented. When explaining projects to residents, written materials must be provided in a language and form understandable to them. - EIA reports are required to be made available to the residents of the country in which the project is to be implemented. The EIA reports are always required to be available for perusal by project stakeholders such as local residents and copying must be created.	EIA Notification, 2006 - The applicant shall make a request through a simple letter to the Member Secretary of the SPCB or Union Territory Pollution Control Committee, in whose jurisdiction the project is located, to arrange the public hearing within the prescribed statutory period. - Whereas, the project falls under schedule 8(b) “Townships and Area Development Projects” of Notifications is excluded from public hearing specified in the EIA notification. The EIA report shall be publicised via the state government’s website after approval.	- Expected target of disclosed information is slightly different, where JICA GL requires far reach of information, while under the Indian law, the approved EIA report written in English shall be publicised via the state government’s website. <Actions to be/have been taken> - The state government has been publicising the project information through the local media in a timely manner. - The summary of the EIA report will be made available in the local language as well as in English language to the concerned project authorities and residents via the local media. It must be also available in selected offices or public libraries or <i>panchayats</i>.
Social Acceptability		
For projects with a potentially large environmental impact, enough consultations with local	The Member-Secretary of the concerned SPCB or Union Territory Pollution Control Committee (UTPCC) shall	The projects categorised into “Building/construction projects are exempted

JICA Guidelines	Relevant Law in India	Gap between JICA Guidelines and Government Law/Actions to be Taken
stakeholders, such as local residents, must be conducted via disclosure of information at an early stage, at which time alternatives for project plans may be examined. The outcome of such consultations must be incorporated into the contents of project plans. • In preparing EIA reports, consultations with stakeholders, such as residents, must take place after sufficient information has been disclosed. Records of such consultations must be prepared; • Consultations with relevant stakeholders, such as residents, should take place, if necessary, throughout the preparation and implementation stages of a project. Holding consultations is highly desirable, especially when the items to be considered in the EIA are being selected, and when the draft report is being prepared;	finalise the date, time, and exact venue for the conduct of public hearing within seven days of the date of receipt of the draft Environmental Impact Assessment report from the project proponent and advertise the same in one major national daily and one regional vernacular daily. A minimum notice period of thirty (30) days shall be provided to the public for furnishing their responses; • The advertisement shall also inform the public about the places or offices where the public could access the draft Environmental Impact Assessment report and the Summary Environmental Impact Assessment report before the public hearing. • No postponement of the date, time, venue of the public hearing shall be undertaken, unless some untoward emergency occurs and only on the recommendation of the concerned District Magistrate, the postponement shall be notified to the public through the same national and regional vernacular dailies and prominently displayed at all the identified offices by the concerned SPCB or Union Territory Pollution Control Committee. • In the above exceptional circumstances new date, time and venue for the public consultation shall be decided by the Member –Secretary of the concerned SPCB or UTPCC only in consultation with the District Magistrate and notified afresh as per procedure under.	from public consultation process as per EIA Notification, 2006. • Still in compliance with the JICA guidelines, it is recommended to conduct public consultation during the preparatory survey and the comments should be incorporated into planning and implementation of the project.
Scope of Impacts to be Assessed		
• The impacts to be assessed on environmental and social considerations include impacts on human health and safety, as well as on the natural environment, that are transmitted through air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global scale impacts. These also include social impacts, including migration of population and involuntary resettlement, local	• The environmental clearance process for new projects will comprise a maximum of four stages, all of which may not apply to cases as set forth below in this notification. These four stages in sequential order are; (1) <i>Screening (Only for Category ‘B’ projects and activities)</i>, (2) <i>Scoping</i>, (3) <i>Public Consultation</i>, and (4) <i>Appraisal</i>. For Social Consultation • Land Acquisition Act 1894 (Amended in 1984) and the Right	• No major gap observed.

JICA Guidelines	Relevant Law in India	Gap between JICA Guidelines and Government Law/Actions to be Taken
economy such as employment and livelihood, utilisation of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety. In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined and assessed to a reasonable extent. It is also desirable that the impacts that can occur at any time throughout the project cycle should be considered throughout the life cycle of the project.	to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013. - The Provision of the Panchayats (Extension to the Scheduled Areas) Act, 1996. - The Madhya Pradesh Panchayat Raj Act, 1993. For Environment Survey - Environmental Impact Assessment Guidance Manual for Building, Construction, Townships and Area Development Projects provides the following items to be assessed: ✓ Land environment ✓ Water environment ✓ Air environment ✓ Noise environment ✓ Biological environment ✓ Socioeconomic Environment ✓ Solid waste	
Monitoring		
- Project proponents should make efforts to make the results of the monitoring process available to local project stakeholders. - When third parties point out, in concrete terms, that environmental and social considerations are not being fully undertaken, forums for discussion and examination of countermeasures are established based on sufficient information disclosure, including stakeholders' participation in relevant projects. Project proponents should make efforts to reach an agreement on procedures to be adopted with a view to resolving problems.	As per EIA Notification, 2006, (i) It shall be mandatory for the project management to submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions in hard and soft copies to the regulatory authority concerned, on 1st June and 1st December of each calendar year. (ii) All such compliance reports submitted by the project management shall be public documents. Copies of the same shall be given to any person on application to the concerned regulatory authority. The latest such compliance report shall also be displayed on the website of the concerned regulatory authority.	- There are some gaps regarding availability of monitoring results to local project stakeholders. <Actions to be/have been taken> - Project proponent should consider the method of unveiling the result of monitoring stipulated under Environmental Clearance to the broad public, such as uploading to the website and to show the solution for pointed out issues under Environmental Management Plan.
Ecosystem and biota		
Projects must not involve significant conversion or	Forests (Conservation) Act, 1980, and Rules 1981 as amended	No major gap observed.

JICA Guidelines	Relevant Law in India	Gap between JICA Guidelines and Government Law/Actions to be Taken
degradation of critical natural habitats and critical forests.	2004. • The Act restricts the powers of the state in respect of de-reservation of forests and the use of forestlands for non-forest purposes. An advisory committee has been created to oversee the implementation of the statute Wildlife (Protection) Act, 1972 • The Act provides for the protection of wild animals, birds, and plants; and for matters connected therewith or ancillary or incidental thereto. Birds are covered under this Act making it illegal to catch, keep, kill, buy / sell birds or damage their nests. • The application of the Order of the Supreme Court in WP 460 of 2004 dated 04.12.2006 has directed that all projects which require environmental clearance and are located within the distance of 10 km from the national park and sanctuaries must be placed before the standing Committee of the National Board for Wildlife constituted under the Wildlife (Protection) Act, 1972.	

Source JICA Survey Team based on related regulations in India and the JICA Environmental and Social Consideration Guidelines (2010)

9.4 Alternative Study

9.4.1 Consideration of Alternative Location

According to the survey of anticipated environmental impacts in the socioeconomic aspects by the project, there was no alternative site considered for project development because the project is located in a land already occupied by Nagaland State.

9.4.2 Comparison of Alternatives including “Without the Project” Option

The alternative study will be conducted by comparing the building location and structure having at least two options. The comparison of alternatives is summarised in Table 9-9.

Table 9-9 Comparison of Alternatives

Option	No Project	Alternative 1: Zoning of Facilities based on DPR	Alternative 2: Zoning of facilities at East Side of the Existing Hospital
Outline	The option of maintaining the already constructed NMCH facilities without any expansion or improvement.	Placing the new extension building on the west side of the existing Mother and Child Hospital.	Placing the new extension building on the east side of the existing hospital
Impact on Natural Environment	No impact is expected as there will be no construction activities, which may negatively affect the surrounding environment.	- The negative impacts on ambient air condition, noise, and vibration to the surrounding area are expected during the construction phase. - Operation of expanded facilities may cause air pollution by power generator and additional load to water resources of the area. - Ground level should be adjusted either by land filling or excavating, and both will result in modification of topography.	- Impacts similar to Alternative 1 are expected during the construction and operation phases. - The necessary modifications to topography will be less than Alternative 1.
Impacts on Social Environment	No improvement on quality of medical services provided in the region, therefore, worthening of medical situation is expected.	Improvement of the quality of medical research and treatment will contribute to the improvement of public health status of the area.	Same as Alternative 1
Overall Evaluation	Although no environmental impact is assumed, quality and capacity of medical service would be insufficient.	This option is the second best, as it is expected to cause impact to topography.	This option is evaluated as the <u>Best Option</u> , as the negative impact to environment will be minimal while contributing to the improvement of the public health status.

Source: JICA Survey Team

9.5 Scoping and Terms of Reference (ToR) for Environmental and Social Consideration Study

The purpose of scoping and drafting the ToR of the EIA study is to properly select the environmental and social impact items, on which the Project potentially impacts through its implementation activities, and to decide parameters and methodology of the survey. For site survey of the Project, air quality and water quality etc. will be measured. Handling of medical wastes, medical wastewater, and liquid wastes will be included in environmental manage plan based on the survey results of present condition of the state. The result of scoping is shown in Table 9-10 and Terms of Reference (ToR) is shown in Table 9-11.

Table 9-10 Result of Scoping

Impact Item	Rating		Reason
	Construction Phase (CP)/	Operation Phase (OP)	
Pollution			
Air Pollution	✓	✓	CP: Some negative impacts on air quality are anticipated due to increased transportation and operation of heavy equipment/ vehicles temporarily during construction activities. OP: Some negative impacts on air quality are anticipated due to increase in traffic volume by patients, staff, and transportation of goods necessary for operating proposed facilities. Impact on air quality is also anticipated by operation of power generator in case of emergency power supply.
Water Pollution	✓	✓	CP: There is a risk of temporary water pollution due to discharge of turbid water and leakage of oil from the construction activities. OP: Impact on water quality caused by operation of the proposed facilities (discharge or leakage of hazardous/organic/inorganic effluents) affecting residents (staff and students) are expected.
Waste	✓	✓	CP: Increase of solid waste amount due to construction waste and general waste from workers is expected. OP: Increase of various solid wastes is expected due to medical and research activities (biomedical and radioactive waste, hazardous waste), and affects a number of residents such as staff and inpatients (general waste).
Soil Contamination	✓	✓	CP: There is a potential risk of soil contamination due to oil leakage from construction activities. OP: There is a potential risk of soil contamination due to spills of hazardous materials, poor management of biomedical wastes generated at the site, and leakage from underground pipes used for biomedical effluent and sanitary wastewater discharges.
Noise and Vibration	✓	✓	CP: Temporary increase of noise and vibration levels due to operation of the construction machineries and traveling of the construction vehicle are expected. OP: Increase of noise and vibration levels due to traveling of vehicles associated with the operation of the proposed facilities, operation of back-up power generator and air system are expected. Operation of medical equipment may not generate noise and vibration.
Ground Subsidence	✓	✓	CP/OP: Ground subsidence is not anticipated because groundwater usage is not planned.
Offensive Odour	✓	✓	CP: No construction activities are expected that would cause offensive odour, but improper management of construction waste may generate it. OP: Improper management of waste and sludge generated at the project site would cause offensive odour.
Bottom Sediment	-	-	CP/OP: Impact on bottom sediment is not expected as there is no water body in and around the project site.
Natural Environment			
Protected Area	-	-	CP/OP: There is no ecologically sensitive area in the surrounding area. No wildlife sanctuaries, national parks, tiger, or elephant reserves exist in the nearby area. Also, no migration route of avifauna is present in the nearby area.
Flora/ Fauna and Ecosystem	✓	✓	CP/OP: It is assumed that the impact on flora/ fauna/ ecosystem by the development of the project is minimal, as the project construction areas are already developed.
Hydrology	✓	✓	CP: Earthwork of excavation and filling works would cause modification of hydrology in and around the site especially during the monsoon season. OP: Alternation of land surface may cause modification of hydrology in and around the site.

Impact Item	Rating		Reason
	Construction Phase (CP)/	Operation Phase (OP)	
Social Environment			
Involuntary Resettlement	-	-	CP/OP: Involuntary resettlement is not required for the project, as the land for the project construction is already secured by the local government.
Poor	-	-	CP/OP: Any activities that might impact on the poor are not planned in the project.
Indigenous or Ethnic People	-	-	CP/OP: No impact on indigenous or ethnic people is expected, because there are no indigenous or ethnic people residing in and around the project site.
Local Economy (e.g., employment and livelihood)	✓	✓	CP: Job creation for construction workers is expected during the construction period because it includes large-scale construction work. OP: Positive impact on local economy is expected by the operation of the proposed facilities.
Land Use and Utilisation of Local Resources	✓	✓	CP/OP: Impact of the project is expected as the land use is modified for the project. Intensity of impact needs to be assessed.
Water Usage	✓	✓	CP/OP: Some impacts are expected as the project plans to utilise public water. Intensity of the impact needs to be assessed by studying the current condition of spring water and water supply.
Existing Social Infrastructures and Services (including traffic condition)	✓	✓	CP/OP: Impact on traffic condition is expected due to increase of traffic for construction activities and operation of the project facilities. The extent of impact needs to be assessed comprehensively considering ongoing road expansion and housing area development around the site.
Misdistribution of Benefits and Damages	-	-	CP/OP: The project would not cause misdistribution of benefits and damages in the surrounding area considering the characteristics of the project.
Local Conflicts of Interest	-	-	CP/OP: In consideration of the project characteristics, the project will not cause conflicts of interest in the surrounding area.
Cultural Heritage	-	-	CP/OP: No impact on cultural heritage is expected since there is no cultural heritage in and around the project site.
Landscape	✓	✓	CP/OP: No significant modifications on landscape are expected as the building height will be up to ten floors; however, it will be confirmed through the survey.
Gender	-	✓	CP: No impact on gender is anticipated by the project. OP: Positive impact is expected during operation phase as the project will contribute improvement of maternal health.
Children’s Rights	-	-	CP/OP: No impact on children’s rights is anticipated caused by the Project.
Health and Safety			
Occupational Health and Safety	✓	✓	CP: Some impacts are anticipated due to large-scale construction works. OP: Some impacts are anticipated due to handling of infectious diseases, radioactive and hazardous materials for medical activities.
Community Health and Safety	✓	-	CP: Some negative impacts on public health are anticipated due to influx of construction workers and discharge of pollutants caused by construction activities. OP: Positive impact is expected due to improvement of medical service by the Project.
Other			
Transboundary Impacts including Climate Change	-	-	CP: Greenhouse gases (GHGs) would be emitted from the construction machines and vehicle. However, those are estimated to be negligible. OP: Emission of GHGs is expected due to operation of the air conditioning system and traveling of vehicles associated with the operation of the project facility. However, those are estimated to be negligible in comparison to other impactful projects.

Source: JICA Survey Team

Table 9-11 Draft ToR for the Environment and Social Consideration Study

Environmental Factors	Survey Items	Survey Methods
Air Pollution	- Current condition of air quality around the project site and nearby monitoring station - Environmental standard of air quality in India and other related international standards if necessary - Estimation of impact, propose mitigation measures, and monitoring plan	- To review existing reports/data, conduct site measurement and analysis - To confirm relevant regulations in India - To survey situations and measures taken by other similar institutions
Water Pollution	- Current condition of water quality in and around the project site - Environmental standard of water quality, effluent and licensing system in India and other related international standards, if necessary - Current condition of wastewater collection - Estimation of impact, mitigation measures, and monitoring plan	- To review existing reports/data, conduct site measurement and analysis - To confirm relevant regulations - To conduct the field survey, to review existing reports/materials - To survey situations and measures taken by other similar projects
Solid Waste	- Regulations related to medical/ hazardous waste management in Nagaland - Current situation of waste management in Nagaland - Estimation of impact, proposal of mitigation measures, and monitoring plan	- To confirm relevant regulations in India - To review existing reports/materials - To survey situations and measures taken by other similar projects
Soil Contamination	- Environmental standard of soil quality in India and other related international standards, if necessary - Potential risk of soil contamination caused by the project activities - Estimation of impact, propose mitigation measures and monitoring plan	- To confirm relevant regulations in India - To review existing reports/materials and similar projects - To survey situations and measures taken by other similar projects
Noise and Vibration	- Environmental standard of noise and vibration in India and other related international standards, if necessary - Current situation of surrounding of the project site (Distance to the residential areas, school, etc.) - Estimation of impact, propose mitigation measures and monitoring plan	- To confirm relevant regulations in India - To conduct the field survey around the project site - To survey situations and measures taken by other similar projects
Ground Subsidence	- Current ground condition around the project site - Current situation of groundwater usage around the project site - Estimation of impact, propose mitigation measures, and monitoring plan	- To review existing reports/materials, to conduct the field survey - To review existing reports/materials, to conduct the field survey - To survey situations and measures taken by other similar projects
Offensive Odour	- To identify possible source of offensive odour during the project implementation - Estimation of impact, propose mitigation measures, and monitoring plan	- To review construction plan and operation plan - To survey situations of and measures taken by other similar projects
Flora /Fauna and Ecosystem	- Current condition of flora/ fauna and ecosystem in surrounding area - Estimation of impact, proposal of mitigation measures, and monitoring plan	- To conduct the field survey - To review documents related to ecosystem of surrounding area
Hydrology	- Current condition of hydrology in surrounding area - Drainage plan during project implementation - Estimation of impact, proposal of mitigation measures, and monitoring plan	- To conduct the field survey around the project site - To review construction plan and operation plan - To survey situations of and measures taken by other similar projects

Environmental Factors	Survey Items	Survey Methods
Topography and Geographical Features	- Current condition of topography and geographical features in and around the site - Plan of modifying topography	- To conduct field survey - To review construction plan
Local Economy (e.g., employment and livelihood)	- Employment plan during the construction phase - Prediction of impact on local economy caused by operation of the proposed facilities	- To examine the construction plan - To review similar projects
Land Use and Utilisation of Local Resources	- Land use history of the project site - Project implementation plan that involves local resources	- To conduct the field survey around the project site - To examine the construction plan and implementation plan
Water Usage	- Current situation related to water usage - Water usage plan during project implementation period	- To conduct the field survey, to examine the results of the field survey, to review similar projects - To examine the usage of water necessary for project implementation
Existing Social Infrastructures and Service	- Existing social infrastructures around the project site - Operation plan of the construction machinery and vehicles during the construction phase - Estimation of traffic increased by the project operation	- To conduct the field survey around the project site - To examine the construction plan, to review similar projects - To review the transport demand forecasting
Landscape	- Current landscape of the project site and surrounding area - Design of infrastructure that may modify landscape	- To conduct the field survey around the project site - To examine the construction plan, to review similar projects
Occupational Health and Safety	- Potential risks related to occupational health and safety - Guidelines related to occupational health and safety in India and other related international guidelines	- To review the project activities - To review existing documents, reports, and materials
Community Health and Safety	Impact on the public health in consideration of the types of activities during construction phase	To review construction plan and activities
Transboundary Impacts including Climate Change	- Relevant policies for global warming in India and current situation of emission of GHGs - Project activities that might emit GHGs	- To confirm relevant policies in India and to review existing reports/materials - To examine the construction plan and operation plan, to review similar projects

Source: JICA Survey Team

9.6 Impact Assessment

The results of environmental and social impact assessment and comparison of rating during scoping and evaluation are presented in Table 9-12. Significance of impacts was evaluated based on the following concepts.

- ✓: Positive/negative impact is expected to some extent (impacts to be evaluated).
- A+/-: Significant positive/negative impact is expected.
- B+/-: Positive/negative impact is expected to some extent.
- D: No impact is expected.
- N/A: The impact was not evaluated as it was judged to have no impact.

Table 9-12 Results of Impact Assessment

Item	Scoping		Evaluation		Reason
	CP	OP	CP	OP	
Pollution					
Air Pollution	✓	✓	B-	B-	CP: Negative impacts are anticipated due to operation of concrete batch plant, transport of construction materials, working of machinery and vehicle movements inside the project site. There will be also gas emissions from construction vehicles and equipment such as generators, excavators, bulldozers, trucks, and cars. Mitigation measures such as use of low-emission machineries, contaminant free fuel, and training for vehicle operators can mitigate and minimise the impact. OP: Negative impacts are anticipated which will be mainly related to the emissions from diesel generator sets. There will be also impacts related to increase in emissions from road traffic. Also, there is a possibility to disperse contaminant air if proper measures are not taken. Even so, considering the baseline air condition of the project site, it is expected that the project will not cause non compliance of air quality standards of the surrounding area as far as the mitigation measures will be properly conducted.
Water Pollution	✓	✓	B-	B-	CP: Some negative impacts are expected due to accidental spills from the use of oil and grease as well as construction materials during construction phase. To mitigate the impact, permeable materials such as oil and grease should be treated and stored at shielded area, and the area should be managed regularly. OP: Impacts on water quality due to discharge of wastewater from medical facilities and mistreatment/leakage of liquid waste are expected. Although the wastewater treatment facilities will be installed, discharged treated water may cause pollution. To minimise the risk, quality of effluent from STP shall be checked regularly. For liquid waste management, ETS shall be installed under the instruction of SPCB, and its performance should be checked so to avoid depletion of water quality in surrounding environment. It is expected that the project will not cause non compliance of water quality standards of the surrounding area as far as the mitigation measures will be properly conducted.
Solid Waste	✓	✓	B-	B-	CP: Increase of solid waste amount due to construction activities and general waste from workers is expected. The impact will be limited inside the project site and several mitigation measures will be available. OP: Increase of various solid wastes is expected due to medical and research activities (biomedical, radioactive, and hazardous waste) and operation of the facility in general. The impact can be minimised by segregating wastes at source, collecting and storing them and handing over to authorised third party in compliance with relevant regulations and/or guidelines.
Soil Contamination	✓	✓	B-	B-	CP: There is possibility of soil contamination due to leakage of oil and chemical substances used for construction activities. Impact can be avoided and mitigated by applying impermeable sheets around the oil/chemical handling area and properly managing them. OP: Impact on soil contamination is expected due to leakage or mismanagement of oil and liquid waste containing heavy metals and non-volatile compounds. The impact can be avoided and mitigated by applying adequate measures, such as installation of confined oil handling area and effluent treatment facilities.

Item	Scoping		Evaluation		Reason
	CP	OP	CP	OP	
Noise and Vibration	✓	✓	B-	B-	CP: Temporary impact on noise and vibration levels due to the operation of construction machineries and traveling of the construction vehicle are expected, and these can be mitigated by applying a temporary fence. Also, considering limited time period for construction, overall impact is estimated to be within the acceptable level. Additional measures such as installation of earth filled mount may be considered to avoid disturbing the patients inside the NMCH. OP: Impact on noise and vibration levels due to traveling of vehicles associated with the operation of the hospital, operation of back-up power generator and air system are expected. These can be mitigated by periodically maintaining project-related machineries and equipment. Also, operation of medical equipment may not generate noise and vibration as the project applies high specification for these equipment to minimise noise generation. It is expected that the project will not cause non compliance of noise and vibration standards of the surrounding area as far as the mitigation measures will be properly applied.
Ground Subsidence	✓	✓	D	D	CP: No negative impact is expected as there is no plan to utilise groundwater for construction. OP: Impact on ground subsidence is estimated to be minimal or almost negligible as water will be supplied from public water, and the project will not use groundwater as water source.
Offensive Odour	✓	✓	D	B-	CP: No construction activities are expected that would cause offensive odour. OP: There is possibility to generate offensive odour if waste and sludge generated from wastewater treatment facilities (STP and ETP) are improperly managed. These should be avoided by properly managing wastes as described in solid waste.
Bottom Sediment	-	-	N/A	N/A	CP/OP: Impact on bottom sediment is not expected as there is no water body in and around the project site.
Natural Environment					
Protected Area	-	-	N/A	N/A	CP/OP: There is no ecologically sensitive area within 10 km of radial distance from the proposed project boundary. No wildlife sanctuaries, national parks, tiger, or elephant reserves exist in 10 km radius. Also, no migration route of avifauna is present in 10 km radius.
Flora/ Fauna and Ecosystem	✓	✓	B-	D	CP: Some impacts to ecosystem caused by modification of vegetation at and around project site are expected. The impact can be minimised by introducing greenbelt around the project area. OP: It is assessed that impact on flora/ fauna/ ecosystem by operation of the project is negligible as there is no planned activity that further modify vegetation of the site during the operation phase.
Hydrology	✓	✓	B-	D	CP: Alteration of land surface may cause modification of hydrology in and around the site. To avoid negatively affecting hydrology, drainage around the site should be designed properly to handle expected run off during the monsoon season. Furthermore, the impact is expected to be negligible considering the hilly geographical feature of the project site. OP: No activities may cause negative impact on hydrology during the operation phase.
Topography and Geographical Features	✓	✓	D	D	CP/OP: There will be some earthworks for the project development to adjust the ground level; however, no adverse impact is expected as the scale of modification is small.
Social Environment					
Involuntary Resettlement	-	-	N/A	N/A	CP/OP: Involuntary resettlement is not required for the project, as the land for the project development is already secured by the project proponent.
The Poor	-	-	N/A	N/A	CP/OP: Any activities that might impact on the poor are not planned in the project.
Indigenous, or Ethnic People	-	-	N/A	N/A	CP/OP: No impact on indigenous or ethnic people are expected, because there are no indigenous or ethnic people residing in and around the project site.
Local Economy (e.g., employment and livelihood)	✓	✓	B+	B+	CP: Job creation for non-skilled construction related workers is expected. This is expected to be temporary for at most 48 months period. OP: During the operation phase, positive impact on livelihood as the access to health treatment is expected to increase for the surrounding communities.

Item	Scoping		Evaluation		Reason
	CP	OP	CP	OP	
Land Use and Utilisation of Local Resources	✓	✓	D	D	CP/OP: The impact of land use modification and usage of local resource are estimated to be negligible as the surface area to be modified is relatively small compared with the entire land area, and the area has been utilised by existing facilities of NMCH. In case local material would be necessary for back filling for instance, the impact can be minimised by obtaining material from the authorised site.
Water Usage	✓	✓	B-	D	CP: It is planned that water necessary for construction will be bought from the water provider. This may adversely impact water use of surrounding area in some extent; therefore, the contractor shall employ the appropriate water provider. OP: During the operation phase, the project may not impact water usage as it is planned to utilise public water. In addition, the amount of increased water utilisation because of the project implementation would be limited compared with the current water use by the entire institute. Therefore, the impact is estimated to be negligible.
Existing Social Infrastructure and Services (including Traffic Condition)	✓	✓	B-	B-	CP/OP: It is estimated that the project activity during both construction and operation would impact traffic condition of surrounding area due to increased traffic volume for the activities. During the construction phase, the contractor shall employ a traffic guide and plan the operation not to cause concentration of activities as possible.
Misdistribution of Benefits and Damages	-	-	N/A	N/A	CP/OP: The project would not cause misdistribution of benefits and damages in the surrounding area considering the characteristics of the project.
Local Conflicts of Interest	-	-	N/A	N/A	CP/OP: In consideration of the project characteristics, the project will not cause conflicts of interest in the surrounding area.
Cultural Heritage	-	-	N/A	N/A	CP/OP: No impact on cultural heritage is expected since there is no cultural heritage that were identified in and around the project site.
Landscape	✓	✓	D	D	CP/OP: Some modification on landscape is expected as the existing buildings in the surrounding area are lower than the planned design of the project building with ten stories. However, since there was no symbolic view at the surrounding area, the impact is expected to be negligible.
Gender	-	✓	N/A	B+	CP: No impact on gender caused by the project is anticipated. OP: The positive impact is expected due to the project in improving maternal health situation in the surrounding areas by its medical and research activities.
Children's Rights	-	-	N/A	N/A	CP/OP: No impact on children's rights caused by the project is anticipated.
Health and Safety					
Occupational Health and Safety	✓	✓	B-	B-	CP: Some impacts are anticipated due to large-scale construction works associated with project activities. These can be avoided or minimised by applying best practices for construction works such as safety and health training to workers, and usage of protection gears. OP: Some impacts are anticipated due to handling of infectious diseases, radioactive, and hazardous materials for medical activities. These risks will be minimised by facility design that separates the flow of patients and medical staff to minimise the chance of contact, formulating safety manual, and accident preparedness plan.
Community Health and Safety	✓		B-	B+	CP: Some negative impacts on public health are anticipated due to influx of construction workers for construction activities. These would be mitigated by providing training and education to workers for safe operation and behaviour to the community. OP: Positive impact is expected due to improvement of medical services especially cancer treatment in the region.

Item	Scoping		Evaluation		Reason
	CP	OP	CP	OP	
Other					
Transboundary impacts including Climate Change	-	-	D	B-	CP: GHGs would be emitted from operation of construction machines and vehicle. The impact is estimated to be limited and mostly negligible considering the duration and nature of construction activities. OP: Emission of GHGs is expected predominantly due to operation of generator, wastewater treatment system, air conditioning system, and traveling of vehicles associated with the operation of the hospital. The extent of impacts would be minimised by applying mitigation measures proposed to other items. In addition, adopting fuel effective/high performance equipment further contribute reduction of emission of GHG. Overall, considering the nature and scale of project, impact on global warming is expected to be minor.

Source: JICA Survey Team

9.7 Mitigation Measures

The proposed mitigation measures during the construction phase and operation phase are summarised in Table 9-13.

Table 9-13 Proposed Mitigation Measures for Construction and Operation Phases

item	Mitigation Measures
Construction Phase	
Air Pollution	To seek to use fuel-economy/ low-emission construction vehicle and machineries. To sprinkle water around the project site, where dust is generated especially during the dry season. To maintain construction vehicles and construction machineries adequately. To install temporal enclosure around the construction site. To give guidance for drivers about idling stop and avoiding excessive load operation such as quick acceleration and overloading. To adhere to international standards such as “Air Emission and Ambient Air Quality” of EHS Guideline.
Water Pollution	To install appropriate drainage system in the construction site before construction activities commence. To check leakage of oil and chemical products periodically. To install impermeable material around the oil and chemical storage and oil handling area. To train operators of construction machineries in daily maintenance to prevent oil leakage. To collect waste oil into the designated container separately and hand over to authorized third party for treatment and disposal.
Solid Waste	To handle waste within the project site and store them with cover until handed over to authorized third party. To segregate waste and recycle or sell to third party as applicable.
Soil Contamination	Same as water pollution
Noise and Vibration	To install temporal fence and earth filled mount. To strive to introduce low-noise and low-vibration machineries. To avoid construction at night-time as much as possible. To avoid intensive operation of construction machineries that generate noise and vibration. To adhere to international standards such as “Noise Management” of EHS Guideline.
Ground Subsidence	To monitor groundwater level and ground subsidence status periodically and adopt other source in case significant declines are observed.
Offensive Odour	Same as “solid waste”
Flora/ fauna and ecosystem	To introduce green belt
Hydrology	To install proper drainage system in the project site.
Water Usage	Same as ground subsidence
Existing Social Infrastructures and Service	To plan timing and route for construction related traffic. To deploy traffic controller. To inform foreseen activities to the public as needed.
Landscape	To install temporary enclosure wall during construction works. To conduct greening and planting trees around the boundary of project site at the earliest possible timing.

item	Mitigation Measures
Occupational Health and Safety	To provide safety and health training to workers when employed and enforce norm of safety construction. To promote use of appropriate personal protective equipment (helmet, protective shoes, glove, etc.). To establish the system for safety and health management at the construction site, and to clarify the responsible person and reporting system. To apply good practices for similar construction.
Community Health and Safety	To provide training on public health and infectious diseases for construction workers.
Transboundary Impacts including Climate Change	To adopt fuel-economy/ low-emission construction vehicle and machineries as applicable and economically feasible. To control idling operation of machineries.
Operation Phase	
Air Pollution	To utilise low-pollutant fuel as applicable and financially feasible. To maintain generator periodically to sustain high performance in the long term. To treat contaminated air with HEPA filter before discharging to environment and constantly maintain air conditioning system in good condition. To adhere to international standards such as “Air Emissions and Ambient Air Quality” of EHS Guideline. Apply same measures as in the construction phase.
Water Pollution	To monitor the quality of treated wastewater and check compliance with standards prescribed by SPCB. To install ETP designed for medical institute, and properly operate them following the instruction by SPCB. To inspect the rainwater drainage system and maintain it periodically. To adhere to international standards such as “Wastewater and Ambient Water Quality” of EHS Guideline for effluents from ETP and STP.
Solid Waste	To segregate waste by type and hazard level in proper container, collect and store them in sealed storage until handed over to authorised third party. To develop a Manual for Waste Handling to all medical staff and put into practice.
Soil Contamination	To develop management rules for chemical products, and to implement these rules with relevant medical workers. To prepare action plans in case of toxic/hazardous substance leakage. To collect solid and liquid wastes with infectious or chemical substances separately, store them in sealed container or storage until handed over to authorised third parties for disposal or treatment. To inspect the containers and storages regularly and to maintain them in good condition to prevent accidental leakage. To conduct mitigation measures listed for water pollution and solid waste.
Noise and Vibration	To install low-noise type system, to inspect them regularly in order to maintain them in good condition. To prepare concrete enclosure around the facilities that may generate noise and vibration as needed. To adhere to international standards such as “Noise Management” of EHS Guideline.
Offensive Odour	Same as “solid waste”
Existing Social Infrastructures and Services	To separate the traffic route for visitor and non-visitor (staff and third parties) for smooth traffic management in and around the project site. Take same measures as done in the construction phase, if appropriate.
Occupational Health and Safety	To formulate the Safety Manual for Hospital Operation, update it regularly and to enforce it to all relevant workers. To provide safety training for all staff, to formulate and implement health and safety education plans. To provide annual health check for all employees. To monitor occupational risk associated with medical activities such as radiation exposure level, solvent handling and worker’s injuries, and provide additional health check to prevent irreversible health damage of staff.
Transboundary Impacts including Climate Change	To introduce vehicles and machineries that would generate less GHGs, and to maintain them adequately.

Source: JICA Survey Team

9.8 Implementation Structure of the Environmental Management Plan

Proposed monitoring plan during the construction phase and operation phase are summarised in Table 9-14 and Table 9-15.

Table 9-14 Proposed Environmental Monitoring Plan (Construction Phase)

Category	Monitoring Item	Monitoring Site	Frequency
Air Pollution (Ambient Air)	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , and CO	Near the project site	Monthly
Water Pollution	Maintenance situation of temporary drainage, temporary storm water reservoir, and septic tank	Construction site	Monthly
Solid Waste	Generation and treatment amount of construction and general waste	Construction site	Monthly
	Status of waste management (if covered or stored properly, etc.)	Construction site	Monthly
Soil Contamination	Oil leakage (daily maintenance record of relevant machineries, record of oil leakage accidents etc.)	Construction site	Monthly
Noise and Vibration	Noise level, vibration level	Several points on boundary of the project site	More than monthly, when noise generating activities are conducted
Offensive Odour	Record of unusual smell	In and around the construction site	When sensed
Ground subsidence/ Hydrology/ Water Usage	Groundwater level, ground level	Well and several points close to well	Monthly
Existing Social Infrastructures and Services	Number of traffic accidents that involved construction related vehicles	Project site and its surrounding area	Monthly
	Placement of traffic guard in the exit of the construction site	Construction site	Monthly
Occupational Health and Safety	Implementation of safety training/ safety driving trainings for the construction workers	Project site	Monthly
	Workers' accidents	Project site	Monthly
	Safety situation in the construction site	Project site	Everyday
Common	Complaints from neighbours	Project site and its surrounding	Monthly

Source: JICA Survey Team

Table 9-15 Proposed Environmental Monitoring Plan (Operation Phase)

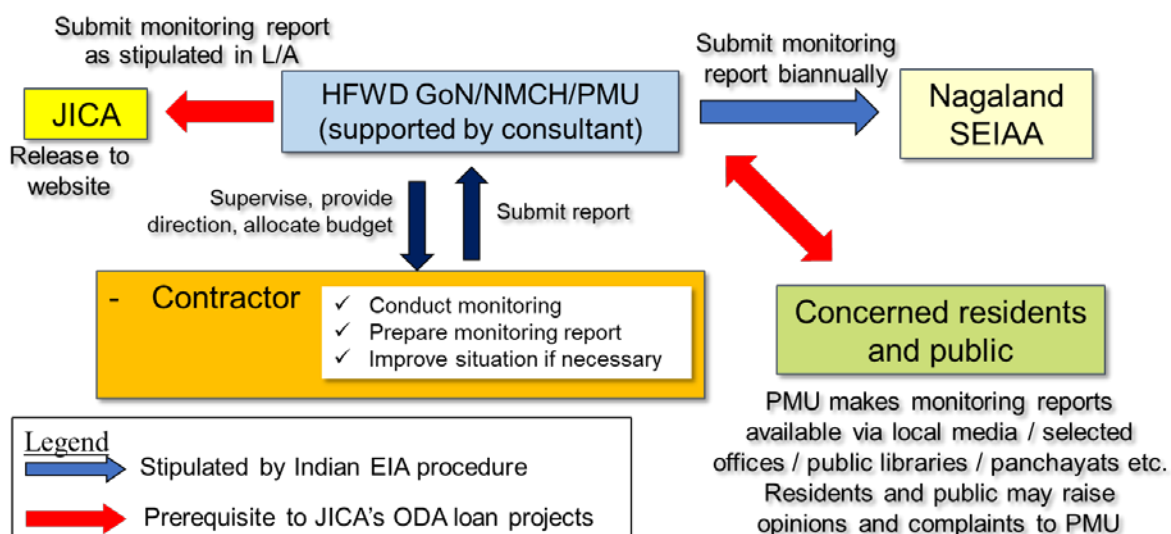
item	Monitoring Item	Monitoring Site	Frequency
Common	Implementation of environmental mitigation plan	Project site and its surroundings	Monthly
	Complaints from neighbours	Project site and its surroundings	Monthly
Air Pollution	PM ₁₀ , PM _{2.5} , Sox, NO ₂ , and CO	Near the project site	Monthly
(Stack Emissions from DG set)	PM, SOx, NO ₂ , HC, and CO	Outlet of stack	Once in a month (half year after construction, while generator is operated)
Water Pollution	pH, BOD, TSS, COD, TN, TP, and total coliform	Outlet of STP	Monthly
		Outlet of ETP	Monthly
Solid Waste	Amount of generated waste by each category	Project site (waste storages)	Monthly
	Status of waste storage (if there is no leakage, contamination with other categories, etc.)	Project site (waste storages)	Monthly
Soil Contamination	Oil leakage (daily maintenance record of relevant facilities, record of oil leakage accidents etc.)	Project site	Monthly
	Leakage of chemical/hazardous liquids	Project site	Monthly
Noise and Vibration	Implementation status of periodic check of noise generating facilities and the emergency power supply	Project site	Monthly (while power generators are operated)
Offensive Odour	Record of unusual smell	In and around the construction site	When sensed
Existing Social Infrastructures and Services	Traffic accident, status of traffic congestions	In and around the project site	Monthly

item	Monitoring Item	Monitoring Site	Frequency
Occupational Health and Safety	Implementation of safety training for the employees	Project site	Annual
	Occupational accidents	Project site	Monthly (Safety and Health Committee)
	Implementation status of employees' health check	Project site	Annual/Monthly (Safety and Health Committee)
	Employees' radiation dose	Project site	Annual/Monthly (Safety and Health Committee)

Source: JICA Survey Team

9.8.1 Environmental Management during Construction Phase

During the construction phase, the construction contractor will implement the environmental management plan (EMP) and the environmental monitoring plan (EMoP) under the supervision of the project proponent with assistance of the project management consultant as presented in Figure 9-5. The construction contractor will undertake obligations for implementing the EMP and EMoP including setting contact points in case residents raises complaints, as well as reporting of the results to the PMU, then the PMU submits the results of environmental monitoring as stipulated under the environmental clearance to the State Environment Impact Assessment Authority (SEIAA) of Nagaland biannually on 1st June and 1st December. The same reports should be delivered to the JICA office as stipulated in the L/A. It is recommended that the copy of report shall be made available in selected offices or public libraries or *panchayats*, etc., for interested parties in accordance with JICA's guideline.



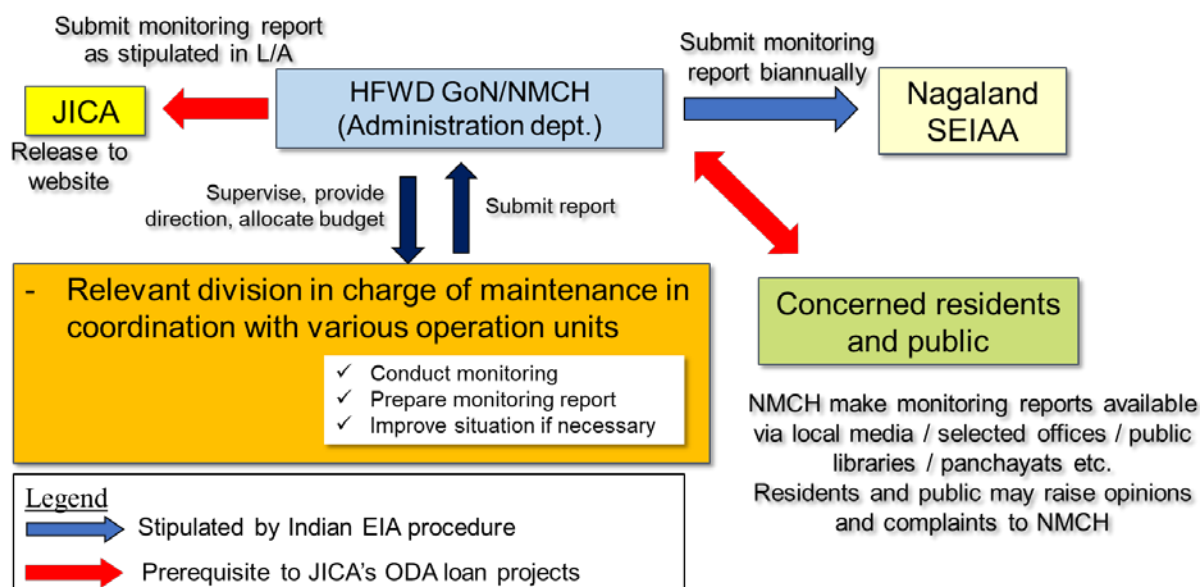
Source: JICA Survey Team

Figure 9-5 Environmental Management structure during Construction Phase

9.8.2 Environmental Management during Operation Phase

Environmental management during the operation phase follows similar procedures as the construction phase, administration department of NMCH will be in charge of preparing environmental monitoring reports and submitting it to Nagaland SEIAA and JICA India office biannually through DHFW. Furthermore, NMCH will be responsible of making monitoring reports to residents and public, and receiving opinions or complaints from them as presented in Figure 9-6. In addition, each part of the hospital is responsible for the management of health and safety of healthcare workers, and segregation and collection of each waste. The Administration Department shall be responsible in instructing the Engineering Department for the O&M of infrastructure such as generator sets, wastewater treatment plant, and so on. In addition, for waste management and occupational health protection, each unit that deals with waste and

operational risk should be responsible in managing them and submits the required report to the administration.



Source: JICA Survey Team

Figure 9-6 Environmental Management structure during Operation Phase

9.9 Stakeholder Engagement

9.9.1 Outline of the Stakeholder Meeting

Stakeholder meeting was held on March 7th, 2023 with the presence of participants including the project proponent and the local residents. The meeting was held at the conference hall of DHFW and was attended by 30 participants. After the explanation of the main purpose of the meeting, namely introduction of the stakeholders and environmental and social consideration processes of the project, summary of environmental and social survey findings, discussion of potential impacts and mitigation measures, and any other relevant issues and concerns. Unlike the public meeting in the early stages, this meeting focused on each of the identified impacts associated with the Project and the proposed management and mitigation/enhancement measures in order to seek feedback.

9.9.2 Result of Public Interaction

Local communities are generally receptive of the new hospital construction; however, concerns were expressed about project activities and infrastructure facilities to be provided under the project. Communities' focuses were mainly concentrated on safety issues, encroachment related issues and pollution due to stocking of construction material. Also, majority of local people were expecting employment generation and improvement of health infrastructure. Officials attended the meeting of different departments were concerned about environmental pollution during project implementation. The Nagaland Pollution Control Board representatives were very much active in their respective domain in terms of environmental pollution prevention and mitigation aspects. Stakeholder-wise environmental and social issues are summarised in Table 9-16, and the full record of the stakeholder meeting is presented in the FR.

Table 9-16 Issues Raised by Participants of Stakeholder Meeting

Issues	Issue Addressed in ESMP
Community	
Construction and demolition waste should not be stored for long in the project site.	Construction material will be stored on side of embankment keeping enough space for local commuters. Haul road will be provided for material transfer.
Construction labourer shall not throw away any plastic bag/ materials to nearby area.	Waste bin will be provided in each work site for collection of plastic waste. These bins will be emptied, and waste materials will be dumped to nearby sanitary landfill side on regular basis.

Issues	Issue Addressed in ESMP
Contractor shall employ local labour during construction and operation	Contractor will be appropriately oriented to engage local labour force in the work to the possible extent based on the required skill base. It will be a part of the contractor's obligation
Will safety measures and pollution control measures as mentioned in Impacts Envisaged & Mitigation Measures will really be followed and take up?	All safety measures and pollution control measures as mentioned in the report will be followed till the extent best possible. Environmental and Social Management Plan will help to keep a check on implementation process of the measures provided.
Nagaland Pollution Control Board	
Regular environmental monitoring shall be carried out during implementation.	Baseline environmental monitoring is carried out. Environmental monitoring of air/ surface water/ ground water/ soil and noise will be carried out on a quarterly basis.
What will you do with construction and demolition (C&D) waste?	During construction process contractor will try to minimise the generation of C&D waste, however, whatever waste generated will be first reused in the site if possible and remaining waste will be sent to C&D waste treatment facility authorised by NPCB
How will biomedical wastes be handled?	Hospital staffs will be trained to segregate biomedical wastes and segregated waste will be stored in their respective colour-coded bins. These bins will be handed over to authorised biomedical waste treatment facilities for further treatment.
STP and ETP should be connected to the OCEMS	STP & ETP will be designed to be connected to OCEMS (Online Continuous Effluent Monitoring System)

Source: JICA Survey Team

Chapter 10 Project Implementation

10.1 Outline of the Project

Based on the results of the survey, proposed outline of the Project is presented in Table 10-1.

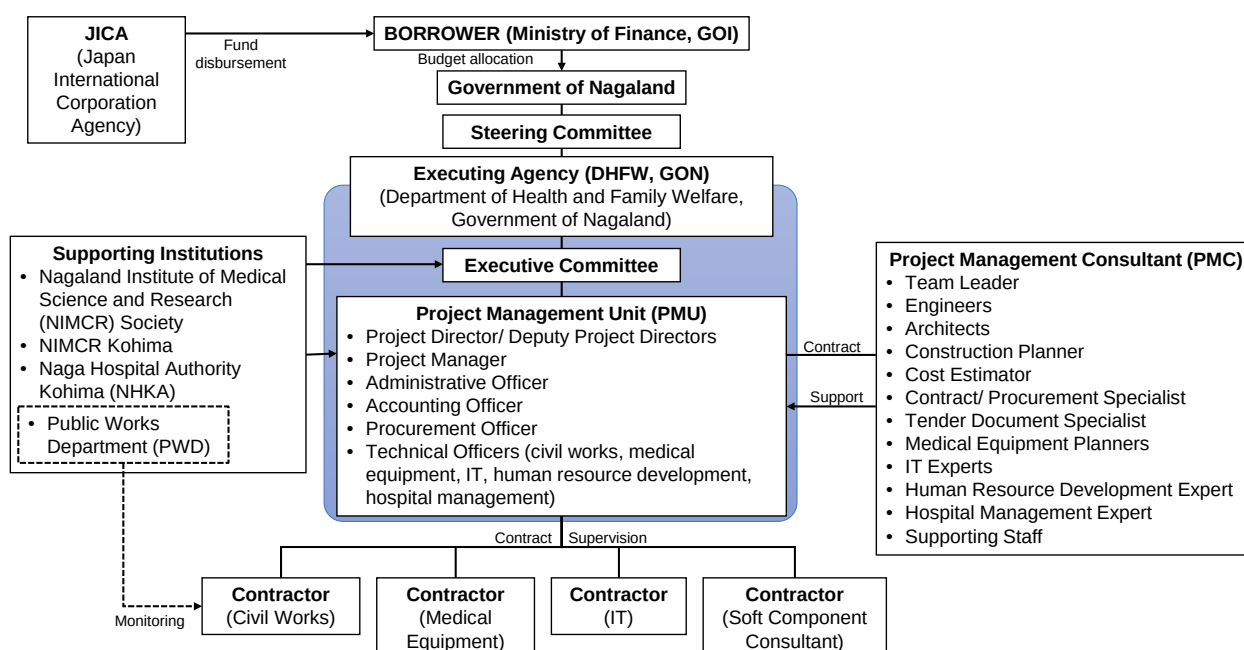
Table 10-1 Outline of the Proposed Project

Period	From October 2024 to October 2031 - Completion of construction works: October 2030 - Start operating the medical college hospital: March 2031
Contents	- Consulting services by Project Management Consultant (PMC) including detailed design, tender assistance, construction supervision - Civil works for building of 400-bed teaching hospital - Medical equipment procurement and setting - IT equipment procurement and hospital information management system (HMIS) - Technical assistance on medical human resource development, hospital management, medical equipment maintenance, and IT utilization

Source: JICA Survey Team

10.2 Proposed Project Implementing Structure

Proposed project implementing structure is illustrated in Figure 10-1. As an executing agency, Department of Health and Family Welfare (DHFV) shall formulate a steering committee and a project management unit (PMU) involving concerned institutions including Nagaland Institute of Medical Science and Research (NIMSR), Naga Hospital Authority Kohima (NHAK), and other concerned agencies. Then, a project management consultant (PMC) team will be hired to support the project management. The contractors for civil works, medical equipment, IT, and soft component (technical assistance), will contract with DHFW and supervised PMU.



Source: JICA Survey Team

Figure 10-1 Proposed Project Implementing Structure

Steering Committee: The Steering Committee shall be chaired by the Chief Secretary. Proposed members are listed in Table 10-2. The Steering Committee shall authorize the essential plans and budget submitted by the Executive Committee. Also, it shall supervise process and progress of the Project, coordinate with relevant institutions and agencies for smooth implementation and problem solution if necessary. The chair shall call the regular meeting at least annually to monitor the status and progress of the project implementation.

Table 10-2 Proposed Members of the Steering Committee

Institutions	Proposed Members
Government of Nagaland	Chief Secretary – Chair
Department of Health and Family Welfare (DHFV)	Commissioner and Secretary
Department of Planning and Coordination	Development Commissioner
Department of Finance	Finance Commissioner
Department of Public Works and Housing	Commissioner Secretary
Department of Forest Environment and Climate Change	Commissioner Secretary
Department of IT&C	Commissioner Secretary
Department of Power	Commissioner Secretary
Department of Public Health Engineering	Commissioner Secretary

Source: JICA Survey Team

Executing Agency: The executing agency will be responsible for overall project implementation and necessary administrative procedure for fund disbursement, as well as coordination with concerned federal agencies such as the Ministry of Family Welfare and the National Medical Commission (NMC), as well as JICA. Under the Commissioner and Secretary Health, the Principal Director, a designated Joint Director, Executive Engineer, as well as Dean cum Director of Nagaland Institute of Medical Science and Research (NIMSR) Society and NIMSR Kohima will be engaged in implementation of the Project.

Executive Committee: The executive committee will be established under the executing agency. It shall be chaired by the Commissioner and Secretary Health. The proposed members are listed in Table 10-3. It will authorize the essential plans and report on the project activities submitted by PMU. Also, it will supervise process and progress of the Project, coordinate with relevant institutions and agencies for smooth implementation and problem solution if necessary. The chair shall call the regular meeting at least every six months to monitor the status and progress of the project implementation. In addition, the Chair could have special invitee(s) according to the necessary topic(s).

Table 10-3 Proposed Members of the Executive Committee

Institutions	Proposed Members
DHFV	• Commissioner and Secretary Health – Chair • Principal Director • Director of Medical Education • Joint Director in-charge • Deputy Director in-charge • Executive Engineer • Senior Account Officer
NIMSR Kohima	• Director cum Dean • Medical Superintendent • Deputy Director Administration
Nagaland Health Project	• Project Director

Source: JICA Survey Team

PMU: The PMU is responsible for overall project management as representative of the executing agency. The Principal Director will be the project director to oversee the activities of PMU. The Dean cum Director NIMSR Kohima will be the deputy project director. The project manager and other officers shall be appointed by the executing agency exclusivity for the Project. The PMU will prepare and submit relevant plans, reports, and necessary documents necessary for project implementation. For daily administrative and technical project management, the PMU will be assisted by PMC accordingly to ensure a well-conceived management plan and implementation, and act as a decision-maker and supervisor for daily activities of the Project.

PMC: The PMC will provide consulting services to PMU for smooth project implementation. The main responsibility will be to manage project implementation including the records of project progress and accounts, and to assist PMU in making necessary reports to the authorities such as JICA and GoI, and in coordinating with them for submissions, approvals, and concurrences including communication linkage with all internal and external parties concerned (municipality, authorities, others). Also, PMC is engaged

in a part of technical assistance; plan and conduct of study visits to learn from good practices on medical human resource development, hospital management, medical equipment maintenance, and digital health.

10.3 Proposed Project Implementation Schedule

10.3.1 Prerequisites

The procurement related to the project will be done in accordance with the Procurement Guidelines for Yen Loan Projects (April 2012). Considering necessary period for JICA's concurrence as in the guideline, the overall project implementation schedule shall be devised based on the prerequisites in Table 10-4. Activities that are possible to be implemented in parallel shall be considered overlaps.

Table 10-4 Prerequisites of the Project Schedule

Project Milestone	
Loan Pledge:	December 2023
Signing of L/A:	January 2024
Selection of PMC (By the DHFW)	
Preparation of Terms of Reference (ToR), JICA concurrence:	4.0 months
Releasing the request for proposal, preparation of proposal by prospective consultant:	2.0 months
Evaluation of submitted proposals (QCBS), JICA concurrence:	4.0 months
Negotiations, JICA concurrence, and consulting agreement:	2.0 months
Design Stage (By the PMC)	
Basic design:	6.0 months
Detailed design	6.0 months
Bidding Procedure (By the PMC)	
Preparation of P/Q document and JICA concurrence:	2.0 months
Releasing P/Q, preparation of P/Q by applicant:	1.5 months
Evaluating submitted P/Qs and JICA concurrence	1.5 months
Preparation of bidding document and JICA concurrence:	4.0 months
Releasing bidding document and preparation of bid by prospective bidder	3.0 months
Evaluating submitted bids and JICA concurrence:	5.0 months
Negotiations, JICA concurrence and awarding contract:	3.0 months
JICA concurrence and conclusion of contract:	1.0 month

Source: JICA Survey Team

10.3.2 Construction Work Period

In general, the construction schedule of a facility is greatly affected by the geological and climatic conditions of the proposed site. Therefore, it is advisable to determine a realistic schedule by referring to the expertise of local contractors.

In this report, the overall construction period is estimated in the following Table 10-5.

Table 10-5 Estimated Construction Period

Construction	
Main Hospital	48 months

Source: JICA Survey Team

10.3.3 Project Implementation Schedule

Considering the above necessary period for each process, the project implementation is shown in Figure 10-2 and Figure 10-3.

Regarding the EIA procedures in the following schedule, it is assumed that the schematic design is detailed enough to be submitted for building permits and EIA procedures.

The application for the building permit should be conducted just after the completion of the detailed design. The acquisition of the building permit must be required before the commencement of the construction. On the other hand, it would be preferable to acquire the building permit by the timing of the distribution of the tender drawings because contractors estimate the construction cost, considering whether the building permit has already been approved or not in order to avoid the risk of the delay of the commencement.

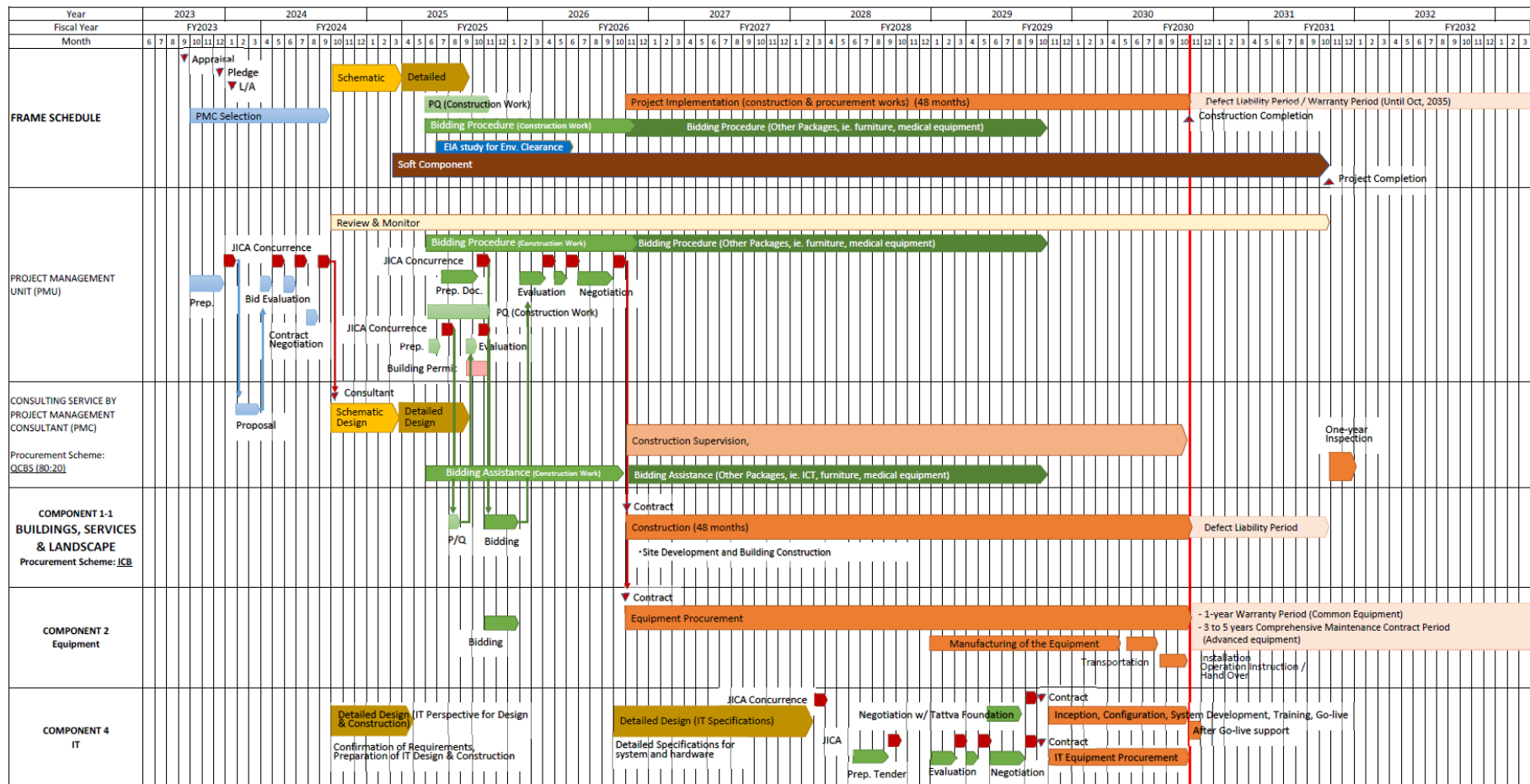


Figure 10-2 Project Implementation Schedule (Construction)

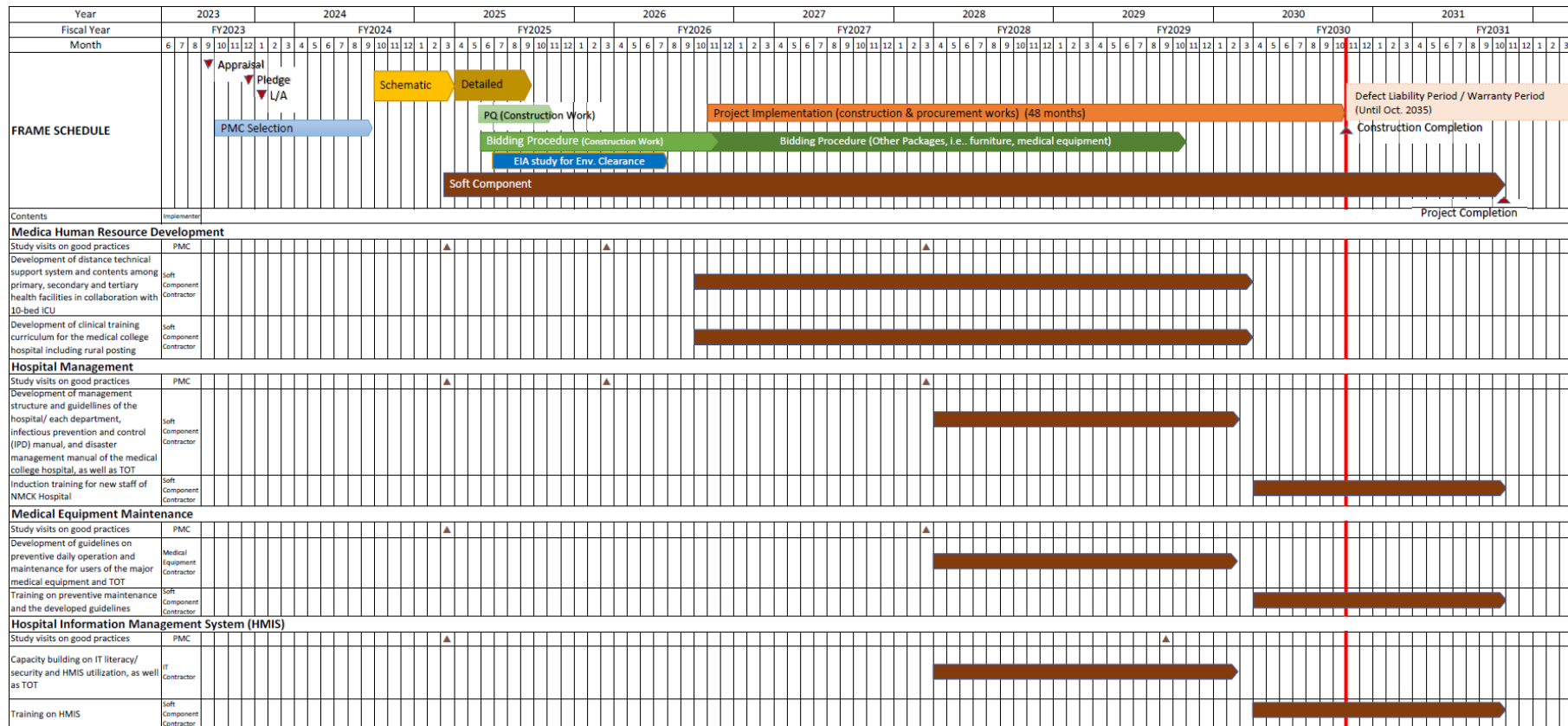


Figure 10-3 Project Implementation Schedule (Soft Components)

Chapter 11 Health Finance, Financial and Economic Analysis

11.1 Health Finance

11.1.1 Financial Situation of Nagaland State

(1) Revenue of Nagaland State

Revenue of Nagaland State is shown in Table 11-1. The revenue gradually increased from INR 114,374 million in 2018/19 to INR 134,511 million in 2021/22. The total revenue in 2022/23 is projected to be INR 151,925 million.

The revenue amount transferred from the central government takes 89-90% of total revenue in 2018-21. The percentage of the transferred receipts are projected to be maintained around 85-88% in 2021/22 and 2022/23, it clearly shows the high financial dependency of the Government of Nagaland on the state government.

Table 11-1 Revenue of Nagaland State

(Unit: million INR)

Item	Actuals 2018-2019	Actuals 2019-2020	Actuals 2020-21	Actuals 2021-22	Revised Estimate 2022-23
A. Tax Revenue	46,388.43	42,253.11	44,319.93	61,763.50	68,481.80
A-1: Share of Central Taxes	37,924.10	32,670.80	34,092.50	48,754.60	54,001.90
A-2: Own Tax Revenue	8,464.33	9,582.31	10,227.43	13,009.00	14,479.90
B. Non-Tax Revenue	2,552.40	3,392.89	2,425.97	3,035.86	8,865.73
C. Grant-in-Aid and Contributions	65,433.30	68,586.93	67,528.41	69,712.07	74,577.36
Total of Nagaland State	114,374.12	114,232.92	114,274.31	134,511.42	151,924.88
Revenue from Central Government	103,357.40	101,257.73	101,620.91	118,466.67	128,579.26
Percentage of Revenue of Central Government	90%	89%	89%	88%	85%

Source: Government of Nagaland (2023)

(2) Expenditure of DHFW

Past trend of annual expenditure of DHFW is shown in

Table 11-2 and Figure 11-1. The total expenditure increased during the latest 5 years. The average expenditure was INR 8,470 million from FY 2018/19 to 2022/23. 79% of the expenditure was spent on medical & public health. Percentage of expenditure of medical, public health, family welfare and capital expenditure in total expenditure of Nagaland State was around 6.6% from FY 2018/19 to 2022/23.

Urban health services-allopathy takes share of 49% of total expenditure. The direction and administration costs of urban health services-allopathy take share of 30% while the hospital and dispensaries costs take share of 17%. Share of the family welfare costs is only 5% and limited.

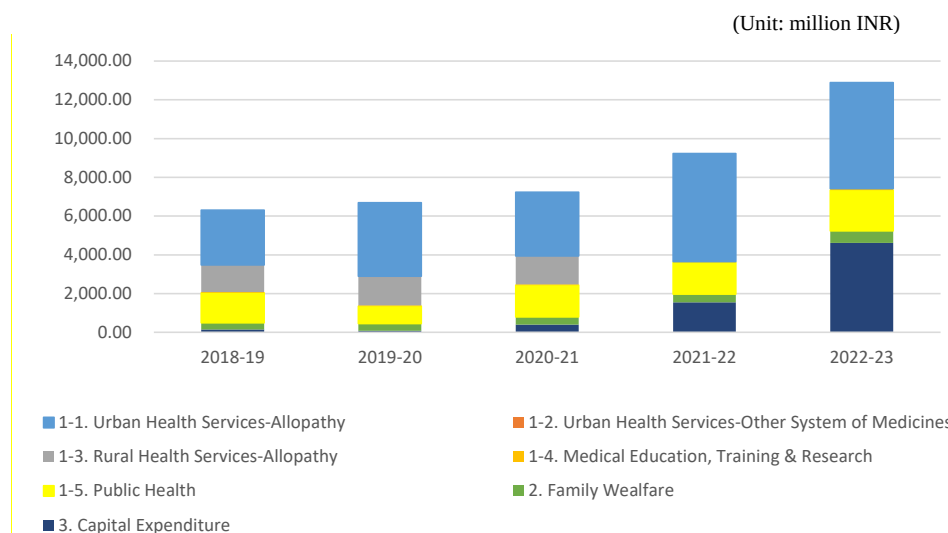
Table 11-2 Expenditure of DHFW

(Unit: million INR)

Item	Financial Expenditure					Average of 5 years	Share	Average Expenditure of State and UTs* in India (2019-20)
	2018-19	2019-20	2020-21	2021-22	2022-23			
1. Medical & Public Health	5,820.33	6,246.79	6,441.77	7,254.87	7,652.45	6,683.24	79%	-
1-1. Urban Health Services-Allopathy	2,832.64	3,794.04	3,283.53	5,576.37	5,468.55	4,191.03	49%	-
1-1-1. Direction & Administration	1,293.97	1,773.99	1,561.71	4,090.23	3,998.75	2,543.73	30%	-

Item	Financial Expenditure					Average of 5 years	Share	Average Expenditure of State and UTs* in India (2019-20)
	2018-19	2019-20	2020-21	2021-22	2022-23			
1-1-2. Medical Store Depots	35.91	35.74	33.13	51.86	30.36	37.40	0%	-
1-1-3. School Health Scheme	33.35	36.55	37.10	0.00	0.00	21.40	0%	-
1-1-4. Hospitals & Dispensaries	1,328.79	1,476.22	1,590.54	1,434.28	1,439.43	1,453.85	17%	-
1-1-5. Other Health Services	140.63	471.53	61.05	0.00	0.00	134.64	2%	-
1-2. Urban Health Services-Other System of Medicines	1.95	0.74	0.80	0.00	0.00	0.70	0%	-
1-2-1. Homeopathy	1.95	0.74	0.80	0.00	0.00	0.70	0%	-
1-3. Rural Health Services-Allopathy	1,399.25	1,506.49	1,479.04	0.00	0.00	876.96	10%	-
1-3-1. Health Sub-Centres	328.11	360.51	333.39	0.00	0.00	204.40	2%	-
1-3-2. Subsidiary Health Centres	38.94	39.48	41.34	0.00	0.00	23.95	0%	-
1-3-3. Primary Health Centres	580.00	608.88	662.42	0.00	0.00	370.26	4%	-
1-3-4. Community Health Centres	320.31	360.68	308.10	0.00	0.00	197.82	2%	-
1-3-5. Hospitals & Dispensaries	131.90	136.95	133.81	0.00	0.00	80.53	1%	-
1-4. Medical Education, Training & Research	43.03	42.56	35.05	37.80	79.43	47.57	1%	-
1-4-1. Allopathy	43.03	42.56	35.05	37.80	79.43	47.57	1%	-
1-5. Public Health	1,543.46	902.97	1,643.35	1,640.70	2,104.48	1,566.99	19%	-
1-5-1. Prevention & Control of Diseases	302.48	303.04	304.20	0.00	0.00	181.94	2%	-
1-5-2. Drug Control	1.72	26.26	3.74	0.00	0.00	6.34	0%	-
1-5-3. Public Health Laboratories	19.77	25.50	22.47	24.07	25.27	23.42	0%	-
1-5-4. Other Expenditures	1,219.50	548.17	1,312.94	1,616.63	1,889.45	1,317.34	16%	-
1-5-5. General	0.00	0.00	0.00	0.00	189.76	37.95	0%	-
2. Family Welfare	347.58	360.94	396.42	413.71	621.54	428.04	5%	-
2-1. Direction & Administration	24.73	13.18	39.39	0.00	0.00	15.46	0%	-
2-2. Rural Family Welfare Services	322.85	347.76	357.03	413.71	621.54	412.58	5%	-
3. Capital Expenditure	146.28	86.25	393.97	1,556.37	4,610.56	1,358.69	16%	-
Total	6,314.19	6,693.98	7,232.16	9,224.95	12,884.54	8,469.97	100%	49,809
Percentage of expenditure of DHFW in total expenditure of Nagaland State	5.5%	5.9%	6.3%	6.9%	8.5%	6.6%	-	-

Source: Government of Nagaland (2022) [64]



Source: Government of Nagaland (2022)

Figure 11-1 Expenditure of Medical, Public Health and Family Welfare

11.1.2 Expenditure of Naga Hospital Authority Kohima

The expenditure of the Naga Hospital Authority Kohima (NHAK) is shown in Table 11-3. The revenue of it could not be received from the Government of Nagaland. Around 98% of expenditure is for employees' salaries. Since details of hospital expenses have not been received, it is difficult to analyse them.

Table 11-3 Expenditure of NHAK

(Unit: INR)

Item	2018-19	2019-20	2020-21	2021-22
Hospital Expenses*	5,500,000	6,000,000	6,000,000	7,500,000
Employee Salaries	212,161,000	252,462,000	263,423,000	289,069,000
Total	217,661,000	258,462,000	269,423,000	296,569,000

*P.O.L (fuel of generators), rent rate & taxes, hospital dietary, medical gases, T.A. (Traveling Allowance) / D.A. (Dearness Allowance), hospital laundry, office expenses, and nursing sundries.

Source: [65]

11.1.3 Health Insurance Schemes

There are two health insurance system in Nagaland State; 1) Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (AB PM-JAY) and 2) the Chief Minister's Health Insurance Scheme (CMHIS) Nagaland. Outline of them is mentioned in Table 11-4. CMHIS is implemented in convergence with AB PM-JAY which is a flagship Program of the Government of India. The converged Scheme shall be known as the "AB PM-JAY CMHIS".

(1) AB PM-JAY

AB PM-JAY is a Government of India flagship health insurance scheme which aims to provide accessible and affordable healthcare and accelerate India's progress towards Universal Health Coverage. This health insurance scheme provides health insurance coverage to over 100 million deprived families in India.

(2) CMHIS

The state government initiated CMHIS Nagaland to alleviate financial hardships due to hospitalization expenses and to prevent inaccessibility to medical care on account of unaffordability. CMHIS is one among the first State-specific welfare scheme wherein every citizen of the State shall be entitled to free and cashless treatment for various ailments. The scheme would be instrumental in mitigating the risk of improvement resulting from hospitalization expenses and promote access to quality and affordable healthcare and accelerate State's progress to Universal Health Coverage.

For government employees, any additional expenses beyond the sum insured shall be reimbursed on a case to case by the State government on recommendation of the State Medical Board. For others, any additional expenses beyond the sum insured will be out-of-pocket payments.

Table 11-4 Outline of Health Insurance Scheme

Scheme	AB PM-JAY	CMHIS
Beneficiaries	The initial beneficiary of AB PM-JAY consisted of families including all its members figuring in the deprivation categories of Socio-Economic Caste Census 2011 and the erstwhile Rashtriya Swasthya Bima Yojana. However, the beneficiary data is based on National Food Security Act (NFSA) Ration Card now. Further, the Building and Construction Workers are also included as additional beneficiary categories. 233,328 poor and deprived families are covered under the scheme in Nagaland.	1. State government employees and pensioners including ex-legislatures and their dependents, which is categorized as CMHIS (EP) 2. All the indigenous and permanent residents of the State who are not covered by AB PM-JAY and are not state government employees and pensioners, which is categorized as CMHIS (GEN).
Sum Insured	INR 500,000 per family per annum on a family floater basis.	1. EP: INR 2 million per family per annum on a family floater basis. 2. GEN: INR 500,000 per family per annum on a family floater basis.
Risk Cover	• Risk cover shall include cost of hospitalization for treatment of various ailments requiring secondary and tertiary level of medical and surgical care treatment. However, OPD services and stand-alone diagnostic investigations are not covered. • All beneficiaries shall be entitled to free and cashless benefit service for treatment of various ailments including pre-existing conditions/ diseases. • The benefits are listed under Nagaland Health Benefit Packages 2022 [66]. The rates indicated against each Package includes all the expenses for treatment.	
Health Benefits Package (HBP)	N-HBP 2022 for CMHIS (GEN): Beneficiaries will be entitled to more than 1950 medical and surgical packages across 27 major clinical specialties as well as entitlement to General Ward, similar to AB PM-JAY	1. N-HBP 2022 for CMHIS (EP): Beneficiaries will be entitled similar to that available for central government employees under Central Government Health Scheme (CGHS) as well as differential room entitlement as per the pay grade of the employee. 2. N-HBP 2022 for CMHIS (GEN): Beneficiaries will be entitled to more than 1950 medical and surgical packages across 27 major clinical specialties.
Hospitals where treatment will be available	• Can avail the benefits in any hospitals (both public and private) within the State and outside the State which are impanelled under AB PM-JAY. A total of more than 28,000 hospitals across the country are currently impanelled under AB PM-JAY.	1. EP: Can avail treatment at all hospitals impanelled under CGHS and hospitals within the state impanelled under CMHIS (EP). 2. GEN: Can avail the benefits in any hospitals (both public and private) within the State and outside the State which are impanelled under AB PM-JAY.

Source: [67]

11.1.4 Out-of-Pocket Expenditure (OOP)

According to Table 11-5, average OOP of Nagaland per delivery at public health facilities in 2019/20 seems to be higher than that of India. Average OOP of IPD of Nagaland at public hospitals excluding childbirth in 2014 was lower than those of India in both rural and urban areas. Average OOP of Nagaland at public hospitals in 2017/18 was higher than those of India in both rural and urban areas. Since the above AB PM-JAY CMHIS started in 2022, the OOP will be reduced in Nagaland State. OPD services and standalone diagnostic investigations are not covered by the schemes.

Table 11-5 OOP of Nagaland and India

Item	Nagaland		India	
Average OOP expenditure per delivery at public health facilities (INR) in 2019/2020	5,778		3,245	
Average OOP of IPD at public hospitals (excluding childbirth) (INR) in 2014	Rural: 2,402	Urban: 4,003	Rural: 5,369	Urban: 7,189
Average OOP of OPD at public hospitals (INR) in 2017/2018	Rural: 2,302	Urban: 770	Rural: 472	Urban: 486

Source: [68] [69]

11.2 General Assumptions of Financial and Economic Analyses

General assumptions are explained in Table 11-6. The evaluation period is set for 40 years based on the recommendation of the JICA manual. Popular values are selected for social discount rate and standard conversion factor, which are used in the economic analysis.

Table 11-6 Assumptions of Financial and Economic Analysis

Indicators	Assumptions	Note
Evaluation Period	40 years - Construction Period: 2024- February 2031 - Operation Period: March 2031-2063	JICA Internal Rate of Return Calculation Manual (2017)
Exchange Rate	USD 1=JPY 137 USD 1=INR 83.7 INR 1=JPY 1.64	JICA General Guideline (June 2023)
Price Level	2023	JICA General Guideline (June 2023)
Social Discount Rate	10%	Popular value used in the economic analysis of JICA and other international institutes
Standard Conversion Factor	0.9	

Source: JICA Survey Team

Financial and economic costs, and operation & maintenance (O&M) costs of the project were estimated by the JICA Survey Team, and transfer costs such as price escalation and tax are excluded from the calculation in the economic analysis. The economic cost was calculated by multiplying the standard conversion factor to the domestic portion of those costs.

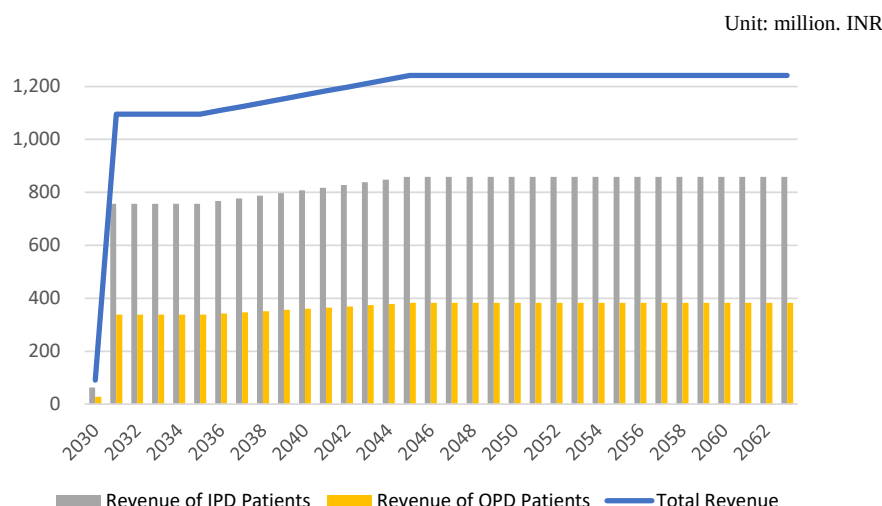
Detailed analysis results are presented in Appendix 6.

11.3 Financial Analysis

Financial validity of the project was evaluated by calculating the revenue and financial costs of the Project. The financial internal rate of return (FIRR) is calculated by using them.

11.3.1 Revenue

Revenues of the service charge paid by patients for OPD and covered by health insurance for IPD were estimated by the JICA Survey Team (Figure 11-2). The number of patients was estimated and shown in Table 11-7.



Source: JICA Survey Team

Figure 11-2 Revenue Estimation

Table 11-7 Estimated Number of Patients of NMCH

(Unit: people/year)

No. of Patients	2030	2031	2032	2033	2034	2035	2036	2037
IPD patients	9,125	109,500	109,500	109,500	109,500	109,500	110,960	112,420
OPD patients	26,919	323,025	323,025	323,025	323,025	323,025	327,332	331,639
No. of Patients	2038	2039	2040	2041	2042	2043	2044	2045-2063
IPD patients	113,880	115,340	116,800	118,260	119,720	121,180	122,640	124,100
OPD patients	335,946	340,253	344,560	348,867	353,174	357,481	361,788	366,095

Source: JICA Survey Team

11.3.2 Results of Financial Analysis

(1) Results

Table 11-8 shows the results of the financial analysis of the project. The FIRR of the project is 6.4%, which is higher than 1.1% (Weighted Average Cost of Capital (WACC) of yen loan). The benefit cost ratio (BCR) is higher than 1.0 and the net present value (NPV) is plus. Therefore, the project is financially viable.

Table 11-8 Results of Financial Analysis

Indicators	Results
FIRR (%)	6.4
BCR	1.30
NPV (INR in million)	7,064

Source: JICA Survey Team

(2) Sensitivity Analysis

Sensitivity analysis regarding a 10% cost increase and 10% revenue decrease was implemented. Results of the sensitivity analysis are shown in Table 11-9. The FIRR of both cases is higher than 1.1%. The BCR is higher than 1.0 and the NPV is plus. Therefore, these cases are feasible.

Table 11-9 Results of Sensitivity Analysis of Financial Analysis

Indicators	Base Case	Cost 10% Increase	Revenue 10% Decrease
FIRR (%)	6.4	4.6	4.4
BCR	1.30	1.18	1.17
NPV (INR in million)	7,064	4,690	3,983

Source: JICA Survey Team

11.4 Economic Analysis

Social and economic validity of the project was evaluated by calculating the economic benefits and costs of the “With” and “Without” cases of the project. The economic internal rate of return (EIRR) is calculated by using economic benefits and economic costs.

11.4.1 Economic Benefits

The following economic benefits are quantified in the economic analysis. They could be changed in the DFR based on the data, which were collected by the JICA Survey Team.

- Benefit of decrease of economic deficit of patients by reducing travel time and costs
- Benefit of reduction of medical costs at private hospitals
- Benefit of extended life period

(1) Benefit of Decrease of Economic Deficit of Patients by Reducing Travel Time and Costs

After the Nagaland Medical College Hospital start its operation, number of referral patients and accompanying family members from Nagaland to other states could be reduced. The saved transportation costs and accommodation costs are considered as the social benefit of the Project. Calculation of benefit is conducted by the following formula.

Benefit of travel cost reduction = “Reduced number of referral patients” x “Travel costs per patient (Transportation cost per patient + Accommodation costs per patient)”

1) Reduced Number of Referrals

Data for number of referral patients and travel costs per patient was collected by the JICA Survey Team. Table 11-10 shows the number of referrals from NHAK to hospitals outside Nagaland State. The number of referrals will be reduced by the Project, and it was estimated based on the record of their past data. 70% of the referrals to hospitals outside Nagaland State without the project was estimated to be reduced by the project.

Table 11-10 Number of Referrals to Hospitals outside Nagaland State

Type of Hospitals	2020	2021	2022
Private Hospitals	105	188	214
Public Hospitals	31	57	55
Total	136	245	269

Source: Nagaland State (2023)

2) Transportation Costs

Transportation costs are shown in Table 11-11.

Table 11-11 Transportation Costs to Hospitals Per Patient

Location	Travel Time by Road	Travel Costs (INR)
Imphal, Manipur Sate	4 hours and 58 minutes	3,600
Guwahati, Assam State	7 hours and 53 minutes	5,710 (estimated based on data of Imphal)
Shillong, Meghalaya State	9 hours and 36 minutes	6,950 (estimated based on data of Imphal)

Source: Nagaland State (2022), JICA Survey Team

3) Accommodation Costs

Accommodation costs in the above locations are shown in Table 11-12. At least one person per patient is expected to stay at hotel near hospitals to take care of patients. Since average days of hospitalisation is five days [70], average accommodation costs were calculated by the following costs multiplied by 4 (nights).

Table 11-12 Accommodation Costs

Location	Accommodation Costs (INR/ night)
Imphal, Manipur Sate	873
Guwahati, Assam State	327
Shillong, Meghalaya State	488

Source: JICA Survey Team

(2) Benefit of Reduction of Medical Costs at Private Hospitals

The benefit of reducing treatment costs at private hospitals was calculated by the following formula.

Benefit of reducing treatment costs at private hospitals = Number of patients who need tertiary medical care at private hospitals outside Nagaland State without the project × Difference between treatment costs at private hospitals and those at public hospitals.

The number of patients who need tertiary medical care at private hospitals was estimated based on Table 11-10, and 70% of the referrals to private hospitals outside Nagaland State without the project was estimated to be reduced by the project. The difference between treatment costs for Inpatient Department (IPD) at private hospitals and those at public hospitals is shown in Table 11-13.

Table 11-13 Difference Between Treatment Costs at the Private Hospitals and Those at the Public Hospitals

19,852 (INR/patient)

Source: [71]

(3) Benefit of Extended Life Period

The effect of the Project is the extension of the average life period in Nagaland State by the treatment at the tertiary level hospital. The benefit amount was estimated by the following formula. It is assumed that recovered patients are employed in any profitable activities during the rest of his/her working age, and its value added is considered as a social benefit.

Benefit of extended lifetime = “(1) Number of recovered patients (people/year)” × “(2) Average extended working time (year)” × “(3) Per capita Net State Domestic Product (INR/year)”

1) Number of Recovered Patients

The number of NMCH patients is estimated by the JICA Survey Team. Since diseases of patients are various, it is difficult to estimate the number of recovered patients who suffer from all kinds of diseases. Therefore, the JICA Survey Team used stroke, which was the top cause of death in Nagaland State in 2019 to estimate the recovered patients and average extended working time. Mortality of stroke in India is from 18% to 41% [72]. The JICA Survey Team estimated that the mortality rate will be improved from 30% to 18% by the Project. The number of recovered patients is estimated based on the inpatients of NMCH, who require surgery and the estimated rate of recovered patients. Estimated number of recovered patients is shown in Table 11-14.

Table 11-14 Estimated Number of Recovered Patients

(Unit: people/year)

2031	2032	2033	2034	2035	2036	2037	2038
1,752	2,102	2,102	2,102	2,102	2,130	2,158	2,186
2039	2040	2041	2042	2043	2044	2045-2063	
2,215	2,243	2,271	2,299	2,327	2,355	2,383	

Source: JICA Survey Team

2) Average Extended Working Time

The average age of having stroke in India is 51.6 years old [73] [74]. Since retirement age is 60 years old in Nagaland State [75], eight years and five months are used as the average extended working time.

3) Per Capita Net State Domestic Product

Per capita Net State Domestic Product (NSDP) of Nagaland State at constant price is INR 73,361 (2019-2020) [76]. Since the average growth rate of NSDP from 2011 to 2019 was 4.2%, the growth rate is estimated to be 4.2% from 2020 to 2024. It is estimated to decrease 0.2% every five years after 2024. Per capita NSDP in the future was calculated based on the above assumptions.

11.4.2 Results of Economic Analysis

(1) Results

Table 11-15 shows the results of the economic analysis of the project. The EIRR of the project is 24.9% which is higher than 10% (the social discount rate). The BCR is higher than 1.0 and the economic net present value (ENPV) is plus. Therefore, the project is economically viable.

Table 11-15 Results of Economic Analysis

Indicators	Results
EIRR (%)	24.9
BCR	2.54
ENPV (INR in Million)	8,951

Source: JICA Survey Team

(2) Sensitivity Analysis

Sensitivity analysis regarding a 10% cost increase and 10% benefit decrease was implemented. Results of the sensitivity analysis are shown in Table 11-16. The EIRR of both cases is higher than 10%. The BCR is higher than 1.0 and the NPV is plus. Therefore, these cases are economically feasible.

Table 11-16 Results of Sensitivity Analysis of Economic Analysis

Indicators	Base Case	Cost 10% Increase	Benefit 10% Decrease
EIRR (%)	24.9	23.1	22.9
BCR	2.54	2.31	2.29
ENPV (INR in million)	8,951	8,371	7,476

Source: JICA Survey Team

Chapter 12 Project Evaluation

12.1 Operation and Effect Indicators

The indicators for short-term and long-term are proposed separately as it takes long time to evaluate the project effects which include enhancing the healthcare human resource development systems through clinical-based education. Table 12-1 shows the proposed short-term operation and effect indicators proposed for the Project. Regarding number of specialist doctors per 100,000 population, this indicator was set to measure the effects of the tertiary medical service.

Monitoring indicators for long-term are proposed that impact of the project should be monitored in the long run. The followings are proposed as long-term monitoring indicators.

- Number of graduates of MBBS course in NIMSR
- Number of doctors per 1,000 population
- Number of specialist doctors per 100,000 population

12.2 Qualitative Effects

Qualitative effects envisaged by the project implementation are as follows:

- Better quality medical personnel will be fostered.
- Management of medical equipments will be properly conducted. (Substitutes will be provided or broken equipments are promptly repaired.)
- Improvement of medical services for regional residents
- Employment of females will be promoted by hiring staff of NIMSR.
- Access to healthcare in Nagaland State (including remote medical examination) will be improved.
- Satisfaction of patients and their families with medical services will be improved.

The above qualitative effects are required to be considered when the project implementation is determined.

Table 12-1 Operation and Effect Indicators

Indicators	Unit	Baseline	Sources	Target (2033)	Estimation Basis	Means of Verification
EIRR	%	-		24.9	Target was referred from the result of economic analysis in Chapter 12.	To be re-calculated by a post evaluation team in 2034
Number of inpatients, outpatients	people/ year	-		Inpatient: 109,500 Outpatient: 323,025	Inpatient: 400 beds x estimated occupancy rate (75%) x 365 days, Outpatient: Inpatient x 2.95 (based on NHAK's data)	To be reported by NIMSR Kohima to DHFW in early 2034
Bed occupancy rate	%	-		75%	Estimated based on occupancy rates among existing hospitals	To be reported by NIMSR Kohima to DHFW in early 2034
Number of students of clinical training	people /year	-		100	Number of annual intake of MBBS course in NIMSR	To be reported by NIMSR Kohima to DHFW in early 2034
OOP of OPD at public hospitals	INR/ patient	1,275 (2017-2018)	Health Dossier 2021: Reflections on Key Health Indicators [77]	1,375	Estimated based on OOP average in India converted to 2033 price (reference: [77], [78])	To be collected by DHFW in early 2034
Number of referrals from district hospitals to hospitals outside Nagaland State	people/ year	269 (2022)	Number of patients referred from NHAK out of Nagaland	81	As referral may depends on desire of patients/their families, it could not to be zero. Then, aim to decrease by 70% of the baseline.	To be reported by NIMSR Kohima to DHFW in early 2034
Number of doctors per 1,000 population	people/ year	0.33 (2021)	Calculated based on the Health Workforce in India, Human Resources for Health Observer Series No. 16 [34]	0.42	Calculated based on human resource deployment plan of NIMSR and population projection	To be collected by DHFW in early 2034
Number of specialist doctors per 100,000 population	people/ year	8.85 (2021)	Calculated based on the Nagaland Statistical Handbook 2021 [37]	16.22	Calculated based on human resource deployment plan of NIMSR and population projection	To be collected by DHFW in early 2034
Number of Business Continuity Plan (BCP) for disaster medical care	number	-		1	Based on NIMSR plan	To be reported by NIMSR Kohima to DHFW in early 2034
Hospital facility with considering gender is constructed and used	Status	-		1	Based on NIMSR plan	To be reported by NIMSR Kohima to DHFW in early 2034
Number of eSanjeevani HWC conducted	Number/ year	-		960	1 (doctors/day) x 2 (patients/hour) x 2 (hours/day) x 20 (working days/month) x 12months	To be reported by NIMSR Kohima to DHFW in early 2034

Indicators	Unit	Baseline	Sources	Target (2033)	Estimation Basis	Means of Verification
Number of ICT training participants	people /year	-		932	Human resource deployment plan of NMCH (doctors, technical and scientific staff)	To be reported by NIMSR Kohima to DHFW in early 2034

Source: JICA Survey Team

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Appendix 1 Proceedings of Major Meetings and the Technical Seminar

- 1-1 Kick-off Meeting
- 1-2 Discussion on Interim Report
- 1-3 Technical Seminar
- 1-4 Exchange Visit to Assam
- 1-5 Discussion on Draft Final Report

Minutes of Meeting

Subject	Kick-Off Meeting
Date & Time	29 th September, 2022 at 2:00 PM
Location	Directorate of Health and Family Welfare, Kohima, Nagaland
Participants	Officials of H&FW, JICA HQ, JICA-India and JICA Survey Team
Documents	PPT Kick off brief presentation by JICA HQ, PPT Report of Field Survey

1. The meeting commenced after vote of appreciation by Dr. K. Vikato Kinimi.
2. Ms. Naoe Soma, JICA HQ presented a PPT on the Kickoff meeting and explained about;
 - Project cycle of JICA ODA loan
 - JICA's Principle upon Project Formulation
 - Schedule until L/A signing
 - JICA's request during the preparatory survey

Ms. Naoe Soma also explained about the Pre- Implementation evaluation stage and post-implementation evaluation stage thoroughly, in the Project implementation topic.

3. Ms. Keiko Nagai on “Outline of the field survey”, from the PPT Report of field survey. She listed the itinerary of the JICA survey team from 19th September 2022 to 14th October 2022.
4. Mr. Nishikawa presented the topic on Facility Planning;
 - Findings from the 1st survey
 - Proposed new location for the 400 bedded hospital as the previous site was a steep slope area for a large volume of construction.
 - Concept of facility planning.
 - Request from the facility planning team.
5. Mr. Hidenori Mochizuki presented on Hospital Management;
 - Shared findings on hospital operations and management.
 - Shared some focal points on hospital operations, referral systems, emergency medical system and regulations and guidelines on hospital management for the new teaching hospital.
6. Ms. Yukari Oshima presented on Human resource development;
 - Human resource deployment plan, sharing of information collected.
 - Human resource development at Nagaland Medical College Kohima, sharing of information collected.

- Higher ratio of female medical workers in Nagaland state.
 - Some University in Japan have interest in collaborating with medical institutions of India.
7. Ms. Keiko Nagai shared an example of human resource deployment and development roadmap;
- Suggestion of hiring initial faculty for Medical college from out of state, till the first batch of students graduates.
 - Hiring of faculty within the state after the first batch graduates.
 - Primary idea of rotation mechanism to develop well-balanced medical human resources.
8. Mr. Tatsuya Matsuoka presented on Information and Communication Technology;
- He shared about the existing HMIS/HIS systems in Nagaland in line with national policies and programs, Ayushman Bharat Digital Mission, hospital information system modules developed by NHP, strong regular and already streamlined NHM reporting systems and E-sanjeevani.
 - ABDM Scheme explained.
 - Challenges and issues in HMIS/HIS in Nagaland.
 - Emerging fast positive scenarios and possible solutions.
9. Mr. Ikuro Mitsumoto presented on Environmental and Social Consideration;
- Needs of Biomedical waste management and treatment plan.
 - Land acquisition still in process.
 - Land use certificate and land acquisition process should be clarified in detail.
10. Ms. Keiko Nagai further shared on schedules for future plans and actions shared.

Q&A and discussion

1. Dr. Kika, Joint Director clarified on the Land acquisition query.
- Minimum acquisition of land for medical college as per NMC guidelines acquired, i.e. 25 acres.
 - Land is acquired by the Government under The Nagaland Land (Requisition and Acquisition Act) 1965.
 - Land is owned by community based.
 - Land is purchased outright /compensated by government.
 - Government issue land patta in the name of the Department acquiring the land.
 - Land acquisitions is done by State Land Acquisition Authority, Headed by the Chief Minister of Nagaland.
 - Public Notice was issued and objection was not received from any person/authority for the land acquired for Nagaland Medical College.

- Timelines: Payment of compensation for the remaining land will be completed by the end of the year, 2022.
 - Land patta shall be obtained from the Deputy Commissioner office for the land which is yet to be acquired.
2. Ms. Aditi inquired whether total land acquisition will be done before the signing of the Loan Agreement, as it will hinder the construction process in future. The Department official replied in affirmative.
 3. Land acquisition information: 50 acres acquired/compensated, 70 acres in process. The purchase/acquisition process shall be completed by 2022.
 4. Mr. Ikuro Mitsumoto inquired about possible issues arising due to resettlement on acquired land.

The Department official replied that there was no re-settlement in the acquired land and since land ownership shall be recorded in the name of Department, there will be no issues of re-settlement.
 5. Ms. Shinohara: enquired whether new location for the 400 bedded hospital is included in the already acquired 50 acres of land, which was affirmatively replied by the Department Officials.
 6. Dr. Kika, Joint Director requested JICA for implementation of other requirements like Biomedical waste management and treatment, liquid waste management and treatment, solar energy installation on campus and technical aides in referral systems, exchange of human resources and other technical support systems.
 7. JICA India requested a revised DPR for this matter.
 8. Dr. Kika, Joint Director, pointed that the new proposed site for the Hospital might be too big for the proposed area so he suggested building of two structures in adjacent areas and connected by a pathway. He also requested implementation of ICT in Medical College by the JICA team.
 9. The Executive Engineer extended her co-operation for the geological, topographical and climate survey of the medical college site.
 10. Ms. Aditi brought to attention the bad condition of the road and the difficulty to access to the Hospital. The Department officials replied that it had already informed the Roads and Bridges Department and the process to improve and repair the road has started.

11. Dr. K. Vikato emphasized on the proper and detailed survey of the land of the medical college site by the geological survey team.
12. The meeting ended with appreciation by the Principal Director and the JICA Survey Team leader.

Attachment: List of Participants

Department of Health and Family Welfare

Dr. Vikato Kinimi	Principal Director
Dr. Atsungla	Director (Health)
Dr. Puse Liegis	Joint Director
Dr. Kika Longlumer	Joint Director
Dr. John Kemp	Deputy Director
Er. Moanaro	Executive Engineer

JICA

Ms. Shinohara Yuko		South Asia Division 1, South Asia Department
Mr. Minoru Matsunoshita		South Asia Division 1, South Asia Department
Ms. Naoe Soma		South Asia Division 1, South Asia Department
Mr. Shusaku Takada	Representative	JICA India Office
Ms. Puri Aditi	Principal Development Specialist	JICA India Office

IQVIA Consultants

Ms. Neeta Gidwani	Kohima
Mr. Pankaj Kumar	
Mr. Amit Kumar	Kohima
Mr. Saumen Sahoo	
Mr. Saurav	
Mr. Vaibhav Goyal	

JICA Survey Team

Ms. Keiko Nagai	Team Leader/ Medical Human Resource Development Planning 1
Mr. Kohei Nishikawa	Deputy Team Leader/ Architectural Planning Building Design 1
Mr. Amit Malik	Utility Planning (Electricity, Mechanical, Plumbing, Sanitary) 2
Mr. Norikazu Kameda	Construction Planning / Cost Estimation 1
Mr. Rang Emei Gonmel	Construction Planning / Cost Estimation 2
Mr. Tamotsu Nozaki	Medical Equipment Planning/ Cost Estimation
Mr. Dai Fujita	Medical Equipment Operation and Maintenance
Ms. Junko Yamada	Health and Medical Service Planning 1
Ms. Sumana Das	Health and Medical Service Planning 2
Mr. Hidenori Mochizuki	Hospital Management 1
Ms. Kanako Miyoshi	Hospital Management 2
Ms. Yukari Oshima	Human Resource Development/ Gender/ India-Japan Medical Exchange Promotion 1
Dr. Yoshihisa Yamazaki	Human Resource Development/ Gender/ India-Japan Medical Exchange Promotion 2
Mr. Tatsuya Matsuoka	Information Management/ IT/ Telemedicine/ Digital Transformation in Health 1
Dr. Ranganayakulu Bodavala	Information Management/ IT/ Telemedicine/ Digital Transformation in Health 2
Ms. Risa Kikuchi	Economic and Financial Analysis
Mr. Ikuro Mitsumoto	Environmental and Social Considerations

Preparatory Survey on Nagaland Medical College Hospital Development Project

Mr. Satoshi Yoshida	Geological, Topographical and Climate Condition Survey
Ms. Rongseninla Jamir	Health System/ Advocate
Ms. Sotisola Imkong	Hospital Management
Mr. Kiron Moni Singh	Medical Equipment
Mr. Kamal Das	Financial and Economic Analysis
Mr. Shalabh Prakash Bharadwaj	Environmental and Social Considerations
Mr. Temjenyuba Pongener	Field Coordinator
Mr. Sheyamong Pechongri	Geological, Topographical and Climate Conditions
Mr. Abhishek Rudra	Architecture and Civil Works

Kickoff Meeting Nagaland Medical College Hospital Development Project

JICA HQ

29th September, 2022



Agenda

Discussion Purpose Only

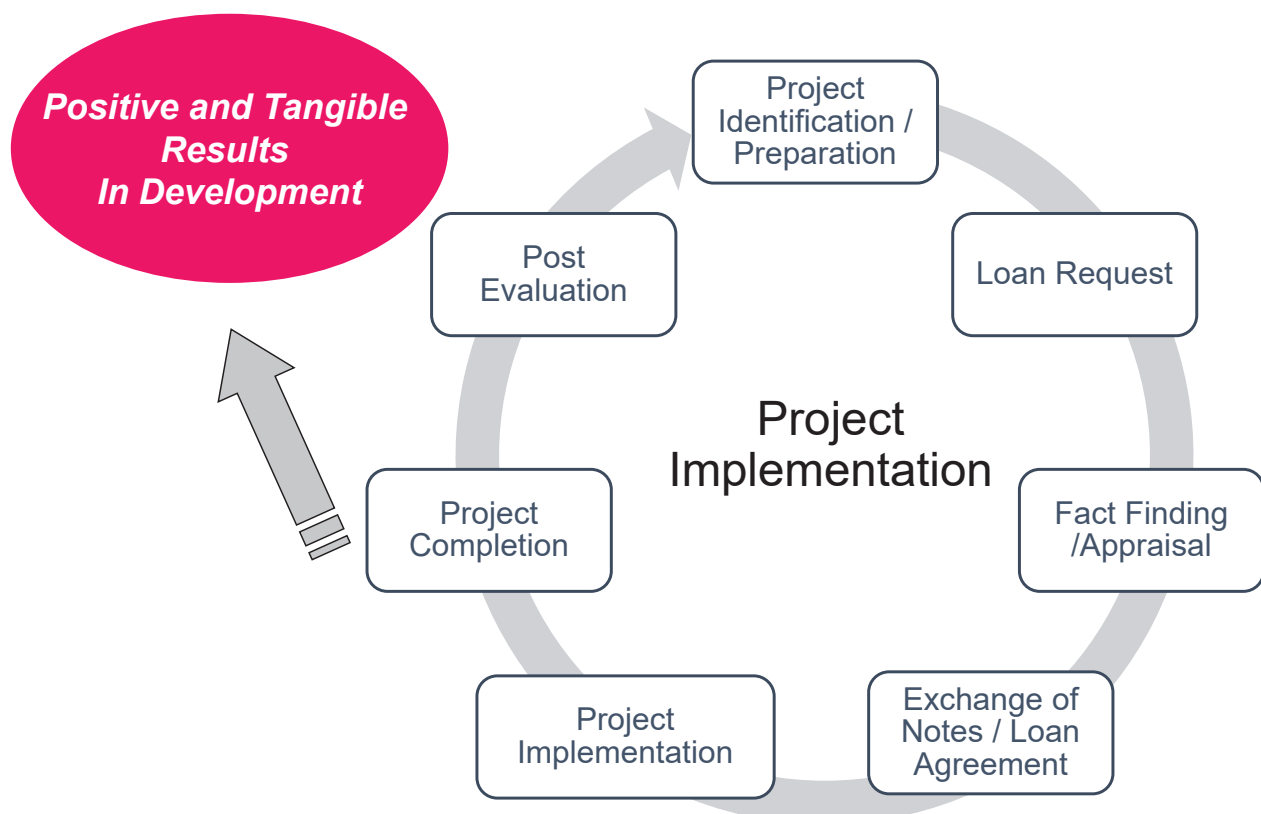
- 1. Project Cycle of JICA ODA Loan**
- 2. JICA's Principle upon Project Formulation**
- 3. Schedule until L/A signing**
- 4. JICA's request during the preparatory survey**



1. Project Cycle of JICA ODA Loan

3

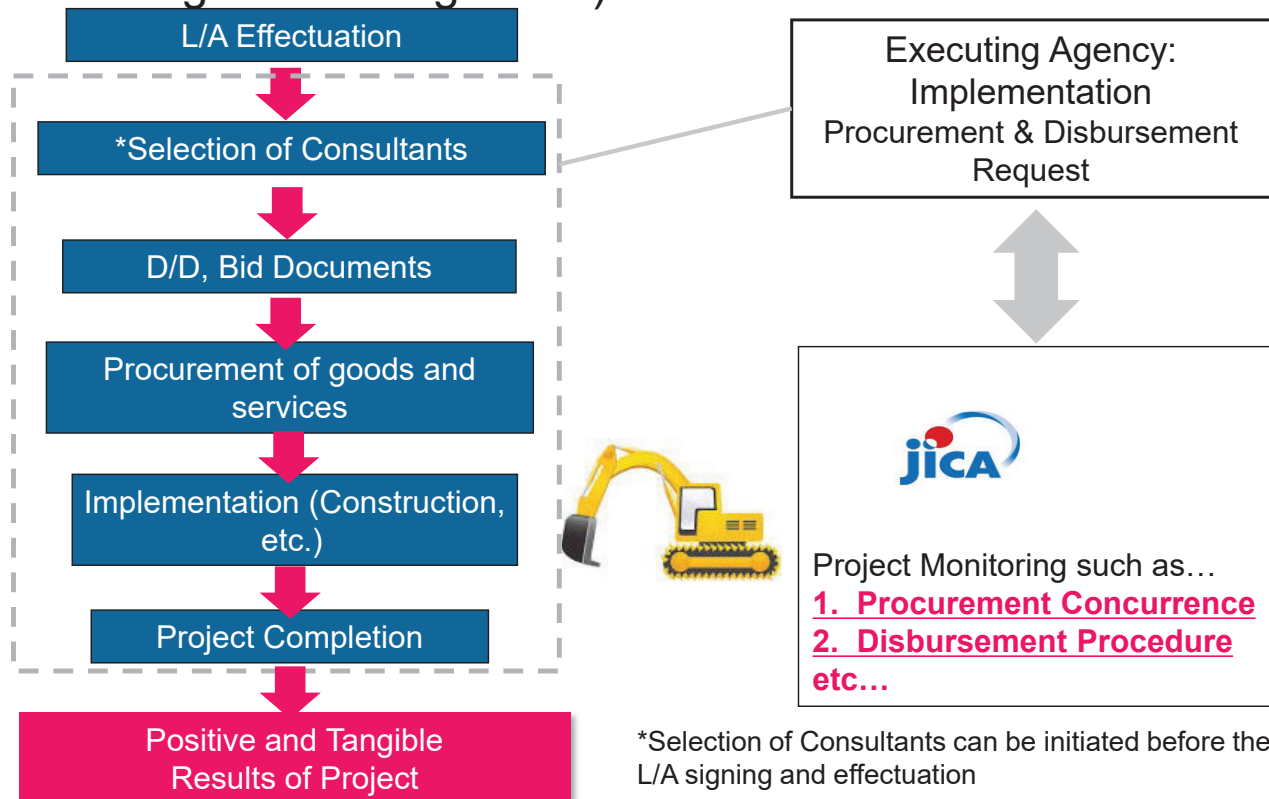
Project Cycle of ODA Loans



4

Project Implementation

Major Steps after Signing of the L/A (on-going project monitoring and management)



2. JICA's Principle upon Project Formulation

Principle of the Project Formulation

The project must tackle with **the fundamental cause** that hinders making the excellent health system in Nagaland.

- Whatever the scope is, the project must be impact-driven.
- We will not formulate the project if the project components are not fully effective to solve the issue.
- The project will be composed very severely in this regard.



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JICA's Interest Through Preparatory Survey

1. Human Resource Development

- Policies of GOI and Nagaland state, implementation status, and future prospects.
- How Nagaland state secures skilled medical personnel, current situation and challenges of human resource development and medical education.

2. Utilization of Medical ICT/DX

- Needs of telemedicine to improve access to medical care and remote training of medical staff in Nagaland.
- How medical data is collected, utilized, managed and monitored.

3. Schedule until L/A signing

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Schedule until L/A signing

Timeline	Activity
September, 2022	Commencement of the Preparatory Survey, Kick-Off Mission
November, 2022	Submission of Interim Report by JICA Survey Team Fact Finding Mission
April, 2023	Submission of Draft Final Report by JICA Survey Team Fact Finding Mission
June 2023	Appraisal Mission
September, 2023	Signing of Loan Agreement

* All subject to the decision of JICA's board, GOJ and GOI.

4. JICA's request during the preparatory survey

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JICA's request during the preparatory survey

For efficient and smooth implementation of the survey

- Assigning of the contact persons with stable communication line.
- Providing reference documents, information, statistics etc. in a timely manner.
- Arrangements of meetings and field visits, if necessary.
- Permission for site survey with photo taking.
- Close cooperation and support.

Thank you!

Preparatory Survey on Nagaland Medical College Hospital Development Project

Report of the Field Survey 1-1

29 September 2022
Kick-off Meeting
Kohima, Nagaland

Contents

1. Outline of the field survey 1-1
2. Findings of each technical topics
 - ① Facility Planning
 - ② Hospital Management
 - ③ Human Resource Development
 - ④ Information Technology
 - ⑤ Environmental and Social Considerations
3. The way forward

Outline of the Field Survey 1-1

■ Itinerary: 19 Sep 2022 – 14 Oct 2022

- 19 Sep: Arrived at Kohima
- 20 Sep: Meeting with the Principal Director, Joint Director, Executive Engineer, the Nagaland Health Project (NHP)
Visit to the Project Site
- 21 Sep: Courtesy call to the Health Minister
Meeting with NHP, the National Health Mission (NHM) Nagaland
Visit to the Naga Hospital Kohima (NHK), private hospitals in Kohima
- 22 Sep: Visit to PHC Khonoma, CHC Viswema
- 23 Sep: Visit to UPHC Seikhazou, NHK
Meeting with the Director of Medical Education, concerned Deputy Directors, Executive Engineer, Nodal Officer
- 25 Sep: Moved to Assam
- 26 – 28 Sep: Visit Dimapur District Hospital and UPHC, PPP hospital in Dimapur (CIHSR)
Case study in Assam (Medical College and Teaching Hospital, Health and Family Welfare Department, etc.)
- 29 Sep: Kick-off Meeting, Mini-technical seminar
- 30 Sep: The first batch will leave Kohima and
the second batch (natural condition and medical equipment) will start a field survey (until 14 Oct).

3

Facility Planning

1. Findings from the 1st survey
2. Concept of Facility Planning
3. Request from the facility planning team

4

1. Findings from the 1st survey



-Hospital construction
(Maternal and Child Hospital)
is still going on.

-Target date of completion is said
in November, 2022. (May extend
at least one more year by the
consultant's prospect.)

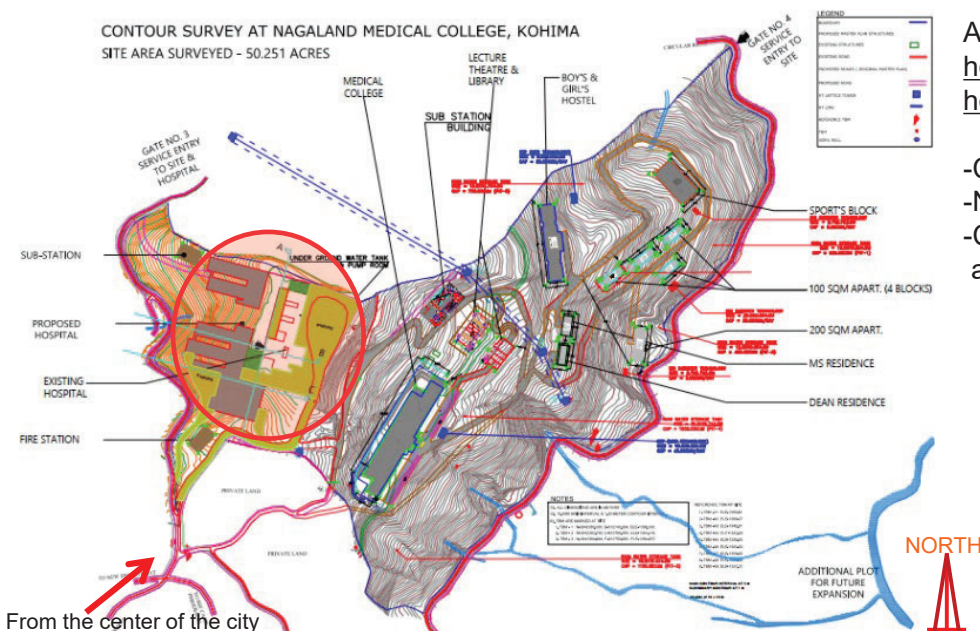
<Completion status>

- Medical college building: 60%
- Boys & Girls Hostel : 60%
- Sports complex : 95%
- MS residence : 95%
- Dean residence : 95%
- 100m2 apartment : 90%
- 200m2 apartment : 45%

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1. Findings from the 1st survey

CONTOUR SURVEY AT NAGALAND MEDICAL COLLEGE, KOHIMA
SITE AREA SURVEYED - 50.251 ACRES



Access road condition around the
hospital (Maternal and Child
hospital):

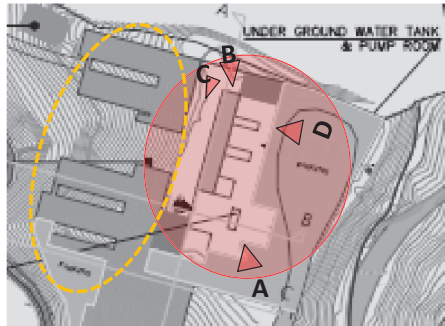
- Current condition is not good.
- Needs to be repaired/improved.
- Construction vehicles can be
accessible.

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1. Findings from the 1st survey



VIEW C (Rear side)



According to the DPR plan, 400 bed hospital is planned to be constructed on the rear side of the existing hospital (Maternal and Child Hospital).

But, the rear side of the building is steep slope.

Generally, embankment soil on the steep slope is unstable.

⇒ The location of the new 400 bed hospital should be reconsidered.

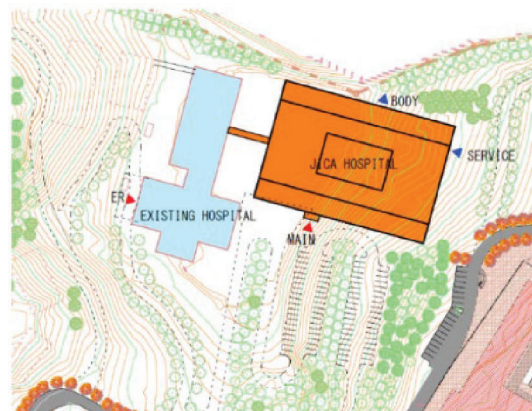
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1. Findings from the 1st survey



DPR Plan (1 basement, 5 stories)

The foot print is also wide.
It is very hard that such a large volume to construct on the steep slope area.



Proposed Plan (2 basement, 11 stories)

The front side of the existing hospital is comparably flat.
We will try to reduce the foot print as much as possible

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2. Concept of Facility Planning

1. Creation of a **patient-centered environment** that enhances quality of life (QOL)
2. **Proximity of the related departments** and **shortened flow lines** to support advanced medical care
3. Realization of **safe and secure medical environment**

9

2. Concept of Facility Planning

1. Creation of a **patient-centered environment** that enhances quality of life (QOL)
 - ① Reduce patient burden by shortening patient travel distances in hospital
 - ② Secure required space around patients
 - ③ Create a ward that focuses on looking after patients

⇒ Each item will be discussed on the sub group meeting

10

2. Concept of Facility Planning

2. Proximity of the related departments and shortened flow lines to support advanced medical care

- ① Compacting facilities
- ② Proximity of related functions
- ③ Vertical flow line planning for efficient transport

⇒ Each item will be discussed on the sub group meeting

11

2. Concept of Facility Planning

3. Realization of safe and secure medical environment

- ① Consideration for infection control
- ② Facility capable of providing medical care in the event of a major earthquake
- ③ Universal design

⇒ Each item will be discussed on the sub group meeting

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3. Request from the facility planning team

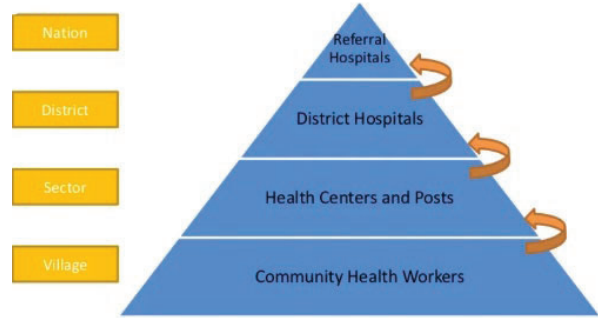
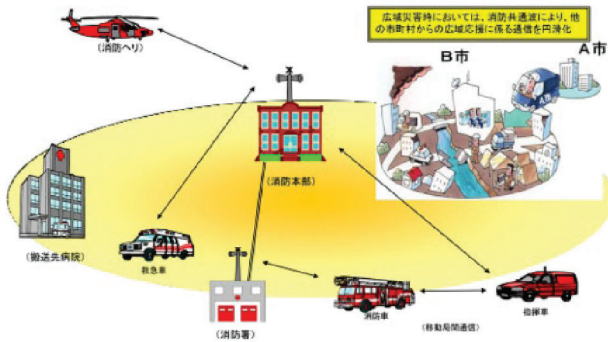
1. Setting of the subgroup web meeting for facility planning
2. Provision of the updated drawings of DPR plan
(CAD data is preferable)

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Hospital Management

Hospital Operation & Management points		Findings
Tertiary Medical care as medical college hospital in the community		Necessary for improvement of referral system and emergency medical system in the community
Overall hospital operation		
	Manuals and guidelines of overall hospital operation and management (infection control, workflow and so on)	Need for development of operational manuals and guidelines
	Support for formulating labor management manuals, organization, committee, etc.	Need for development organization structure, definition and role of committee
	Consideration for introduction of outsourcing or partial PPP	Lack of sufficient private medical service providers in Kohima
Department management		
	Scope of each department work and responsibility description	To be developed
	medical materials management (standardization of drugs and medical supplies, inventory control, 5S improvement, etc.)	To be developed

Hospital Management



10/9 Preparatory Survey on Nagaland Medical College Hospital Development Project

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Hospital Management

Focal point

< Hospital Operation >

- To operate system more efficiently it is important to clarify role and scope of work of each department in new teaching hospital.

< Referral Systems >

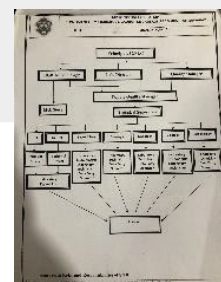
- To provide medical care to the entire region concerned, it is necessary to establish the referral system among medical institutions and improve the efficiency of hospital operations, such as reducing waiting times based on referral system

< Emergency Medical System >

- In order to prevent the concentration of patients in tertiary hospitals and to provide appropriate medical care to patients, it is essential to manage system for emergency patients in Kohima.

< Regulations and Guidelines on Hospital Management >

- Medical college standards by National Medical Commission



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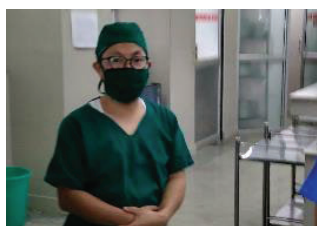
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Human Resource Development

■ Human Resource Deployment Plan

Information collected / surveyed

- Human resource deployment requirement for 100 admissions medical college (standards by the National Medical Commission)
- Lack of human resources at Naga Hospital Kohima, such as doctors. But some young doctors had good motivation to improve health status in Nagaland.
- Expansion of Naga Hospital Kohima are proceeding such as operation theatre being renovated.
- Possibility of reassignment of medical personnel from other medical institutions in Nagaland



Young doctor in anesthesiology, one of the short-staffed departments

10/9/2022



Hearing from female doctor at one of UPHC

Table: Number of Medical Personnel in Nagaland State

Medical personnel	Doctors (General)	Doctors (specialist)	Dental Doctors	Ayush Doctors	Pharmacist
Number	330	175	29	52	384
Medical personnel	Lab technician	Nurse Sister	Staff Nurse	ANM/ FHW	LHV
Number	106	99	572	845	59

Directorate of Economics & Statistics (2021), "Nagaland Statistical Handbook"

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Nagaland Medical College Hospital Development Project

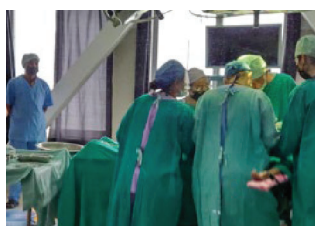
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Human Resource Development

■ Human resource development at Nagaland Medical College Kohima

Information collected / surveyed

- Naga Hospital Kohima are partly already performing educational functions such as accepting of nursing school students for training in hospital (E.x. Gastrointestinal surgery fields etc.).
- Naga Hospital Kohima have plan to hire specialists for departments that are to be established including urology and pediatric surgery.
- Some health institution in Nagaland have good human resource training system, which can be good sample or can cooperate in clinical training in project



Nursing students observing a stomach cancer surgery

10/9/2022



Open incubator at NICU



Reception of Christian Institute of Health Sciences and Research



Dialysis unit of Christian Institute of Health Sciences and Research

Preparatory Survey on
Nagaland Medical College Hospital Development Project

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Human Resource Development

Gender

Information collected / surveyed

- The ratio of female medical workers in Nagaland state is higher than the Indian national average
- In site survey, many female medical staff were observed.
- E.x. there are female doctor who returned to work as a PHC doctor after having experience practicing at a large hospital and then having a baby.

Table: Ratio of Female staff

Cadres	Nagaland State	India
Allopathic Doctors	18.8%	16.8%
Nurses and Midwives	88.2%	83.4%
Co-medical Staff	28.8%	27.3%

WHO(2016), "The health workforce in India"

India-Japan Medical Exchange Promotion

Information collected / surveyed

- Some university in Japan have interest in collaboration with medical institution in India



Naga Hospital Kohima's nurse

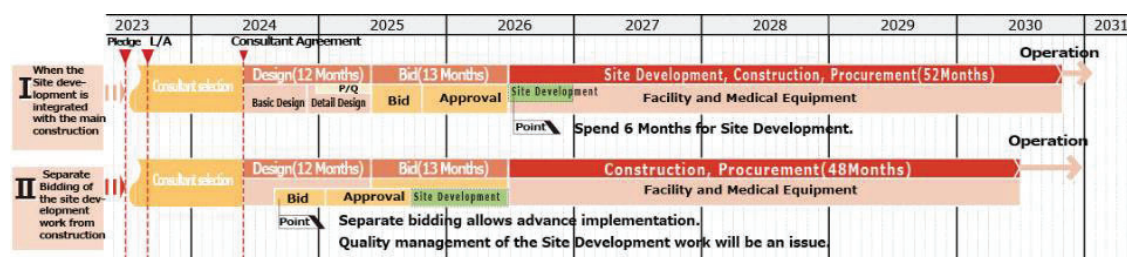
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Human Resource Development

~ an example of human resource deployment and development roadmap ~

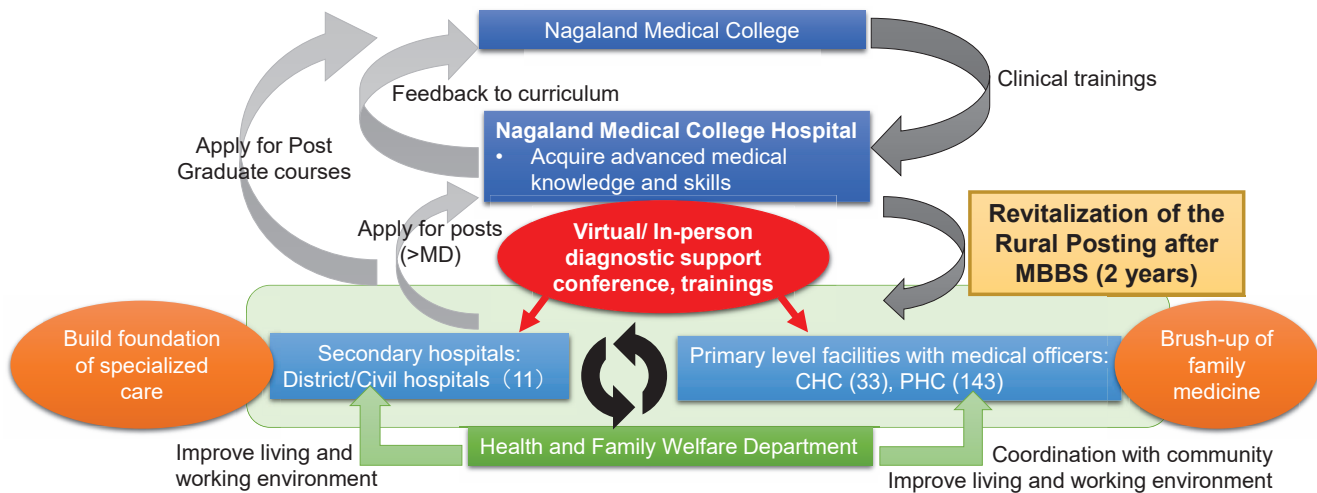


← example of the
Project Schedule

	2023~2028	2028~2029	2030~
Medical College	LoP 1 → Recognition First batch intake: 2023/24	Prepare to open post graduate course? First MBBS: 2029	Post graduate course
Teaching Hospital	NHK	NKH+150 maternal and child dept	550 beds (full scale)
Receive interns		From Nagaland Medical College Kohima	
Human Resources	Faculty: Recruited from out of the State 50 → 90 Tutor/ Sr. Residents 30 → 60		Within the State

Human Resource Development

~Preliminary Idea of Rotation Mechanism to Develop Well-balanced Medical Human Resources~



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Information and Communication Technology

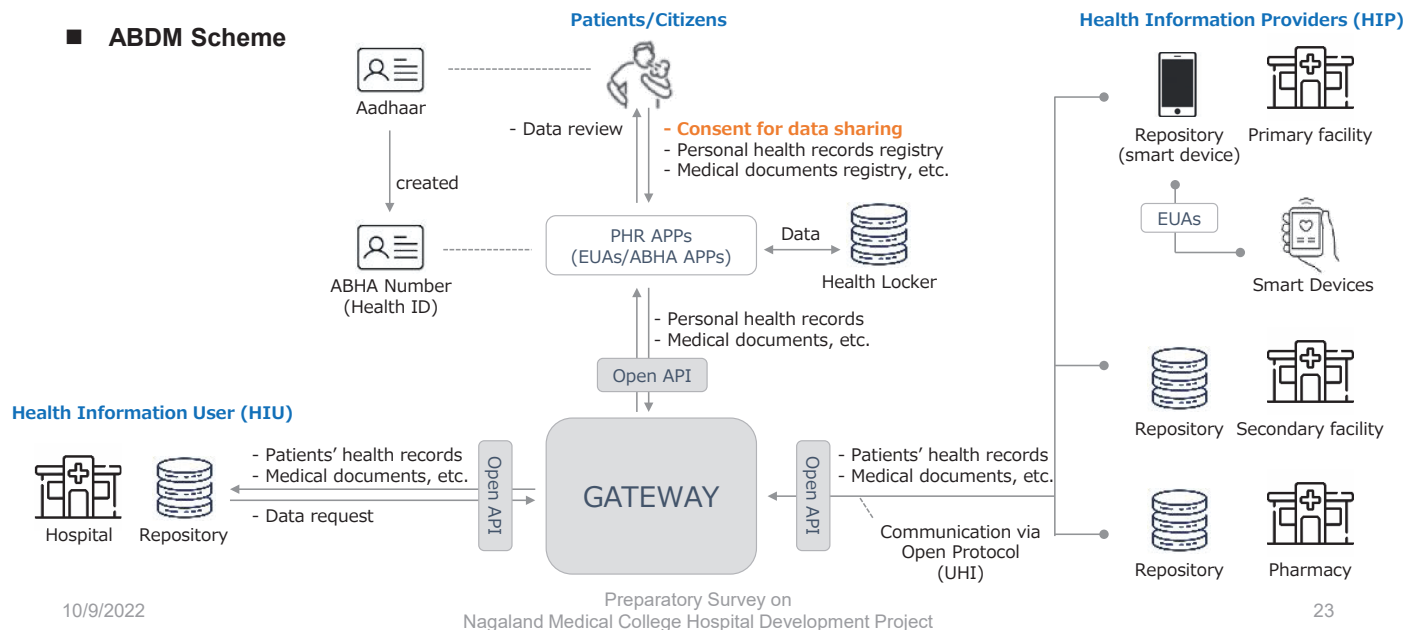
- Existing HMIS/HIS systems in Nagaland in line with National policies and programs.

1. GOI – NATIONAL LEVEL

The Ayushman Bharat Digital Mission (ABDM) aims to develop the backbone necessary to support the integrated digital health infrastructure of the country. It will bridge the existing gap amongst different stakeholders of the healthcare ecosystem through digital records, a unified health interface, end-user applications,

2. In Nagaland, NHP supported by World Bank has developed hospital information system modules (at present 5 common modules) through a qualified vendor/supplier and they are yet to be populated in various hospitals.
3. Strong regular and already streamlined NHM reporting systems for many NHM-supported operations like vaccines and other systems. (like all other states)
4. E-Sanjeevani started off in Nagaland (though connectivity and protocol issues are still challenging in Nagaland)

Information and Communication Technology



Information and Communication Technology

Challenges and issues in HMIS/HIS in Nagaland

1. Lack of IT eco system in Nagaland (meaning private and other large public sector IT organizations other than govt are not many)
2. Long gestation period for projects in Nagaland in every sector including IT infrastructure and services (example of NHP – modules)
3. At present the internet connectivity issues in CHO, PHC and even at CHC level.
4. Ever unresolved issue of clinicians entering the diagnostic data and online prescriptions on complaint like heavy workload:

Information and Communication Technology

■ Emerging fast positive scenarios and possible solutions (1/2)

1. Fast emerging ABDM complaint software's in the public and private sectors (ABDM compliance is mandatory now)
2. Big move towards cloud-based software's/installation eliminates the need for servers/local area networks and maintenance issues.
3. Launching of 5G network by the major telecom carriers with a promise to connect most of the villages/cities by the 2023 end. Operationalization of satellite internet by AIRTEL-oneweb and starlinks by the beginning of 2023 offering to provide assured broadband in any part of India at a reasonable cost.
4. Possibility to get service/training/operational support through tele-support with the 5G connectivity, thereby reducing the dependency on the physical presence of staff in hospitals remote or otherwise.

10/9/2022

Preparatory Survey on
Nagaland Medical College Hospital Development Project

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Information and Communication Technology

■ Emerging fast positive scenarios and possible solutions (2/2)

5. Higher spread and acceptance of customizable E-health of national informatics centre (GOI)
6. Readily available private software for HIS which are cost-effective and less complicated for support matters unlike the public sector NIC, CDAC and others whose technical support is weak.
7. Example of successful collaborations and implementation of HIS in CIHSR, Dimapur (all the modules required for operations medical records are working and will be fully operational in the next 2 to 3 months)
8. Choice of eHealth, private software, CIHSR models are ready options.
9. Final recommendations will be submitted by January after reverifying all the above issues and learning also from other state's lessons.

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Preparatory Survey on
Nagaland Medical College Hospital Development Project

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Environmental and Social Consideration 1/3

■ Biomedical wastes

- How Biomedical wastes, sewage water, and water are treated?
 - Any provision in the proposed hospital plan to have inhouse Biomedical waste management/ treatment facility?
 - Any provision in the proposed hospital plan to have inhouse Sewage/ Effluent Treatment facility?
 - Any provision in the proposed hospital plan to have water Treatment facility?

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Environmental and Social Consideration 2/3

■ Land acquisition

- Land acquisition is still on the way.
 - Acquired Land (Compensated): 40.251 acres
 - Land Yet to Acquire (Additional Area): 70.274 acres
 - Total Site Area: 110.525 acres
- Land use certificates depicts 50.251 acres and 12.70 acres [Total = 62.951 acres] registered in the name of Naga Hospital Authority.

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Environmental and Social Consideration 3/3

- Land acquisition process and Land use certificate should be clarified in detail.
 - How much percentage of the project site was privately owned?
 - Was land acquisition by the Govt. done as per “The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act 2013?
 - Were there any resettlement and rehabilitation required during land acquisition of ‘acquired land’ and “land yet to be acquired’?

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The Way Forward

- Continuous information collection by the Support Team
- Field Survey 1-2 (2nd batch)
 - 3 – 7 Oct: Geology, Topography and Climate Conditions
 - 10 – 14 Oct: Medical Equipment
- Field Survey 1-3 (3rd batch)
 - Early Nov: Facility Planning, Human Resource Development
- Interim Report: End of November 2022
- Discussion on the Interim Report and the way forward: January 2023
- Draft Final Report: April 2023

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Minutes of Meeting

Subject	ITR meeting
Date & Time	19 th January 2023, 13:00 p.m. (IST)
Location	NHP conference room, DHFW, Kohima, Nagaland
Participants	As attached in last page
Documents	♦ PPT on the ITR discussions ♦ ITR in PDF through e-mail on 17 January 2023

1. Opening Remark

- The meeting was opened by Commissioner and Secretary Health, Y. Kikheto Sema, IAS. The main points he mentioned was as follows:
 - (1) Nagaland is facing infrastructural challenge because of topographic situation here, and health is one of this challenge. There is no medical college established in Nagaland until now.
 - (2) He joined in DHFW in September. He spent most of his career in finance department.
 - (3) Having medical college in Nagaland was long-standing desire for Nagaland. In 15th finance commission¹, Nagaland government requested for establishment of medical college to central government, and central government accepted the request. However, because of several challenge such as land holding system, geographical instability, establishment have not been realized. But since the project will be implemented by JICA, he appreciates for JICA as representative of Nagaland government and he doesn't worry about anything on the project.

2. Outline of the interim report

- Team Leader of JICA Survey Team, Ms. Keiko Nagai presented outline and contents of interim report.

3. Discussions on Facility Planning

- Deputy Team Leader of JICA Survey Team, Mr. Kohei Nishikawa explained on facility planning with using PDF material.
- Opinions shared by Director cum Dean, NIMSR, Dr Soumya Chakraborty is as follows:
 - (1) As per NMC, Rehabilitation is now termed as “Physical Medicine and Rehabilitation (PMR)”. It should have minimum of 10 beds, and it will be helpful to both students and patients if it is closer to Orthopedic department. Emergency Unit/ward is now named “Emergency Medicine Department” and required 30 beds, and the plan is fulfilling the request. The total bed requirement is fulfilling.
 - (2) As per NMC, every surgical specialty should have at least one well equipped minor OT attached to it. i.e., Surgery, Orthopedic, Eye and ENT each should have a minor OT of its own, and the number of OT planned seems to be meeting the number of required surgical specialty.
 - (3) Dialysis department, at minimum 10 beds (some beds for isolation/infectious patients), and decontamination zone also required. Endoscopy unit is also required. →The consultant will

¹ It seems have been held in 2017

- reconsider the plan.
- (4) Provision of helipad, drone facility and ramps should be considered. The priority of drone may be lower. →The ramp is not required according to the building code, but the consultant will examine the plan and cost.
 - (5) Nagaland side concerns the height of the building, whether it is technically possible in Kohima.
- The location and layout of building was agreed with Nagaland side as follows:
 - (6) Location will be decided after clarification of permission for high rise building in Kohima.
 - (7) It also depends on the result of Geological Survey.

4. Discussion on Project Implementation Structure

- Ms. Nagai explained on project implementation structure with utilizing PPT material.
- With referring to Ms. Nagai's explanation, Joint Director, Dr. Kikameren Longkumer mentioned importance and usefulness of a sort of umbrella organization for external funded projects which is learnt during Assam visit on 17 January. In Assam, the society, which consists of member even other than governmental officer, works for PMU and mainly in charge of documentation and coordination. For example, DPR, which should be finalized by the local government side after submission of the final report by the JICA Survey Team, was finalized by this society in Assam. Dr. Kika noticed that this practical organization is key that Assam succeed to have received more fund than Nagaland from various international organization.
- Commissioner & Secretary Y. Kikheto Sema, IAS agreed on seeking help for documentation work with explaining that most of the Nagaland people are not comfortable of making report because of cultural background. Other opinion raised is as follows:
 - (1) Regarding idea of the society and including other than governmental officer for implementation body, since this is not so big project, we can start from small with only member from the secretariat and DHFW in first stage and expansion can be considered.
 - (2) NGO people can be included in implementation body such like PMU for technical point of view, however main PMU member should be officer from DHFW or Nagaland Medical College i.e. governmental officer. This is because of accessibility to government decision process.
 - (3) There is some more time to discuss and finalize structure and contents of PMU.

5. Discussion on Medical Equipment

- Mr. Tsutomu Nozaki and Mr. Dai Fujita from JICA Survey Team explained on medical equipment plan and procurement with utilizing PPT material. The opinion as follows were raised:
 - (1) DHFW and Survey team need to discuss and agree whether JICA guideline or another guideline to be applied for procurement.
 - (2) For employment of Bio Medical Engineers (BME), direct employment (in house) is more favorable than contracting with third party.
 - (3) The Nagaland government requested that medical equipment related to dialysis treatment and

endoscopic examination and diagnosis, which had not been included in the medical service plan for the new hospital, be included.

6. Discussion on Soft Component

- Ms. Nagai explained on soft component idea with utilizing PPT material.

7. The way forward

- Ms. Nagai explained following steps with schedule.

8. Closing remark

- Commissioner & Secretary Y. Kikheto Sema, IAS asked Dr. Kika and participants of the meeting to request him any task necessary for completion of this survey and preparation for the project. He mentioned the importance of clarification of each party's responsibility.
- Dr. Kika asked Ms. Aditi for necessary procedure in case the project cost estimation to be increased than estimated before. Ms. Aditi responded that there is no problem of increasing the project cost estimation with mentioning that this project is most prioritized yen loan project in India. JICA can consider once they receive revised cost estimation.

MEETING ATTENDANCE SHEETDate: 19th January 23, 2023

Time: 1:00 p.m. IST

Venue: NHP hall, DHFW

Name	Designation
Y. Kikheto Sema, IAS	Commissioner & Secretary, DHFW
Dr. M.C. Longai	Deputy Director, DHFW
Dr. John Kemp	Deputy Director, DHFW
Er. Moanaro Longkumer	Executive Engineer (MED), DHFW
Lilly Ezung	Technical Consultant, NIMSR
Prof. Dir. Dr. Soumya Chakraborty	Director cum Dean, NIMSR
Dr. Kikameren Longkumer	Jt. Director, DHFW
Dr. Vibeituonuo Mepfuo	Director (HEALTH), DHFW
Dr. J. Hokugha Sema	Deputy Director, DHFW
Dr. Khushiku	Deputy Director, DHFW
Dr. Sendimeren Aonok	M.S. NHAK
Shusaku Takada	JICA India office
Aditi Puri	JICA India office
Keiko Nagai	Team leader, JICA survey team
Yukari Oshima	JICA survey team
Hidenori Mochizuki	JICA survey team
Dr Ranganayakulu Bodavala	JICA survey team
Dai Fujita	JICA survey team
Tatsuya Matsuoka	JICA survey team
Kiron Moni Singh	JICA survey team
Sotisula Imkong	JICA survey team
Temjenyuba	JICA survey team
Minoru Matsunoshita	JICA headquarter (on line)
Rei Sagawa	JICA headquarter (on line)
Kohei Nishikawa	JICA survey team (on line)
Yuka Kobayashi	JICA survey team (on line)
Norikazu Kameda	JICA survey team (on line)
Rang Emei	JICA survey team (on line)
Hiroshi Abo	JICA survey team (on line)
Ikuro Mitsumoto	JICA survey team (on line)
Junko Yamada	JICA survey team (on line)
Kanako Miyoshi	JICA survey team (on line)
Tamotsu Nozaki	JICA survey team (on line)
Yoshihisa Yamazaki	JICA survey team (on line)
Kanako Miyoshi	JICA survey team (on line)

Preparatory Survey on Nagaland Medical College Hospital Development Project

19 January 2023
Discussion on the Interim Report

Agenda

1. Opening Remarks
2. Outline of the Interim Report
3. Discussions on the Important Topics
 - a. Facility Plan
 - b. Project Implementing Structure
 - c. Medical Equipment Plan
 - d. Soft Component
4. The Way Forward
5. Closing Remarks

2. Outline of the Interim Report

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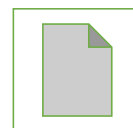
Contents of the Interim Report

Chapter 1	Introduction	• Background and rationale of the Project • Outline and scope of the Project • Progress and the way forward of the Survey	Chapter 7	ICT Planning	• Current situation of health ICT • Preliminary proposal on hospital management system and telemedicine
Chapter 2	Human Resource for Health	• Current situation of medical human resources • Preliminary proposal on medical human resource development	Chapter 8	Preliminary Proposal on Technical Assistance	
Chapter 3	Overview of the Project Site	• Social condition and land acquisition status • Geological, topographical, and climate conditions	Chapter 9	Environmental and Social Consideration	• Results of the field reconnaissance • Proposed Project Components Subject to Environmental and Social Impacts • Implementation System and Legal Framework for Environmental and Social Considerations • Alternative Study • Scoping and Terms of Reference (ToR) for Environmental and Social Consideration Study • Impact Assessment • Mitigation Measures • Implementation Structure of Environmental Management Plan
Chapter 4	Facility Planning	• Current situation of the site, existing buildings, services • Preliminary design • Proposed layout plan and section zoning • Construction regulations and restrictions • Facility planning Considerations for natural disasters and gender			
Chapter 5	Medical Equipment Planning	• Current Situation of medical equipment and maintenance capacity • Preliminary proposal on medical equipment	Chapter 10	Project Implementation	• Proposed project implementing structure
Chapter 6	Hospital Management	• Current situation of hospital operation • Preliminary proposal on hospital management • Examples of hospital management in Japan	Chapter 11	Project Cost Estimate	• Analysis of DPR
			Chapter 12	Health Finance, Financial and Economic Analysis	• Current situation of health finance • Methodology of financial and economic analysis
			Chapter 13	Project Evaluation	• Operation and Effect Indicators • Qualitative Effects

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3. Discussions on Important Points

3a. Facility Planning



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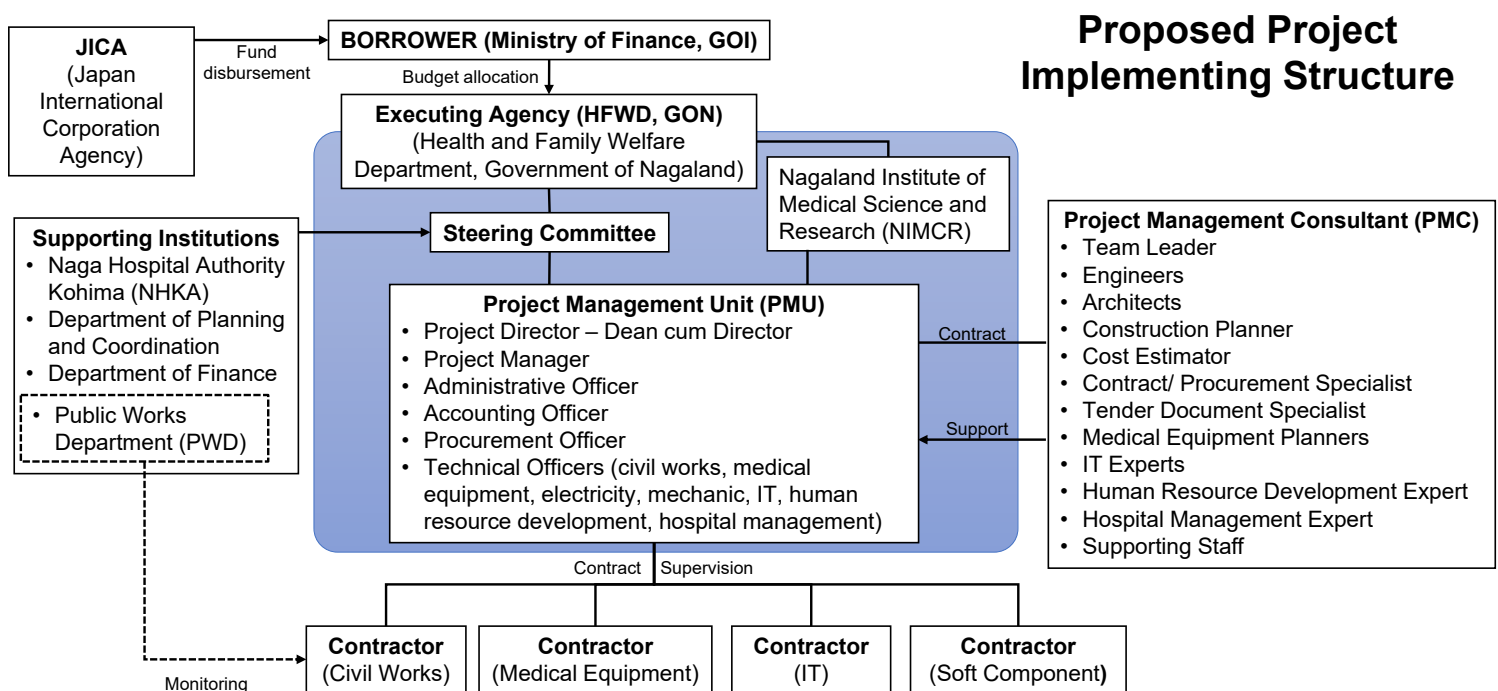


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3. Discussions on Important Points

3b. Project Implementing Structure

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Proposed Members of the Steering Committee

Institutions	Proposed Members
HFWD	- Commissioner and Secretary Health: Chair - Principal Director - Joint Director in-charge - Director of Hospital and Medical Education - Executive Engineer
NIMSR	- Dean cum Director: Co-chair - Medical Superintendent
NHAK	- Director - Medical Superintendent
Department of Public Works	Chief Engineer
Department of Finance	Finance Commissioner
Department of Planning and Coordination	Additional Development Commissioner

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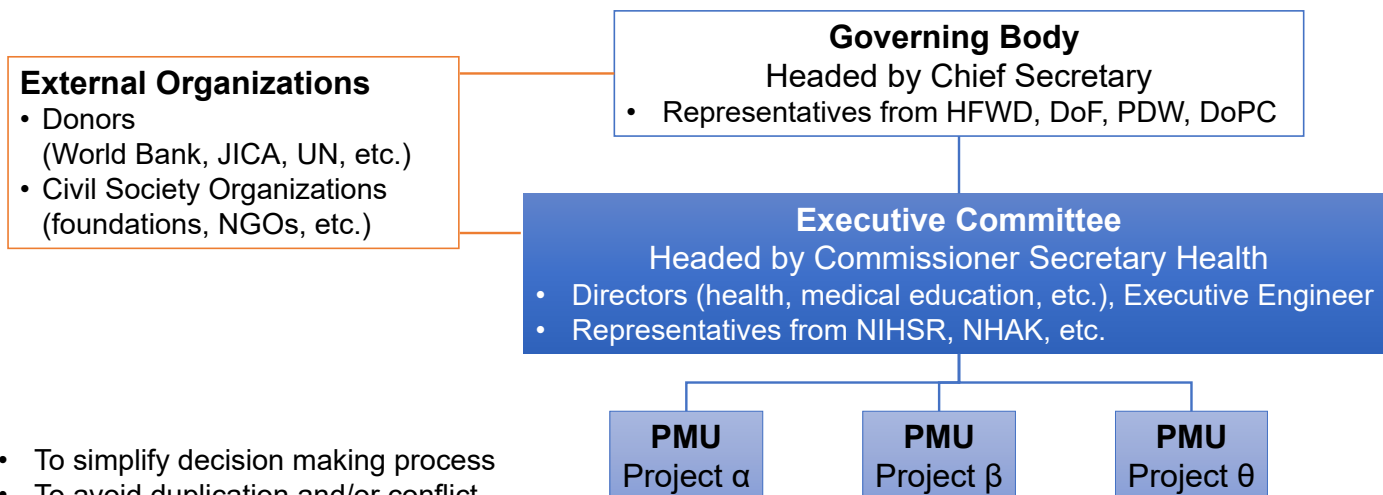


Roles of Each Organizations

Organization	Major Roles
Steering Committee (SC)	- Coordination among the concerned agencies for smooth and efficient implementation of the Project - Monitoring of progress and implementation status of the Project - Authorization of important plans and reports submitted by PMU
Project Management Unit (PMU)	- Responsible for overall project management including tendering, procurement, and supervision of the contractors - Preparation of plans, reports, and documents - Daily decision making for smooth project implementation
Project Management Consultant (PMC)	Providing consulting services to assist PMU for project management

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Ref: Umbrella Organization for Externally Funded Projects



- To simplify decision making process
- To avoid duplication and/or conflict
- To supplement each other toward entire goal
- To promote synergy

Reference: Assam Medical Infrastructure Development and Management Society
<https://ahidms.assam.gov.in/about-us/organisation-chart>

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3. Discussions on Important Points

3c. Medical Equipment Planning

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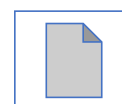
Work processes of the Medical Equipment Planning

- (1) As of December 2022.
- 1) Receive the list of equipment with prices required for the new hospital (In October 2022).
- 2) Coordinate the functions of the 'Medical College Hospital', taking into account the functions of the existing 'Kohima Hospital' and the 'Maternity and Child Healthcare Building'
 - Neurology is not required in New Hospital.
 - Oncology is not required in New Hospital.
 - Endoscopy unit is not required in New Hospital.
 - Radiation Therapy Department is not required in New Hospital.
 - Dialysis Department is not required in New Hospital.

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Work processes of the Medical Equipment Planning

- (2) Work to be started after January 2023
- Based on the mutual consensus between the Government of Nagaland and the Survey Team related to the facility planning has been reached, the Survey Team will be finalised the current medical equipment list with prices for getting final confirmation by the Government of Nagaland .



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Introduction of Japanese Manufacturers

Medical Equipment	Japanese Manufactures
CT scanner	• FUJIFILM* • Canon
MRI	• FUJIFILM* • Canon
X-ray machine	• FUJIFILM* • Shimazu Corporation*
Flat panel detector	• FUJIFILM* • Konica Minolta*
Mobile X-ray machine	• Shimazu Corporation* • FUJIFILM* • Konica Minolta*
Ultrasound machine	• FUJIFILM* • Canon
Endoscopy	• Olympus* • FUJIFILM* • Hoya
Laboratory equipment	• Sysmex*

*Participating in the Technical Seminar on 20th Jan.

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3. Discussions on Important Points

3d. Soft Component Proposal

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What is “Soft Component”?

- Technical assistance for capacity development
- To be implemented as a part of the Project
- Aiming to enhance effectiveness and sustainability of the Project in close combination with facility and equipment development through development of;
 - Comprehensive medical human resource development system,
 - Capacity of staff for proper medical equipment operation,
 - Capacity of staff for IT utilization and security,
 - Hospital management structure and operating system, etc.

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Proposed Soft Component Activities 1/2

Sub-components	Objectives	Proposed Activities	Targets
Medical Human Resource Development	To develop comprehensive medical human resource development system	• Revitalization of rural posting system • Study visits to Japan on medical human resource development in teaching hospital • Development of distance technical support system among primary, secondary and tertiary health facilities (in collaboration with 10-bedded ICU project, PG and BSc Nursing courses in district hospitals, etc.) • Development of clinical training curriculum for the medical college hospital	• HFWD officers • NIMSR faculties • NHAK
Operation and Maintenance of Medical Equipment	To strengthen capacity for preventive maintenance of users of major medical equipment	• Study visits to Japan on sustainable operation and maintenance of medical equipment • Development of guidelines on preventive daily operation and maintenance for users of the major medical equipment • Training on preventive maintenance by the developed guidelines	• Users of the medical equipment

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Proposed Soft Component Activities 2/2

Sub-components	Objectives	Proposed Activities	Targets
IT	To strengthen IT literacy	- Study visits to other state on advanced e-health, hospital management information system, and eSanjavni - Development of IT user training programme (incl. pilot training)	IT engineers of NHAK and NIMSR
Hospital Management	To develop management system of the medical college hospital	- Study visits to Japan on hospital management, disaster health management (preparedness in a hospital, mobile team, etc.), and regional medical service collaboration system - Development of management structure of the medical college hospital (organization chart, operation plan, etc. of each department) - Development of a training programme on disaster management and response training for hospital staff (incl. pilot trainings)	- Managers and administrative officers of NHAK and NIMSR - NIMSR faculties

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4. The Way Forward

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Next Steps

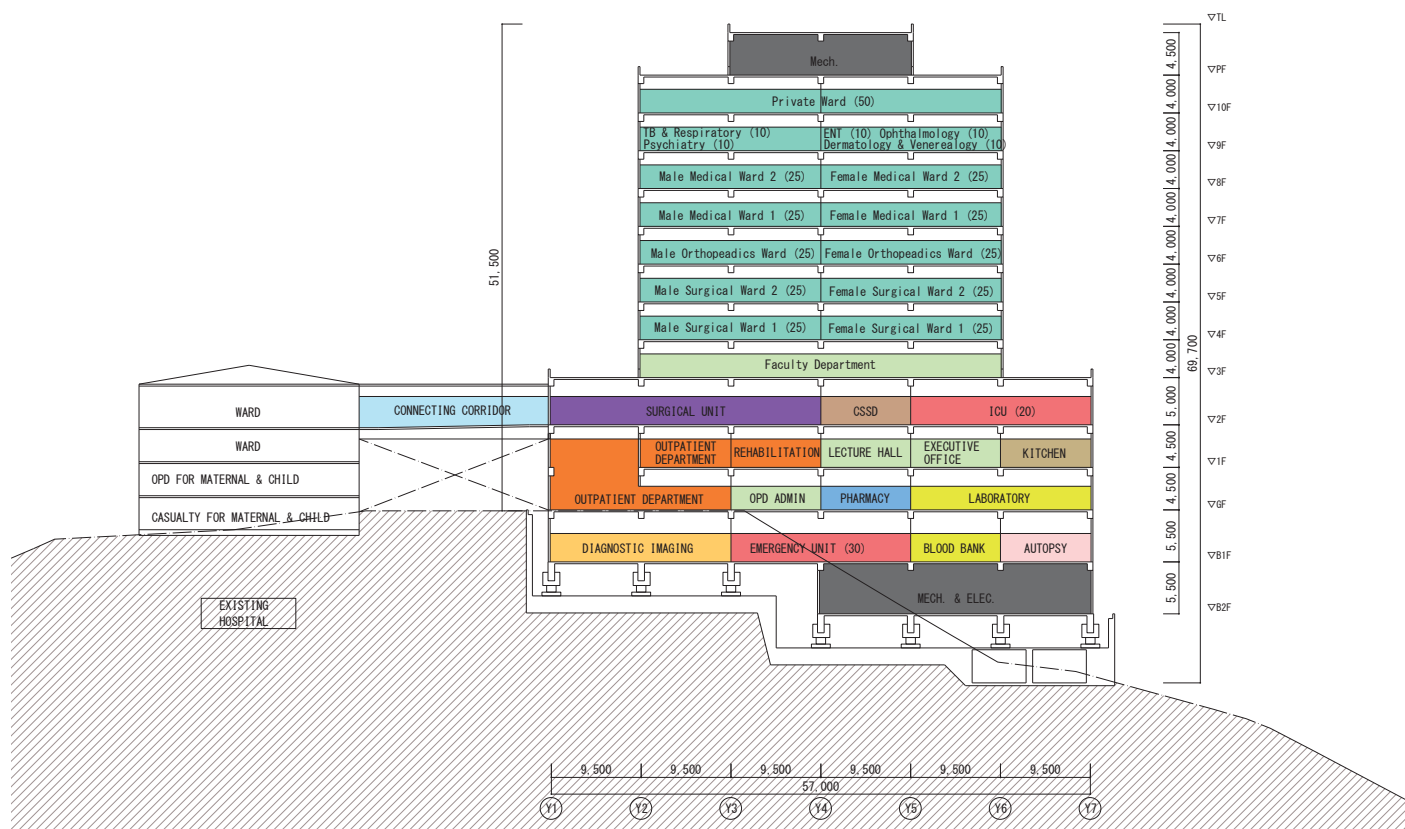
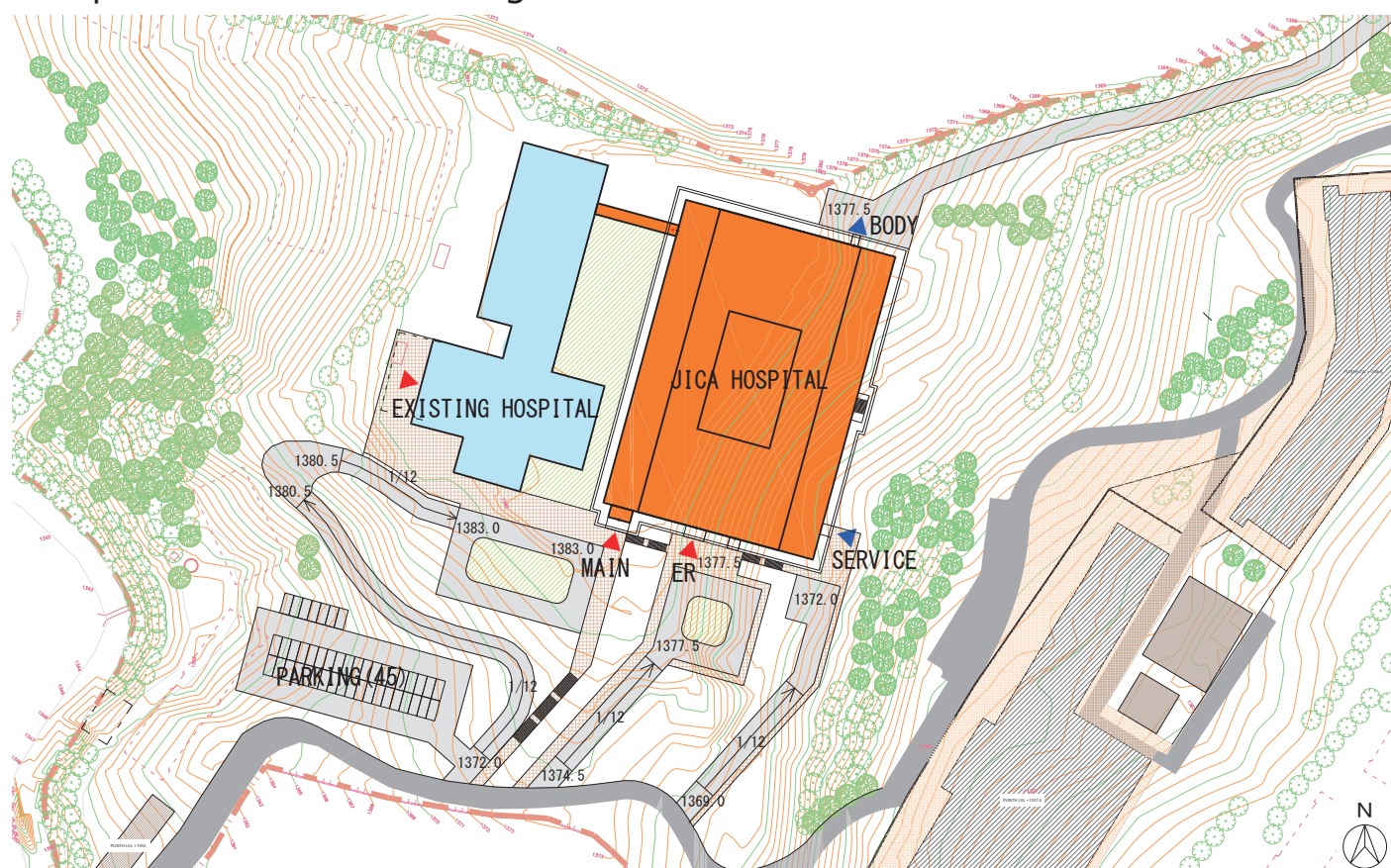
From now on	Additional information collection and continuous discussion on:	
	- Facility planning - Medical equipment planning - IT planning	- Project cost estimate - Economic and financial analysis - Health system overview - Human resource deployment plan
February and March 2023	- Subcontracted survey on environmental and social consideration - Subcontracted survey on geological and topographical condition <i>JICA HQ Fact Finding Mission (tentative)</i>	
End of April 2023	Draft Final Report consisting of: - Facility, medical equipment, and IT plans - Soft component proposal - Project cost estimate - Project implementation plan and implementing structure and schedule - Results of economic and financial analysis, as well as environmental and social consideration survey etc.	
May 2023	<i>JICA HQ Appraisal mission (tentative)</i>	
September 2023 and after	<i>Final Report will be submitted.</i> <i>Loan Agreement will be signed.</i>	

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Thank You

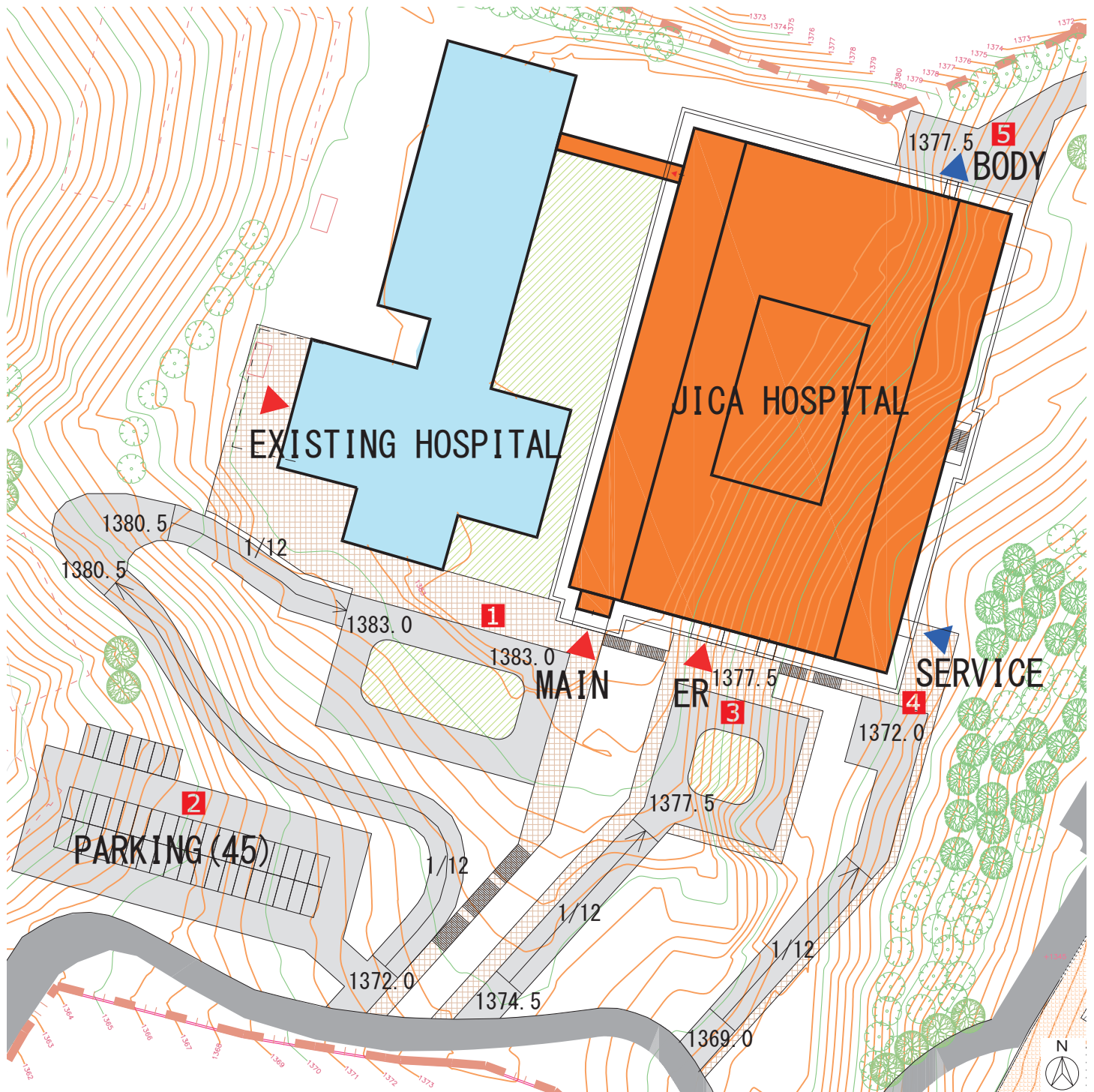


Site plan and Section Zoning



- Total floor area : Approx.44,320 m², Coverage floor area : Approx. 4,480 m²
- Story : 11 stories + penthouse + 2 basement
- Total height : Approx. 51.5m (Lower side), Approx. 69.7 m (Higher side)
- Number of beds: 400 beds
- Structure : Reinforced concrete with seismic isolation

Landscape plan



- 1 Main Driveway**
 - The driveway is spacious so that multiple buses (municipal service and shuttle service etc.) can stop.
 - Canopy is set so that visitors can access to main entrance without umbrella when raining.
- 2 Parking**
 - 45 parking lots on the ground.
- 3 Emergency entrance**
 - Ambulance stop space is secured in front of the emergency entrance.
 - Access flow line to Emergency department is definitely separated from other flow lines.
- 4 Service entrance**
 - Service truck parking space is secured in front of the service entrance.
 - Pharmacy, consumables and food ingredients are carried-in from this entrance.
- 5 Body exit**
 - Bodies are carried out from this entrance.

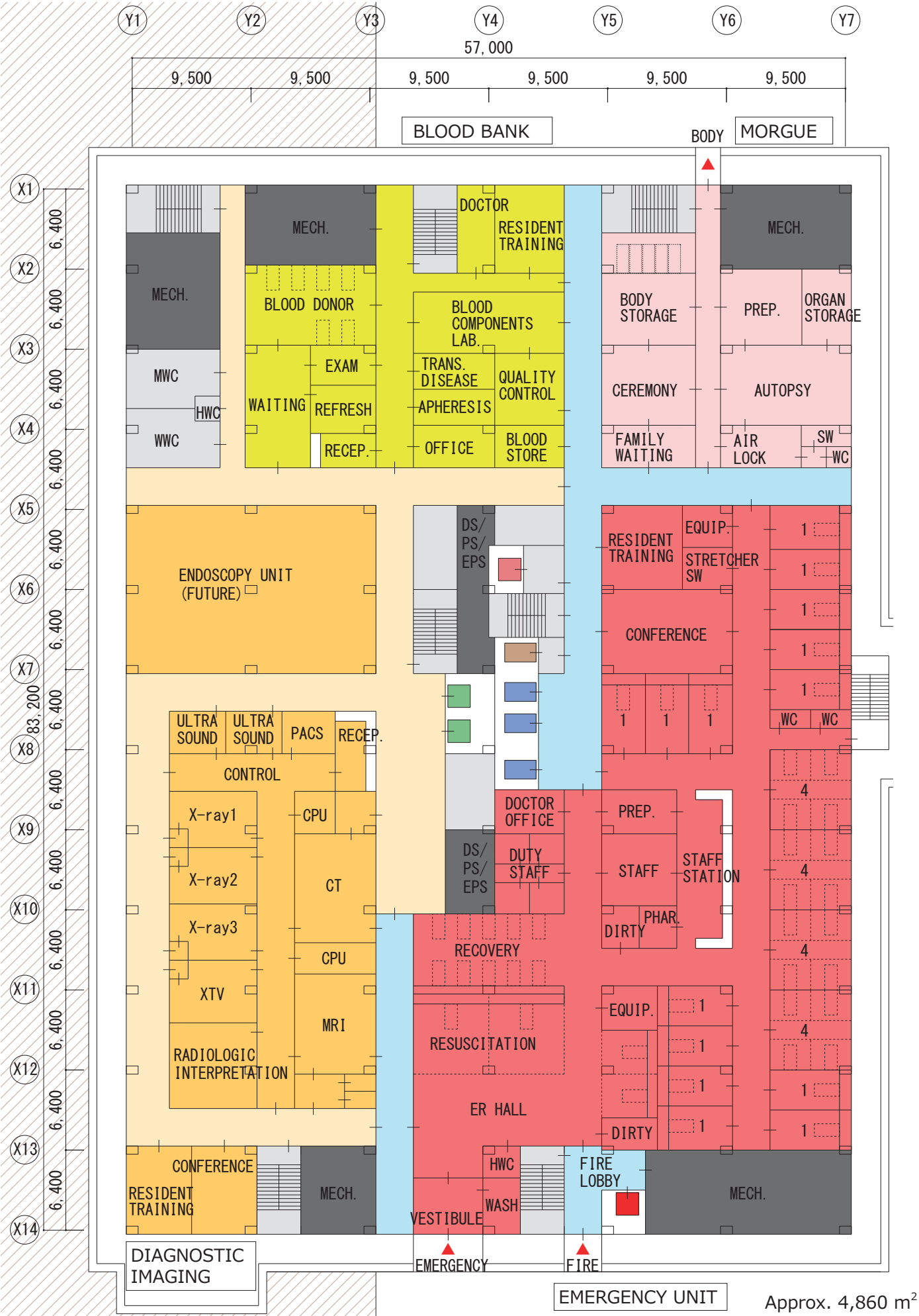
Nagaland Medical College Hospital Development Project

Demarcation between the Existing Hospital and JICA Hospital

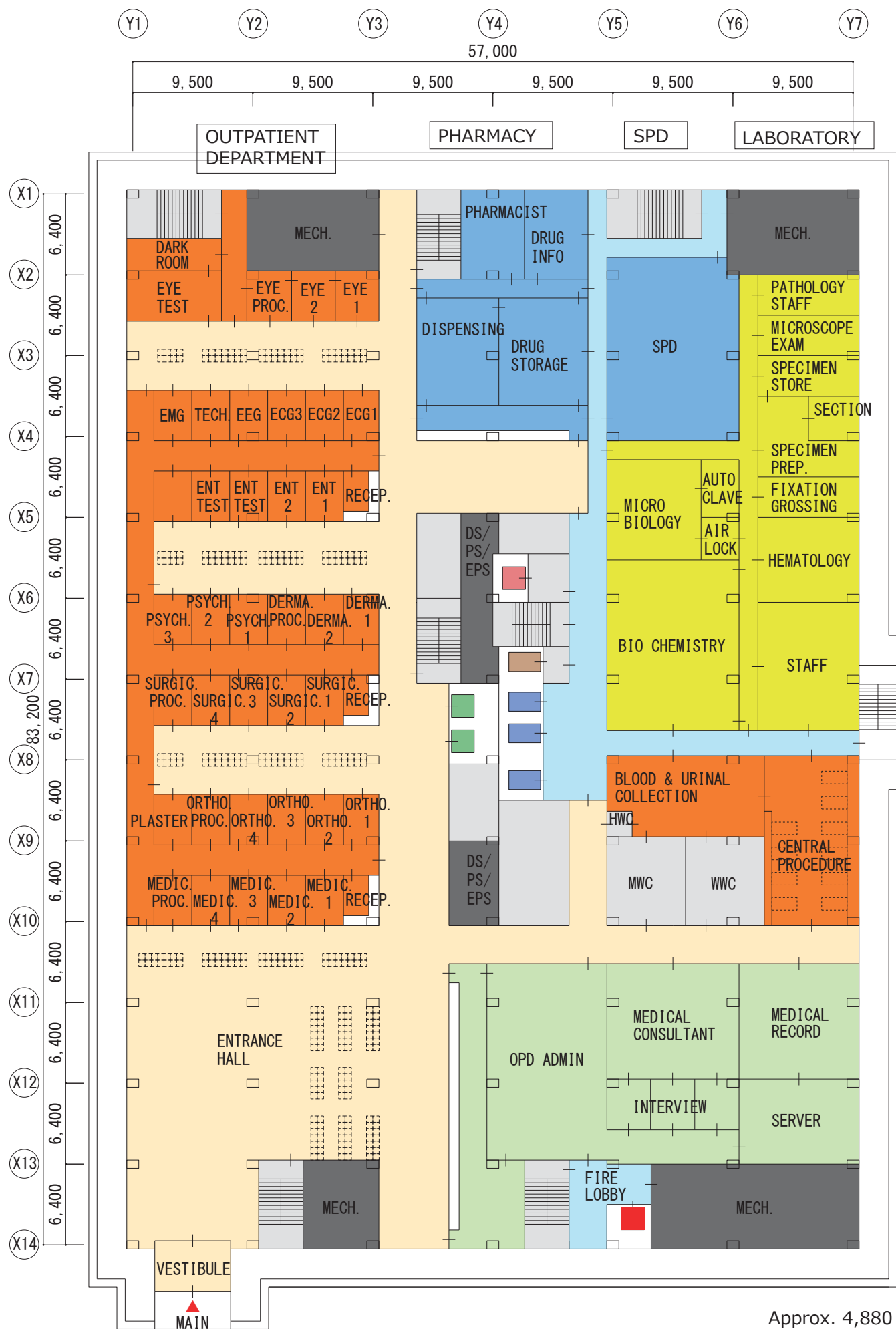
Existing Maternal and Child Hospital	JICA Hospital
Ward	
Obstetrics 50 beds Pediatrics 50 beds NICU	General Medicine Male 50 beds General Medicine Female 50 beds General Surgery Male 50 beds General Surgery Female 50 beds Orthopedics Male 25 beds Orthopedics Female 25 beds Ophthalmology 10 beds ENT 10 beds TB & Respiratory 10 beds Dermatology & Venereology 10 beds Psychiatry 10 beds Emergency ward 30 beds ICU 20 beds Private ward 50 beds
Total number of beds : 100	Total number of beds : 400
Clinical Department	
Outpatient Department for Maternal and Child Casualty for Maternal and Child Dialysis (Future)	Outpatient Department Emergency Unit Diagnostic Imaging Department Laboratory Blood Bank Surgical Unit Rehabilitation Endoscopy Unit (Future)
Service Department	
	CSSD Medical Engineering Pharmacy SPD Kitchen Laundry Morgue
Administration	
	OPD Administration Executive office Doctor office Main Locker
Education	
	Lecture room Conference rooms Library

Nagaland Medical College Hospital Development Project

Basement Floor -1



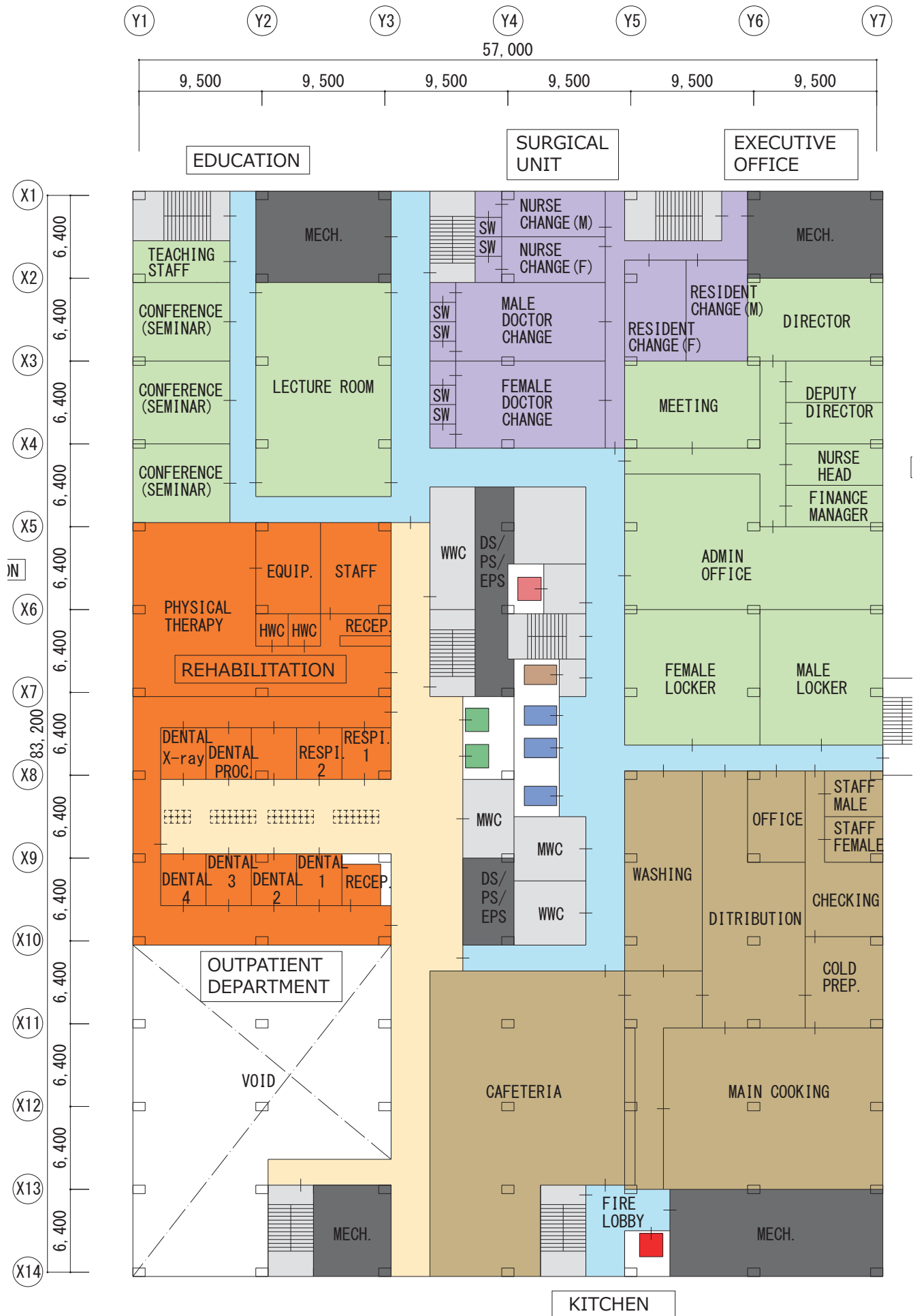
Ground Floor



Approx. 4,880 m²

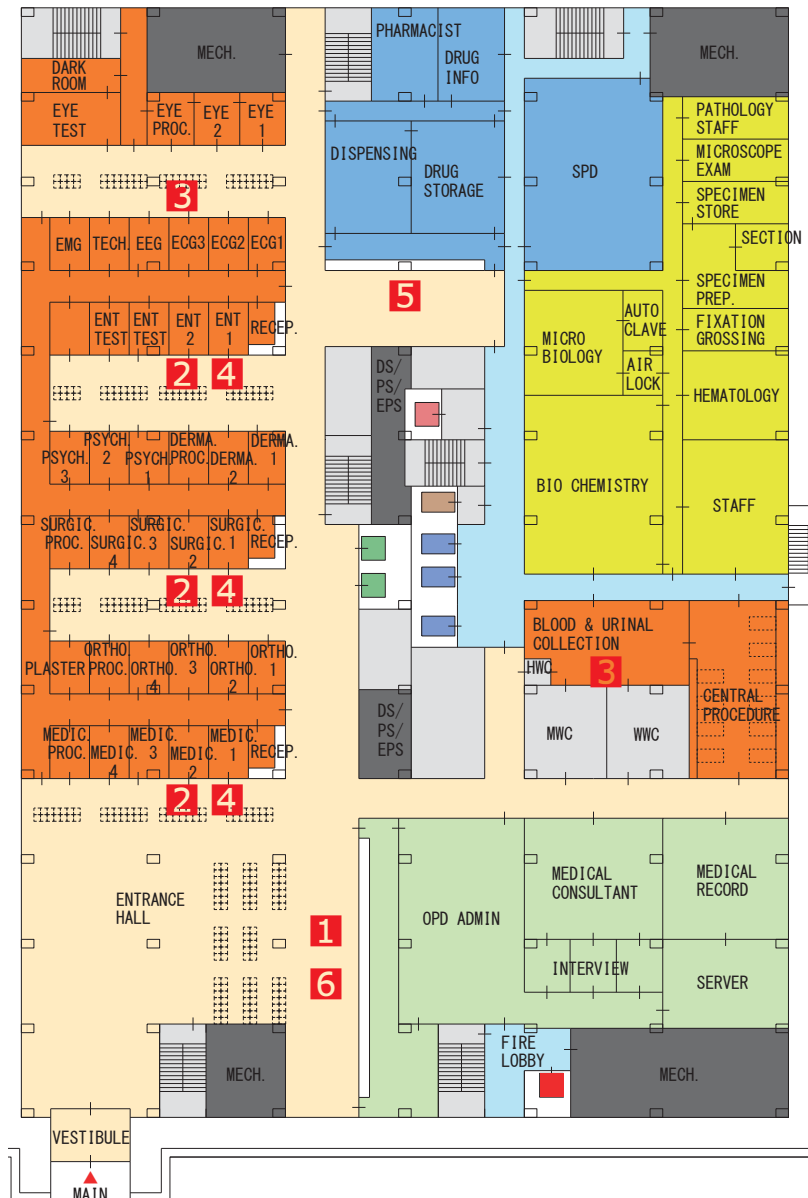
Nagaland Medical College Hospital Development Project

First Floor



Approx. 4,440 m²

Outpatient Department (Ground floor)



Mainly Proposed Rooms

1. Examination rooms (Ground floor)
 - General Medicine, General Surgery, Orthopedics, Dermatology, ENT, Ophthalmology, Psychiatry
 - Approx. 3.0m width × 4.0m depth.
 - Each room is connecting to Staff corridor, which makes it easier for medical staff to move around without facing with patients.
2. Physiological Laboratory
 - ECG (Electrocardiogram), EEG
 - EMG (Electromyogram)
3. Urine & Blood Sample room
 - Toilets are adjacent to this room so as to carry specimen easily.
 - Biochemistry room is adjacent to this room so as to examine specimen rapidly.
4. Central Procedure room
 - IV (intravenous) is conducted in this room. 10 beds are prepared.
5. OPD administration
 - Medical record is adjacent to this area so as to reduce staff's moving distance.
6. Medical Consultant
 - Administration support for hospitalization and discharge etc. are conducted in this room.

Confirmation of the Patients Flow

- 1 Reception**
 - Patients are registered and introduced to each clinical departments in accordance with the recommendation letter's information or the symptoms
- 2 Examination**
 - Doctors examine patients, then order medical check-ups.
- 3 Check-up**
 - Patients move to the concerned departments (Urine & Blood sampling, Physiological laboratory and Diagnostic Imaging etc.) in accordance with the check-up orders.
- 4 Diagnosis**
 - After check-ups, Doctors conclude diagnosis, then examine patients again.
 - Doctors issue the prescription.
- 5 Pharmacy**
 - Patients receive medicine in accordance with the prescription.
- 6 Accounting**
 - If required, patients make the payment at the Reception.



Image of Examination room

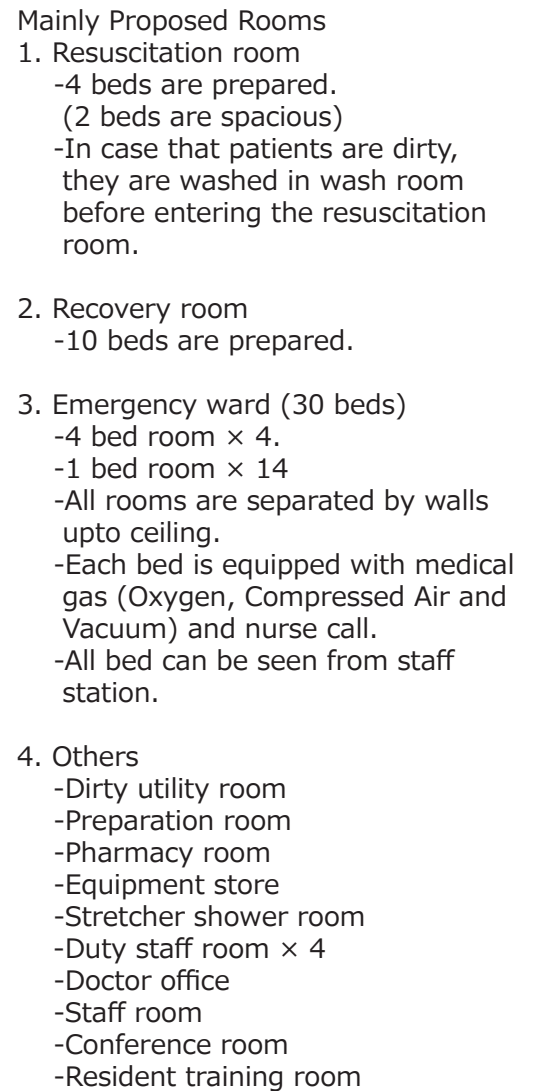
Outpatient Department (First floor)



- Diagnostic Imaging Department (Basement floor -1)



- 7

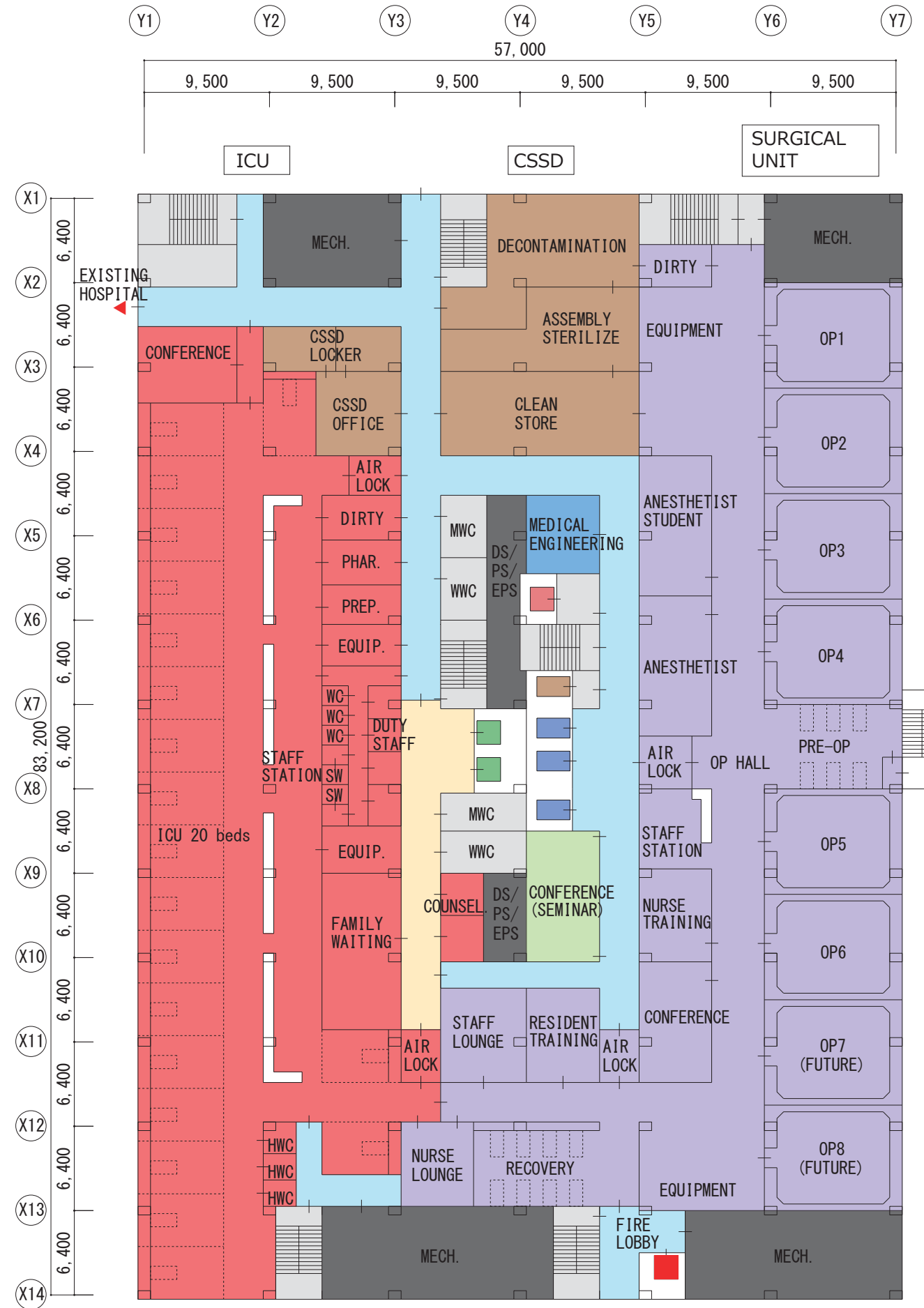


Confirmation of the Emergency Patients Flow

- 9

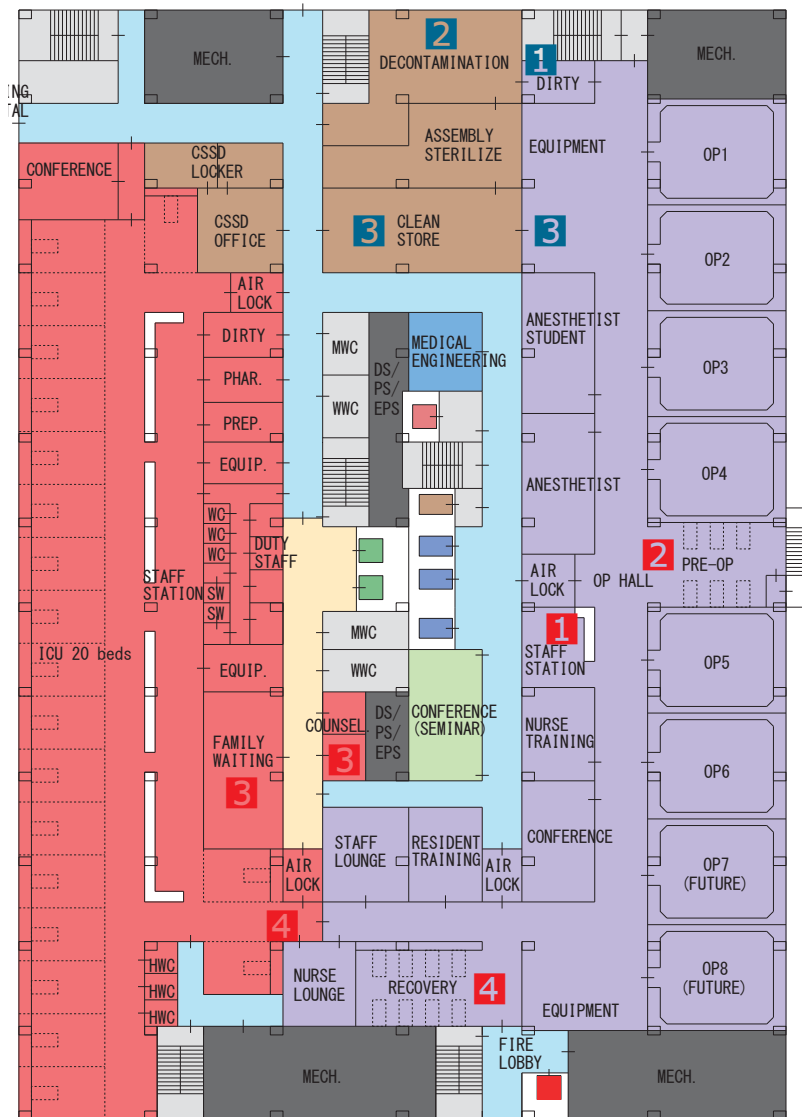
Nagaland Medical College Hospital Development Project

Second Floor



Approx. 4,440 m²

Surgical Unit (Second floor)



Mainly Proposed Rooms

1. Operation theater × 8
 - Approx. 7.0m width × 8.5m depth.
 - Six theaters are general and two theaters for future expansion.
2. Operation hall
 - Approx. 4.0m width so that patients bed can go through each other smoothly.
 - Located adjacent to ICU department so that patients can be transported to ICU directly after operation.
3. Pre operation (6 beds)
 - Each bed is equipped with medical gas (Oxygen, Compressed Air and Vacuum)
4. Recovery (8 beds)
 - Each bed is equipped with medical gas (Oxygen, Compressed Air and Vacuum)
5. Locker rooms for doctors, nurses and residents
 - Located at first floor.
 - Access to Operation hall through stairs and air lock.
5. Others
 - Equipment store
 - Dirty utility room
 - Anesthetist room
 - Anesthetist student room
 - Conference room
 - Resident training room
 - Nurse training room
 - Staff lounge
 - Nurse lounge

Confirmation of the Patients Flow

- 1 Reception**
 - Emergency patients and Ward patients are transferred by medical elevator, then all patients go through staff station.
- 2 Pre operation**
 - Patients receive the required procedure before operation.
- 3 Operation**
 - Family of patients wait at family waiting or counselling room during operation.
- 4 After operation**
 - Patients stay at recovery area for a while if required.
 - Patients who require intensive care are transferred to ICU.

Confirmation of the Equipment Flow

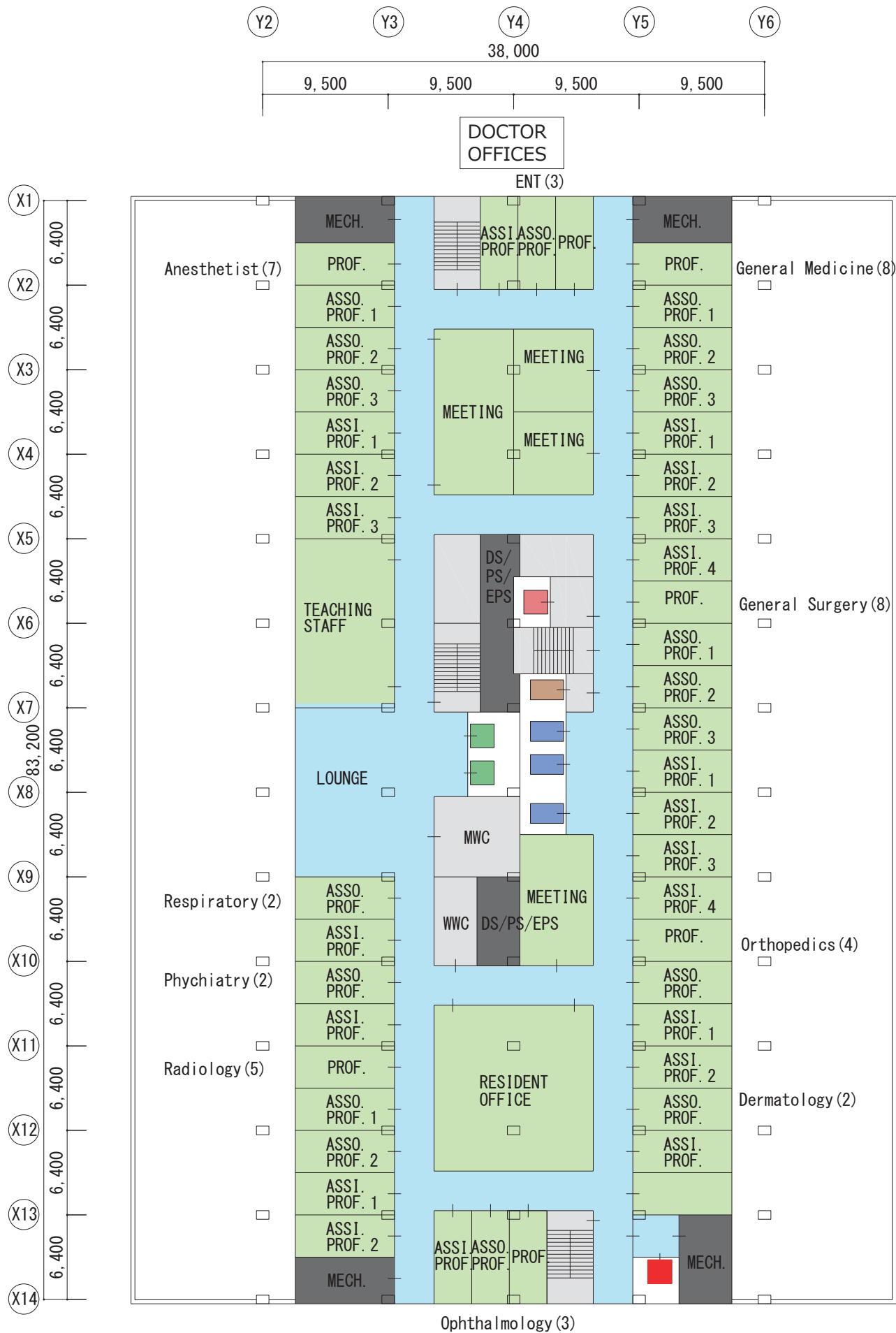
- 1 Dirty utility room**
 - Dirty equipment is gathered to this room.
- 2 Decontamination**
 - Dirty equipment is washed in this room.
 - Dirty equipment can be received from not only Surgical unit but also all departments.
- 3 Issue**
 - Clean equipment is stored at Clean store after sterilization.
 - Surgical equipment is issued to equipment store of surgical unit directly.



Image of Operation theater

Nagaland Medical College Hospital Development Project

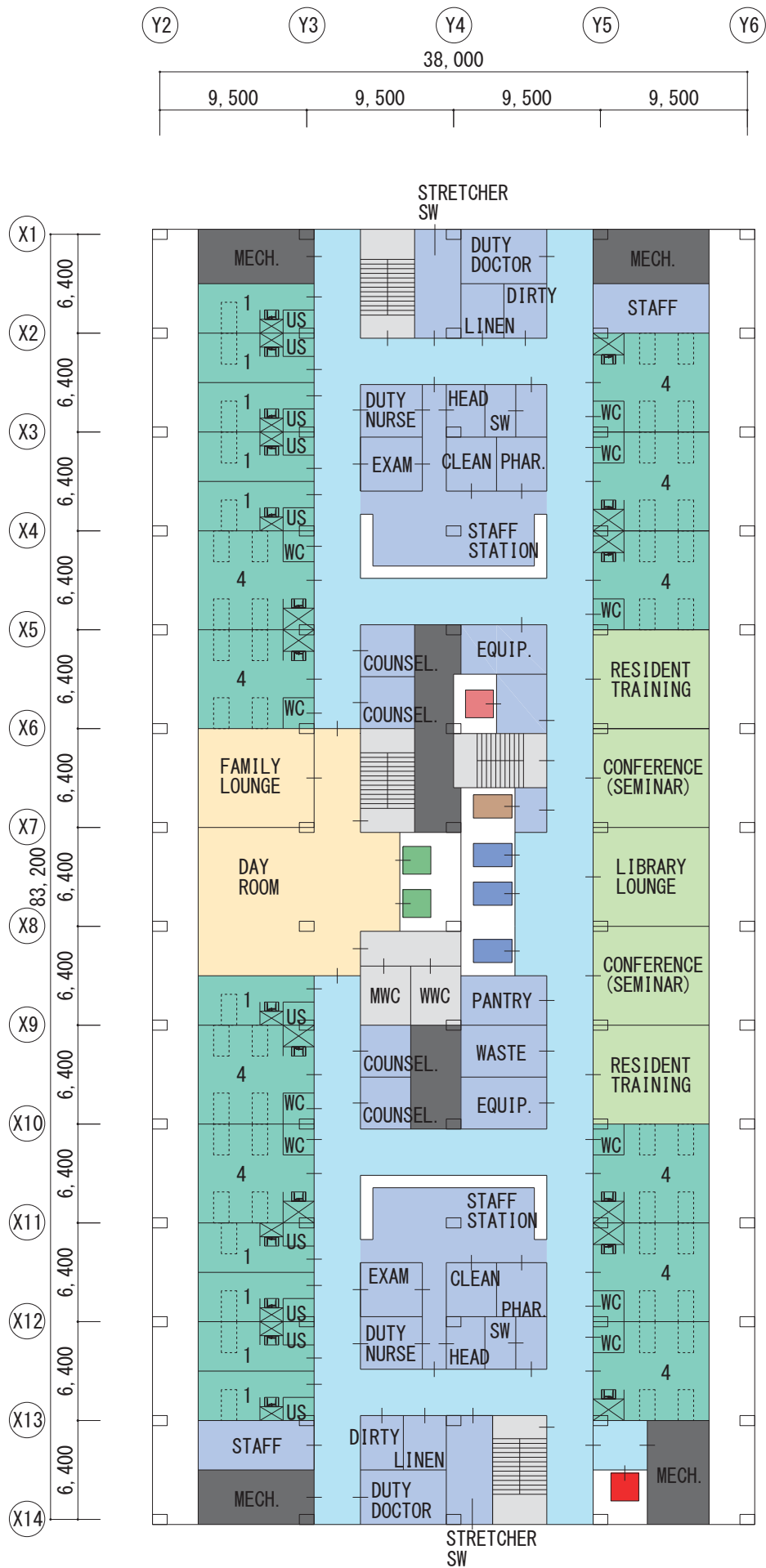
Third Floor



Approx. 2,770 m²

Nagaland Medical College Hospital Development Project

Fourth floor-Eighth floor



25 beds × 2
Approx. 2,770 m²

Wards (Fourth floor-Eighth floor)



Mainly Proposed Rooms

1. Planned department

- Male Surgical ward 1 (25) (Fourth floor)
- Female Surgical ward 1 (25) (Fourth floor)
- Male Surgical ward 2 (25) (Fifth floor)
- Female Surgical ward 2 (25) (Fifth floor)
- Male Orthopedics ward (25) (Sixth floor)
- Female Orthopedics ward (25) (Sixth floor)
- Male Medical ward 1 (25) (Seventh floor)
- Female Medical ward 1 (25) (Seventh floor)
- Male Medical ward 2 (25) (Eighth floor)
- Female Medical ward 2 (25) (Eighth floor)

2. 4 bed room × 5

- All rooms are separated by walls upto ceiling.
- Beds are separated by curtains.
- Washbasin is equipped.
- One toilet per 4 beds is equipped.
- Each bed is equipped with medical gas (Oxygen and Vacuum) and nurse call.

3. 1 bed room × 5

- All rooms are separated by walls upto ceiling.
- Washbasin is equipped.
- Toilet and shower is equipped.
- Medical gas (Oxygen and Vacuum) and nurse call is equipped.

4. Others

- Examination room, Counselling room
- Clean preparation room, Pharmacy room
- Dirty utility room, waste storage
- Stretcher shower room
- Equipment store, Linen store
- Duty doctor room, Duty nurse room, Head nurse room
- Conference, Resident training room, Library lounge
- Day room, Family lounge

Confirmation of the Patients Flow

1 Inpatients

- In case of diagnosis and operation, all patients are transferred by medical elevators.

2 Patients family

- They can access to ward by general elevators.
- Enter in and exit of all persons are monitored by staff station's nurse.

Confirmation of Food and Items Flow

1 Food distribution

- Food for patients are transported from Kitchen (First floor) by food elevator.

2 Waste

- Medical wastes are temporarily stocked at dirty utility room.
- General wastes are temporarily stocked at waste storage.
- Wastes are transported to basement by staff elevator.

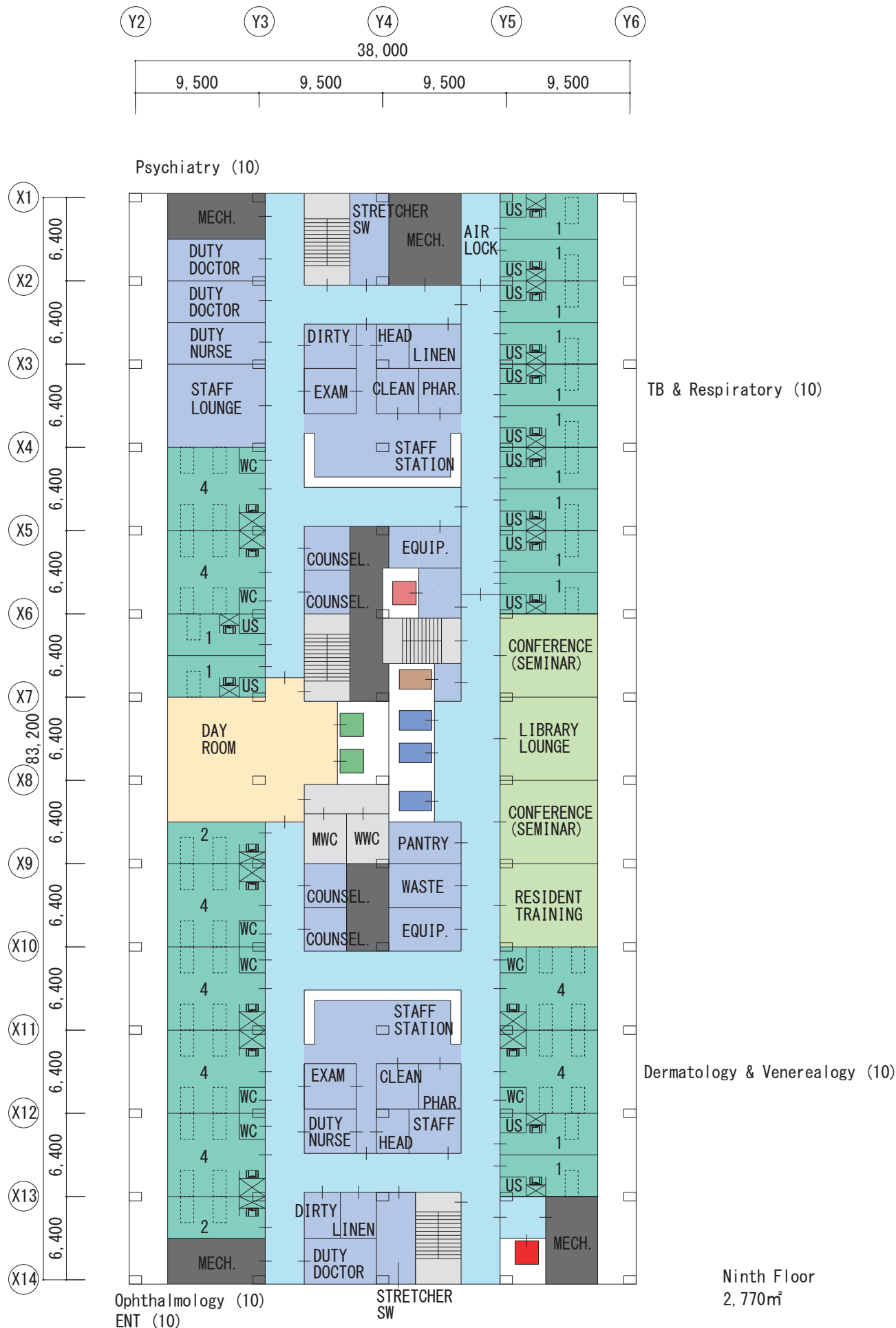
3 Linen, Pharmacy and Consumables

- Those items are transported from basement by staff elevator.

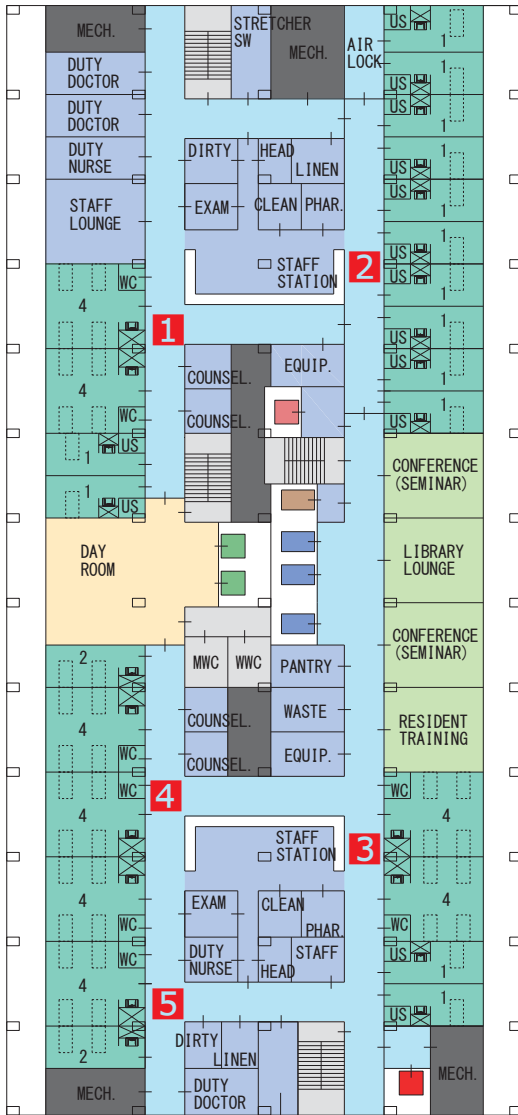


Image of 4 bed room

Wards (Ninth floor)



Ward (Ninth floor)

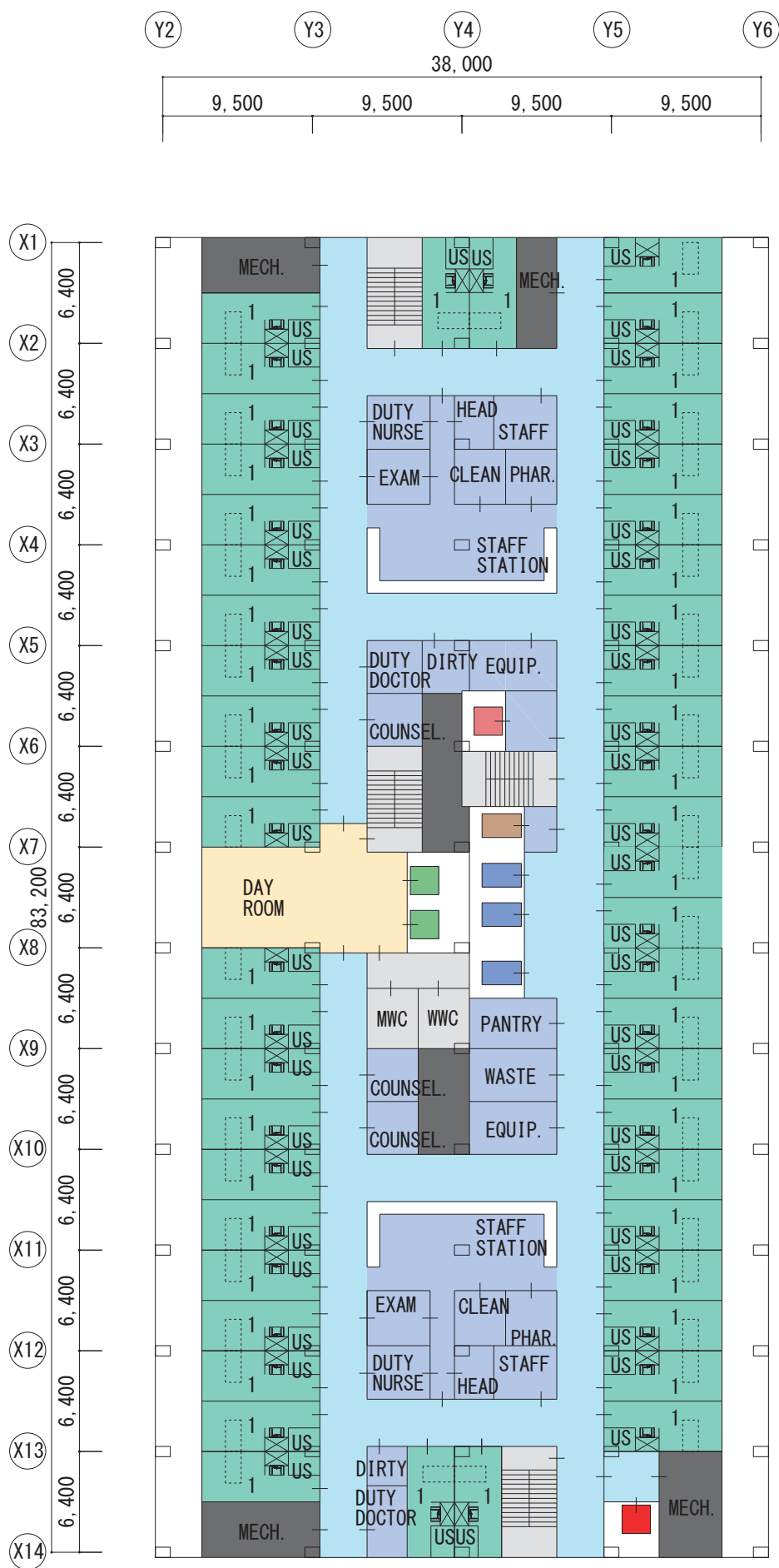


Mainly Proposed Rooms

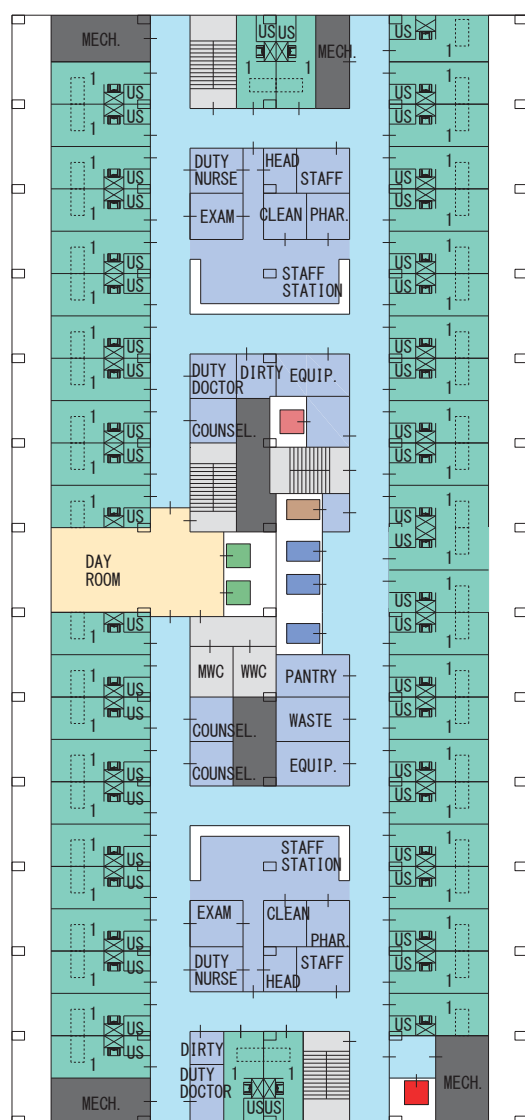
1. Psychiatry (10) **1**
 - 4 bed room × 2 (one for male and one for female)
 - 1 bed room × 2 (one for male and one for female)
2. TB & Respiratory (10) **2**
 - 1 bed room × 10
 - two rooms are negative pressure for infectious patient
3. Dermatology & Venereology (10) **3**
 - 4 bed room × 2 (one for male and one for female)
 - 1 bed room × 2 (one for male and one for female)
4. Ophthalmology (10) **4**
 - 4 bed room × 2 (one for male and one for female)
 - 2 bed room × 1
5. ENT (10) **5**
 - 4 bed room × 2 (one for male and one for female)
 - 2 bed room × 1
6. Others
 - Examination room, Counselling room
 - Clean preparation room, Pharmacy room
 - Dirty utility room, waste storage
 - Stretcher shower room
 - Equipment store, Linen store
 - Duty doctor room, Duty nurse room, Head nurse room
 - Conference, Resident training room, Library lounge
 - Day room

Nagaland Medical College Hospital Development Project

Tenth floor



25 beds × 2
Approx. 2,770 m²



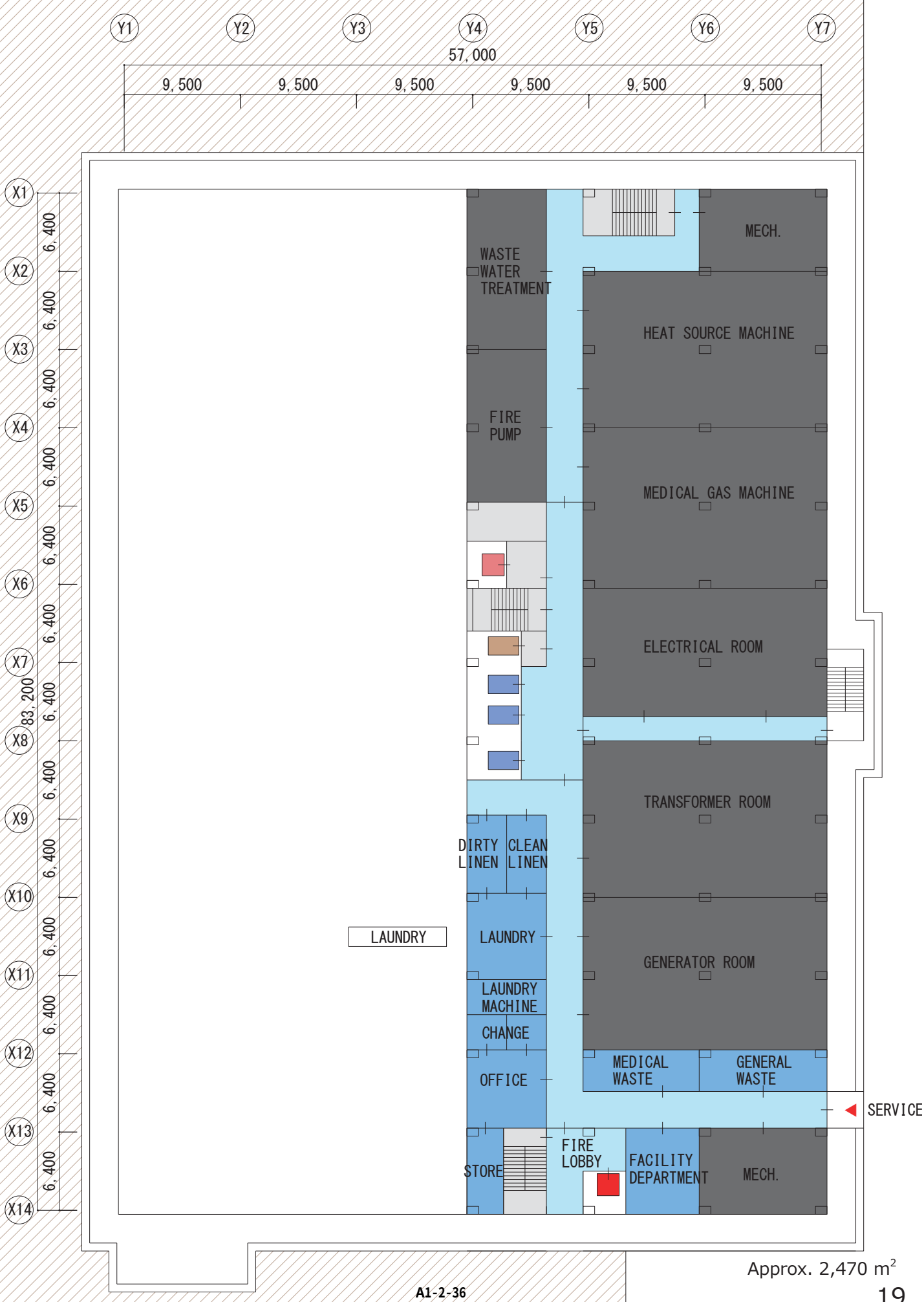
1. 1 bed room x 50

- All rooms are separated by walls upto ceiling.
 - Washbasin is equipped.
 - Toilet and shower is equipped.
 - Medical gas (Oxygen and Vacuum) and nurse call is equipped.
2. Others
- Examination room, Counselling room
 - Clean preparation room, Pharmacy room
 - Dirty utility room, waste storage
 - Equipment store, Linen store
 - Duty doctor room, Duty nurse room, Head nurse room
 - Day room



Image of 1 bed room

Basement Floor -2



Kitchen

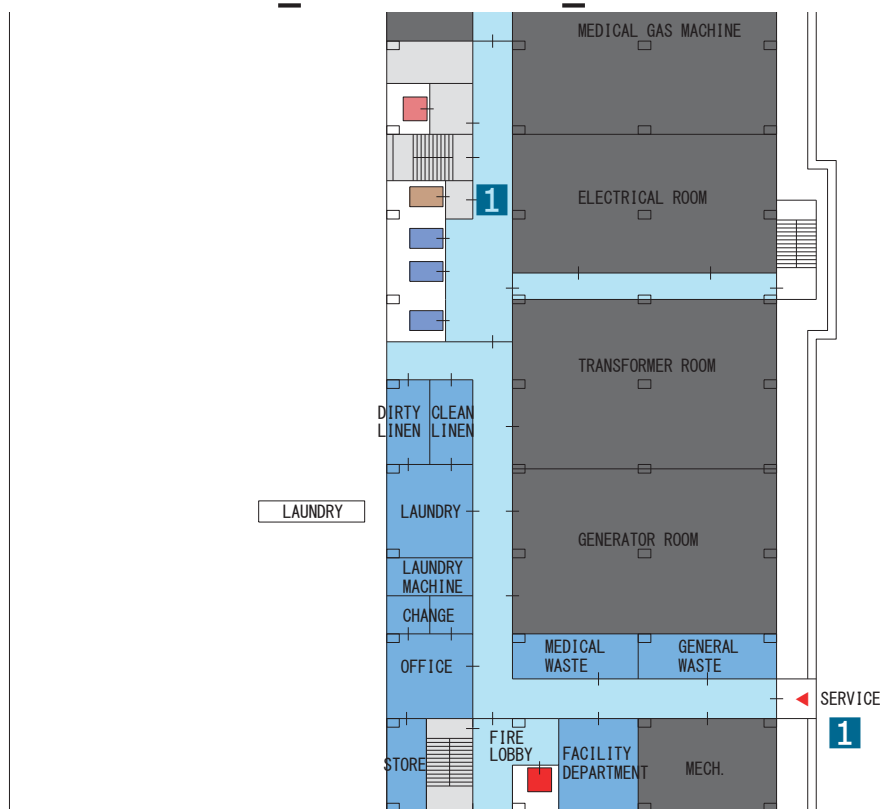


Confirmation of Food Flow

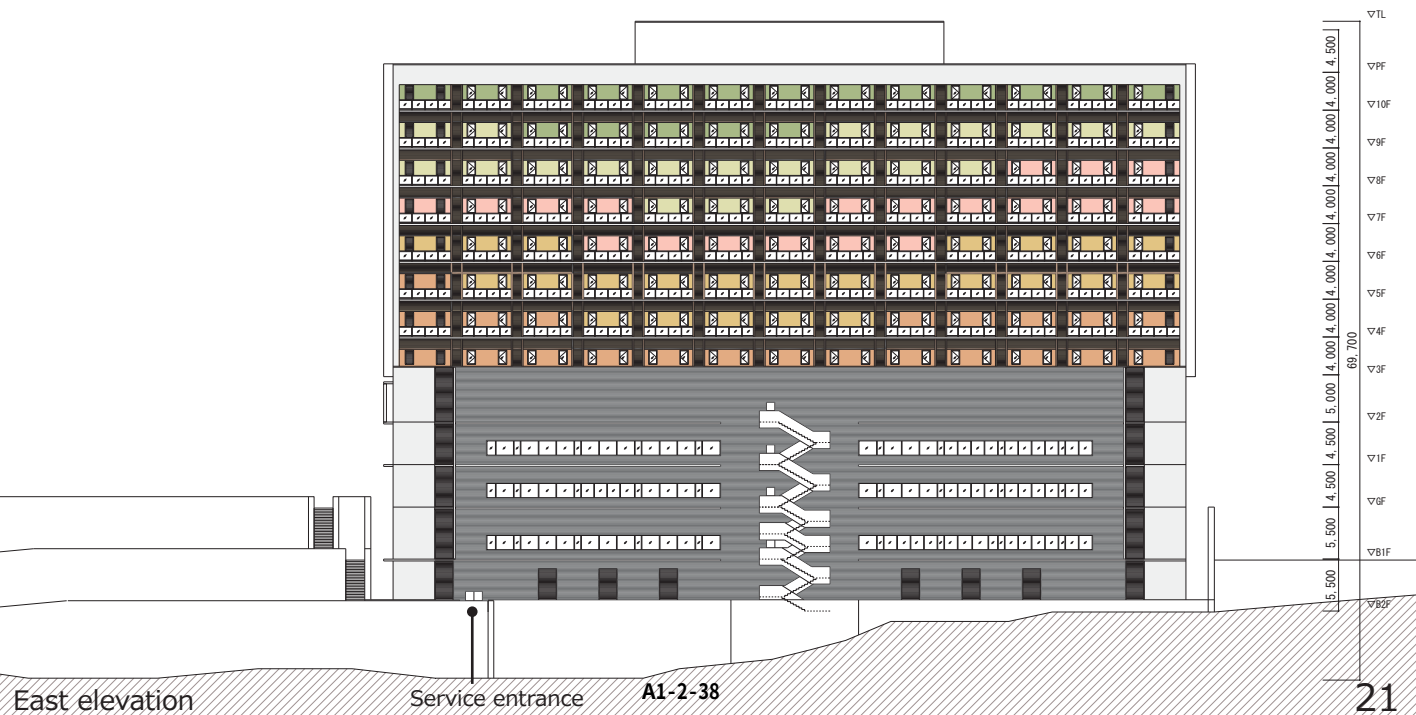
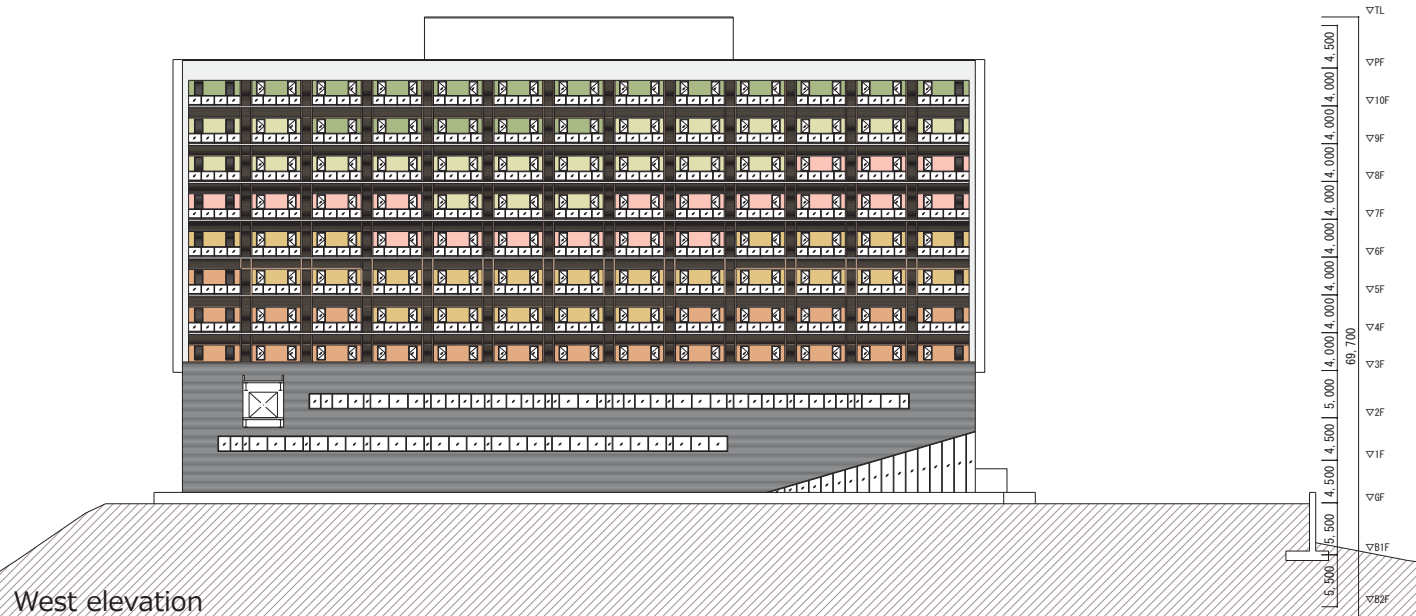
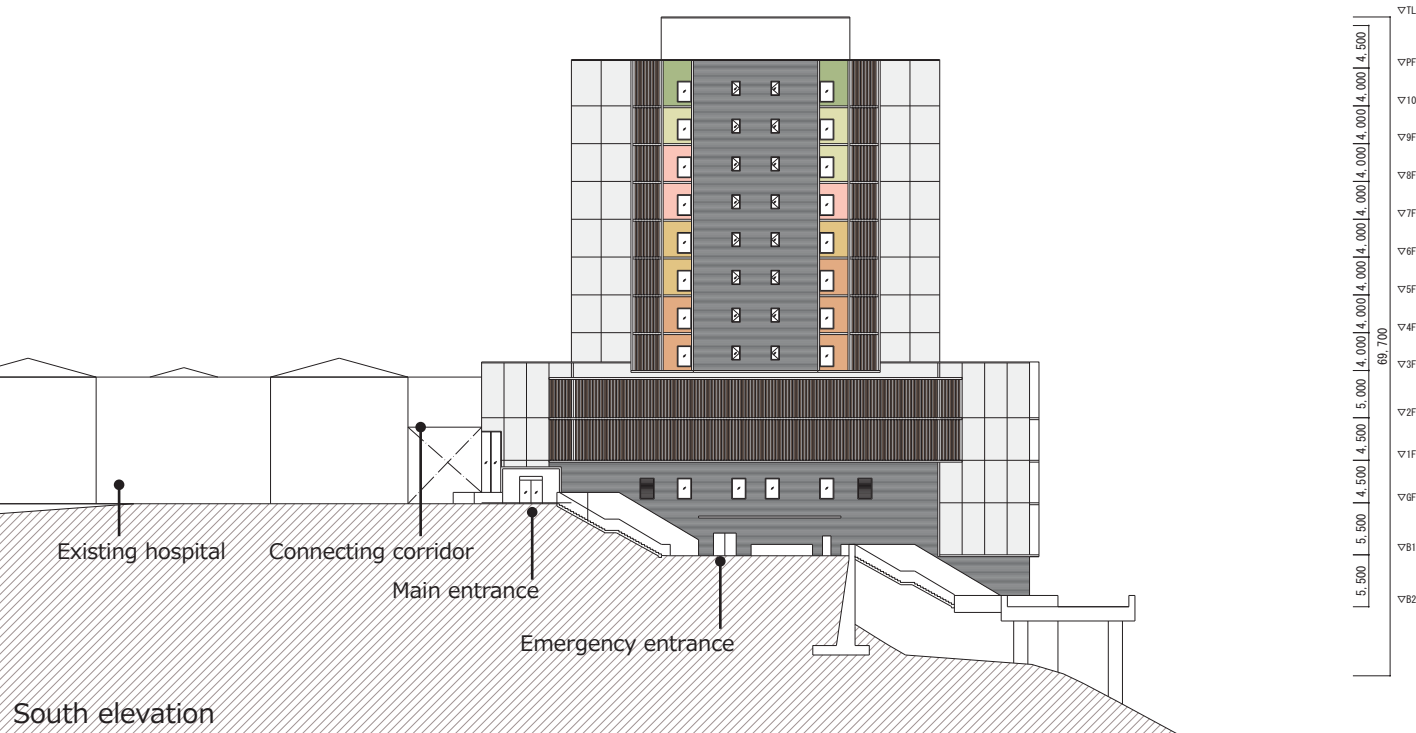
- 1 Carry-in of food ingredients**
 1. Food ingredients are carried from the southeast entrance of the basement floor -2.
 2. Then, they are transported from the basement floor -2 to the first floor by the food elevator.
 3. They are transported from the food elevator hall to checking room, going through the service corridor.
- 2 Distribution of foods to wards**
 1. Foods for wards are set to carts in distribution room after cooking.
 2. Carts are transported to wards by food exclusive elevator.
- 3 Return of kitchen carts**
 1. Kitchen carts are returned from wards by food exclusive elevator.
 2. Kitchen carts and dishes are washed in washing room.

Proposed Rooms

1. Cafeteria
 - For staff dining
2. Checking room
 - Food ingredients are checked at this room.
3. Office
4. Cold preparation room
 - Cooking without heating.
5. Main cooking room
 - Cooking with heating.
6. Distribution room
 - To serve on plate.
 - Carts for carrying to wards are set.
7. Washing room
 - Dish washing.
 - Cart washing.
8. Kitchen staff male room
9. Kitchen staff female room



Nagaland Medical College Hospital Development Project



Minutes of Meeting / Meeting Memo

Subject	Technical Seminar
Date & Time	20 th January 2023, 9:30 a.m. to 16:00 p.m. (IST)
Location	Hotel Vivor, Kohima
Participants	See attached list
Documents	Presentations

MORNING SESSION

- Welcoming speech was given by Dr. Temjentsungla, Principal Director DHFW.
 - Key note address by Mrs. Keiko Nagai
 - Speech by Commissioner and secretary DHFW, Mr. Kikheto Sema, IAS.
 - Vote of thanks was given by Dr. Vibeitunuo Mepfuo, she recalls the association of JICA and Nagaland in the past, she thanked the JICA Office India, JICA HQ, JICA survey team, and all the participants.
 - Prof. Kenji Wada from Kagawa University shared about “Lessons we learned from JICA advanced training for AIIMS and relevant institutions.” He shared about the Kagawa University and all the different faculties and departments present. He shared about different JICA projects internationally, and he shared the purpose and goals for the JICA advanced training for AIIMS (Cancer treatment) where the overall goal is to increase the number of patients who can receive improved medical care at AIIMS. They set up program in 3 issues i.e., Hospital Management, Cancer Response and Telemedicine. They concluded that more hybrid training systems will be provided, more specialized training programs are required, longer hands-on training at the hospital is required and shared their future perspective.
 - “Examples of Clinical training in Teaching hospital in Japan” was presented by Dr. Yoshihisa Yamazaki and Ms. Yukari Oshima. They shared the importance of Clinical training. They also shared the structure of Medical program in Japan. They shared examples from Japan which makes clinical clerkship more efficient.
 - “JICA’s cooperation for health/medical DX” was presented by the DX promoting Office, JICA HQ. JICA DX vision and role of STI & DXoffice was shared by Ms. Haruka Sakai. She also shared the introduction Case in Indonesia-D2D telemedicine.
Case in Bhutan-Data utilization in health sector was presented by Mr. Yushi Nagano. He explained the support JICA was providing in Bhutan in data utilization, tackling Non- Communicable Disease (NCD) with data, health stack and digital health platform. He shared Thoughts on Nagaland medical college hospital project, focused on Digital Health stack and Telemedicine. He reminded the importance of appropriate data management along with the digital health stack/ architecture for better services, continuous service improvement and leveraging private sector innovation. Seeking of Opportunities of telemedicine among facilities in Nagaland was shared.
- Question: 1.** In the long run, if JICA can assist the Nagaland Govt. in setting up more health centers around the state and to connect with each other.

2. Bhutan health service is basically free, can this model be replicated in Nagaland? – the situation in Bhutan is different from Nagaland, regarding development of digital health system, although it depends on the situation of the market, what should be done is basically the same. Important thing in starting digital development is that there are areas where the govt. should lead and there are areas where the private sectors should lead and each one should do their part. Also JICA and Nagaland govt. can research and find what model suits the Nagaland situation best.

- “Digital health situation in India” was presented by Prof. Ganesh Ramakrishnan, Indian Institute of Technology Bombay. He talked about digital health and opportunities around digital health through AIML (Artificial Intelligence & Machine Learning).
 - “Bahmni: Open source free HIMS software” was presented by Dr. Akhil Malhotra, Domain Specialist (Healthcare), Thought works.
 - “eHealth, NIC” was presented by Mr. Nilkamal Deb Purayastha, Chief Developer of eHealth, National informatics Centre Tripura.
 - “Good practices in Health/MedicalDX in Japan” was presented by Dr. Eisuke Shimizu, CEO, OUI Inc.- He presented about their device Smart Eye Camera which is used for Remote diagnosis of eye diseases using smartphone attachment medical device smart eye camera.
- Ms. Gyokanne, Melody International Ltd.- She introduce about the Fetal Monitor iCTG.

Afternoon Session

- Japanese Health/Medical Technology in India:
 - 1) FUJIFILM India Private Limited- Mr. Shunsuke Honda, Senior Manager.
 - 2) KONICA MINOLTA Healthcare India Private Limited (Mumbai)- Mr. Manoj Kumar, Head of Sales Department.
 - 3) OLYMPUS Medical Systems India Private Limited. (Gurgaon)- Mr. Naoshi Kikumoto, Managing Director.
 - 4) SHIMADZU MEDICAL (India) Private Limited (Chennai)- Mr. Yasukuni Katakami, Manager.

Question: Will Remote Maintenance services from Japan and Singapore be available in India for 24 hours? – Yes, even though there is time difference, email support system is present for 24 hrs.

What will be the cost when client receives such remote services? – bill is supplied along with Equipment or services and it is not much for remote services.

In case of service engineers needed to be send to Nagaland, where will be the nearest office?

- Presently No service engineers in Nagaland, but service engineers present in India so whenever needed can be send to Nagaland.

5) SYSMEX India Limited. (Mumbai)- Mr. Pravin Gundewar, Sr. Product Manager.

Question:

Does Sysmex have any businesses in delivering equipments, for example hematology analyzers, to hospitals and contracting region rental placements? – Yes

- Remarks – Mr. Shusaku Takada, JICA India Office.
- Closing Remark – Dr. C. Tetseo, Director (Dental) DHFW. He thanked the JICA survey team and JICA and for helping Nagaland develop its medical sector. He thanked all the participants and presenters from different Organisations.

Note: Presentations of speakers except key note speech are not for public.

PARTICIPANTS LIST OF TECHNICAL SEMINAR ON 20TH JANUARY 2023 AT HOTEL VIVOR KOHIMA

Name	Title	Organization/ Agency
1. Mr. Abeilie Pius Sole	Hospital Administrator	NIMSR
2. Dr. Bendangtula	Deputy Director (AYUSH)	DHFW
3. Dr. Chiekroshuyi Tetseo	Additional Director (Dental)	DHFW
4. Dr. Chikrozho Kezo	Deputy Director	DHFW
5. Dr. E. Mothsuthung	Additional Director	DHFW
6. Dr. Hoito Chishi	Joint Director	DHFW
7. Dr. Imkongtemsu	Joint Director	DHFW
8. Er. Jemima Thong	Junior Engineer (MED)	DHFW
9. Dr. Joel Koza	Deputy Director	DHFW
10. Dr. John Kemp	Deputy Director	DHFW
11. Dr. Khelito Zhimomi	Joint Director	DHFW
12. Dr. Kikameren Longkumer	Joint Director (Planning)	DHFW
13. Dr. M.C. Longai Phom	Deputy Director	DHFW
14. Mr. Manoj Kumar	Head of sales department	KONICA (Mumbai)
15. Dr. Manyau Phom	Deputy Director	DHFW
16. Dr. Mereninla Senlem	Joint Director	DHFW
17. Mrs. N. Lilly Ezung	Technical Consultant	NIMSR
18. Dr. Nitovi Shikhu	Deputy Director	DHFW
19. Dr. Nyanthung Kikon	Deputy Director	DHFW
20. Mr. Saumen Sahoo	PMC	NMCK
21. Prof.Dir.Dr. Soumya Chakraborty	Director-cum-Dean	NIMSR
22. Mr. Talitemjen Jamir	Procurement Consultant	NIMSR
23. Dr. Temjentsungla	Principal Director	DHFW
24. Dr. Thomas Keppen	Deputy Director	DHFW (NHP)
25. Dr. Tinurenla Anichari	Deputy Director	DHFW
26. Dr. Vibeitunuo Mepfuo	Director (Health)	DHFW
27. Dr. Y. Kheshika Yeptho	Deputy Director	DHFW
28. Mr. Chinmoy Deka		SYSMEX
29. Er. Moanaro Longkumer	Executive Engineer (MED)	DHFW
30. Er. Kezhalhoude	Engineer	DHFW
31. Mr. Debojit Paul		KONICA
32. Dr. Toshirenla	Additional Director	DHFW
33. Mr. Imtisunep		DHFW(NHP)
34. Mr. Thenuohelip Sachu	R.O	DHFW
34. Mrs. Asuile liegise	SDO	DHFW
35. Mr. R.K. Pairson	SPO	Jhpiezo, Nagaland
36. Ms. Ojungsangla	P. O	Jhpiezo, Nagaland
36. Mr. Thungchio Y Enny	Senior Pharmacist	DVDMS-REMMS
37. Mr. Bodsuwe Kapfo		DVDMS-REMMS

38. Mr. Rabeuthung Ngullie	HOD- IT	CIHSR
39. Mr. Kevezo Chuzho	I/c HMIS	NHAK
40. Mr. Neizovolie Nigel Solo	IT Consultant	NHAK
41. Mr. Y. Kikheto Sema IAS	Commisioner and Secretary	DHFW
42. Mrs. Puri Adithi	Principal Development Specialist	JICA India Office
43. Mr. Shusaku Takada	Representative	JICA India office
44. Mrs. Keiko Nagai	Team Leader/ Medical Human Resource Development Planning	JICA Survey team
45. Mr. Hidenori Mochizuki	Hospital Management	JICA Survey team
46. Mr. Dai Fujita	Medical Equipment Operation and Maintenance	JICA Survey team
47. Ms. Sotisula Imkong	Hospital Management	JICA Survey team
48. Mr. Tatsuya Matsuoka	Information Management/ IT/ Telemedicine/ Digital Transformation	JICA Survey team
49. Mrs. Yukari Oshima	Health and Medical Service Planning	JICA Survey team
50. Dr. Ranganayakulu Bodavala	IT	JICA Survey team
51. Mr. Kiron Moni	Medical Equipment Operation and Maintenance	JICA Survey team
52. Mr. Temjenyuba Pongener	Field Coordinator	JICA Survey team

Preparatory Survey on Nagaland Medical College Hospital Development Project

18th January 2023

Technical Seminar

Date: 09:30 – 16:00, Friday 20th January 2023**Venue:** Hotel Vivor, Kohima**Objective:** Enhancing the effectiveness of the project by introducing the knowledge, technology and good practices of Japan and other states to the Department of Health and Family Welfare and the Nagaland Medical College Hospital**Programme:**

Time (IST)	Contents	Presenters
09:30 – 09:35	Welcome Speech	Dr. Temjentaungla, Principal Director Department of Health and Family Welfare
09:35 – 09:40	Key note address	Ms. Keiko Nagai Team Leader, JICA Survey Team
09:40 – 09:55	Speech	Shri. Y Kikhetto Sema, IAS, Commissioner & Secretary Department of Health and Family Welfare
09:55 – 10:25	Lessons we learned from JICA Advanced Training for AIIMS and relevant institutes	Prof. Kenji Wada Professor, Faculty of Chemistry for Medicine, Kagawa University
10:25 – 10:45	Examples of Clinical Training in Teaching Hospital in Japan	Dr. Yoshihisa Yamazaki, Ms. Yukari Oshima Medical Human Resource Development Expert, JICA Survey Team
10:45 – 10:50	Vote of Thank	Dr. Vibeitunuo Mapfhuo, Director of Health Department of Health and Family Welfare
10:50 – 11:10	Tea break	
11:10 – 11:30	JICA's Cooperation for Health/Medical DX	DX Promoting Office, JICA Headquarters
11:30 – 11:50	Digital Health situation in India	Prof. Ganesh Ramakrishnan Indian Institute of Technology, Bombay
11:50 – 12:05	Bahmni: Open-source free HIMS software	Dr. Akhil Malhotra Domain Specialist (Healthcare), Thought works
12:05 – 12:20	eHealth, NIC	Mr. Nilkamal Deb Purkayastha Chief Developer of eHealth, National Informatics Centre Tripura
12:20 – 12:35	Good Practices in Health/Medical DX in Japan	Dr. Eisuke Shimizu, CEO, OUI Inc.
12:35 – 12:50		Ms. Gyokanne, Melody International Ltd.
12:50 – 13:50	Lunch break	
13:50 – 14:10	Japan's Health/Medical Technology in India	Mr. Shunsuke Honda, Senior Manager FUJIFILM India Private Limited
14:10 – 14:30		Mr. Manoj Kumar, Head of Sales Department Konica Minolta Healthcare India Private Limited. (Mumbai)
14:30 – 14:50		Mr. Naoshi Kikumoto, Managing Director Olympus Medical Systems India Private Limited. (Gurgaon)
14:50 – 15:10		Mr. Yasukuni Katakami, Manager, SHIMADZU MEDICAL (INDIA) Private Limited. (Chennai)
15:10 – 15:30		Mr. Pravin Gundewar, Sr. Product Manager Sysmex India Limited. (Mumbai)
15:30 – 15:35	Remarks	JICA
15:35 – 15:40	Closing Remarks	Dr. C Tetseo, Director of Dental Department of Health and Family Welfare

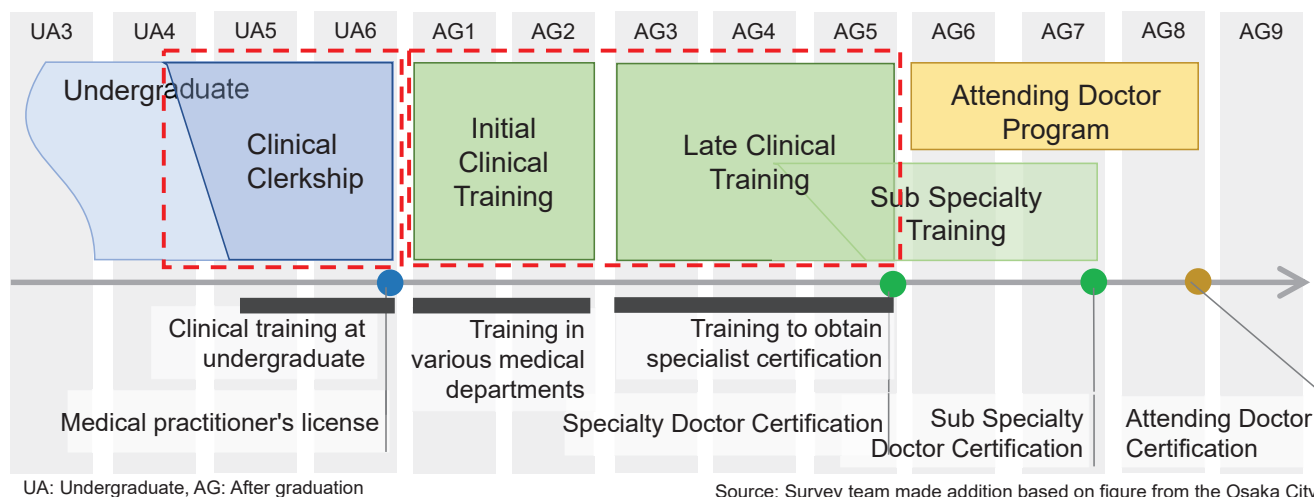
MC: Team Leader, JICA Survey Team

Examples of Clinical Training in Teaching Hospital in Japan

20 January 2023
JICA Survey Team

Importance of Clinical Training

Types of Clinical Training



1/18/2023

Preparatory Survey on
Nagaland Medical College Hospital Development Project

3

Clinical Clerkship

Period:	- At least 3 weeks per following department: internal medicine, surgery, psychiatry, general practice/family medicine, obstetrics and gynecology, pediatrics and emergency. - Period determined by the medical university respectively for other departments
Purpose:	In order for students to take their first steps as a doctor under the guidance of their supervisor, they are required to participate and share in the work of a medical team, and to acquire the following four minimum competences, which are necessary to become a doctor in any medical department in the future. <u>Information gathering</u> (medical interviews, physical examination, basic clinical procedures, communication and reporting) <u>Assessment and treatment planning</u> (textbook literature knowledge and search techniques, case presentation and review sessions, medical record documentation) <u>Implementation of the treatment plan</u> (basic treatment techniques, communication to other healthcare professionals and patients, documentation, communication and reporting) <u>Doctor's professionalism</u>: the way to interact with patients, patients' families and other health professionals, behaviour in line with one's professional competence, acceptance of support and advice, motivation for self-learning, etc.

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Preparatory Survey on
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Clinical Clerkship

Accumulation of Learning Portfolios

The aim is to promote a cycle of practical experience and review. Students are required to proactively accumulate records in the booklet called "Record of Learning and Evaluation"

Mini Clinical Evaluation Exercise (mini-CEX)

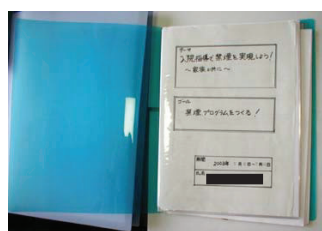
Simplified clinical competence evaluation method using an evaluation form

Simulation Education Programmes

Students are required to be fully educated by using simulators and other educational materials before performing invasive and sensitive medical

360-degree Evaluation

Evaluation of students by multiple professions including chief nurses, nurses and other health professionals, as well as by patients



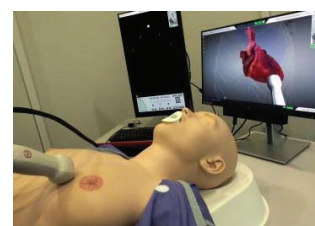
Sample of a learning portfolio folder



360-degree Evaluation



Sample of mini-CEX format



Echocardiography simulator

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Initial Clinical Training and Late Clinical Training

Period:	■ Initial Clinical Training: 2 years training at following compulsory department and other elective department: - Internal Medicine (more than 24 weeks) - Surgery (more than 4 weeks) - Pediatrics (more than 4 weeks) - Obstetrics and Gynecology (more than 4 weeks) - Psychiatry (more than 4 weeks) - Emergency (more than 12 weeks) - Community Medicine (more than 4 weeks)
Purpose:	■ Late Clinical Training: 3 years training at the department in which each resident selects a specialty within the basic areas (19 areas) Residents who are in the foundation-building stage as doctors are expected to adopt the basic values and to acquire a qualities and competencies that will enable them perform basic medical practices. <u>Basic values:</u> Social mission and contribution to public health, altruistic attitude, respect for humanity and self-improvement <u>Basic medical practices:</u> General outpatient care, ward care, initial emergency care, community medicine <u>Qualities and competencies:</u> Ethics in medicine and healthcare, medical knowledge and problem-solving skills, medical skills and patient care, communication skills, practice of team medicine, quality and safety management of healthcare, practice of healthcare in society, scientific enquiry, lifelong attitude to learning

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Initial Clinical Training and Late Clinical Training

E- Portfolio of Clinical Training (EPOC)

Online clinical education evaluation system for postgraduate residents. Reference function for nationwide aggregate data, linkage with the record and evaluation of Clinical Clerkship periods

Feedback from Residents

EPOC will also record feedback from residents on the training programme. This feedback will be used to continuously improvement of the programme.

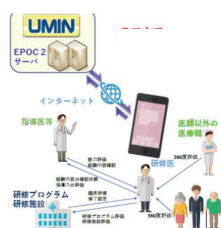


Image of EPOC
1/18/2023

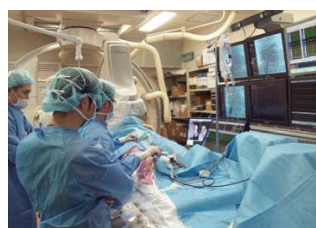


Dr. Yamazaki attending clinical training
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Selection of Clinical Training Hospitals

Graduates of medical universities with a medical licence will decide their training hospital from more than 1,030 training hospitals nationwide in Japan, based on the content of the training programme, the size of the hospital, the specialisation they wish to pursue, etc.

There is also a computerised system for matching applicants with training programmes at training hospitals according to algorithms.



Clinical training in gastroenterology



Clinical training in respiratory medicine

7

Reference

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Record of Exchange Visit to Assam State

Objective	To learn experiences on setting up and operating a new medical college and teaching hospitals and management of Japanese Yen loan project in Assam
Participants	<u>Nagaland</u> Dr. Kika Longkumer, Joint Director, Health and Family Welfare Department Dr. Alemwagang Aier, Joint Director/ Nodal Officer for JICA Survey Team Dr. J. Hokugha Sema, Deputy Director, HFWD Mr. Abeilie Solo, Procurement Consultant, Nagaland Institute of Medical Science and Research <u>Assam</u> Dr. Siddharth Singh, IAS, Commissioner & Secretary (absent, but responsible for the visit) Dr. A. Barman, Director of Medical Education, HFWD Dr. Ramen Talukdar, Principal, Dr. M. K. Thakur, Vice Principal, and Dr. Parth Pratim Baruah, Medical Superintendent, FAA Medical College and Hospital (FAAMCH), Barpeta Mr. Simanta Barman, Project Manager, PMU JICA Project, Assam Health Infrastructure Development & Management Society (AHIDMS) Mr. Biswadeep Das, Project Manager, World Bank Project, AHIDMS
Itinerary	16 January: Leave Kohima to Guwahati 17 January: AM - Visit Fakhruddin Ali Ahmed Medical College and Hospital PM – Meeting with HFWD Assam and AHIDMS
Location	Guwahati and Barpeta, Assam State

1. Visit to FAAMCH

The team from Nagaland observed hospital statistics presented at hospital administration. As FAAMCH is 500-bed hospital which is same size of the future teaching hospital, they could have concrete image on number of patients per year.

Then, they observed outpatient department. Although patient flow is well organized, many patients were waiting for doctor's consultation and doctors were quite busy to deal with patients and their family members. Also, the team made brief observation of oxygen plant provided by the Federal Government during COVID-19 response.

And the team had a meeting with the FAAMCH management team. The principal presented history, academic activities, and hospital services of FAAMCH. FAAMCH management team emphasized an importance of ensuring and retaining of quality faculty members including professors, senior residents, etc. Nagaland team also learned how to maintain the hospital facility and expand the functions, as well as collaboration with local authorities.



2. Meetings with HFWD Assam

In the afternoon, the team visited an office of Director Medical Education. They shared the latest progress of approval process of the National Medical Council and obtained advises from Dr. Barman. He also mentioned that the quality of faculty members is critical.

Then, the team meet with AHIDMS. It is an affiliated agency to HFWD and directly under the state minister to manage external funded projects. All the project management units (PMUs) will be under AHIDMS. When the team visited, PMU for the World Bank Project was just established. The World Bank Project will be designed in close collaboration with JICA Project to promote synergy and efficiency of the project operation. According to JICA PMU, more staff will be recruited according to progress of the project.



3. Conclusion

The objectives of this visit have been achieved and the participants from Nagaland could have concrete ideas on development of medical colleges and hospitals with ensuring quality of services, as well as launching and operating of Japanese Yen Loan Project. According to Assam stakeholders, they had also learned from Tamil Nadu State which has experiences of Japanese Yen Loan projects. After the visit, Nagaland members are contacting with Assam members. This opportunity will help Nagaland stakeholders to smooth setting up of the project implementing mechanism.

End

Minutes of Meeting / Meeting Memo

Subject	Discussions on DFR
Date & Time	(1) From 10:30 to 17:00 on 25 th April, 2023 (2) From 10:00 to 13:00 on 26 th April, 2023 (sub-group meetings) (3) From 16:00 to 17:30 on 26 th April, 2023
Location	Directorate of Health and Family Welfare, Kohima, Nagaland – (1) and (2) NIMSR Kohima – (3)
Participants	Attached
Documents	PPT on DFR Discussions

Points of the two-days discussion are summarized as follows:

1. Brief overview of the latest status of NIMSR Kohima (Dr. Kika)

- Letter of Permission for NIMSR Kohima has been granted and Academic year for 100 MBBS seats to start from Year 2023-2024. The first year will be started from September 2023.
- NIMSR Mon will be launched by 2026. It is being developed design-build contract. It is expected to complete the construction for three years.
- Aiming to fulfill WHO recommendation on doctor ratio shortly, both medical colleges should be attractive for students, faculties, and patients.
- Recruitment of faculty in progress for first phase. By third renewal of the College, 430 beds will be required as per guidelines of the National Medical Council (NMC).
- The name of the college changed from Nagaland Medical College to Nagaland Institute of Medical Science and Research (NIMSR), Kohima (hereafter to be called as NIMSR Kohima).
- Green energy aspects like solar energy to be implemented in the NIMSR.
- NIMSR is trying to provide best quality medical education and trying to gain competitiveness.
- Preliminary works for Mon Medical college are being proceeded. The procurement type of Mon Medical College is Engineering, procurement, and construction contract, which is to be handled by single contractor from design to construction.

Following to brief explanation of the meeting agenda and contents of the draft final report (DFR) by Ms. Nagai, essential points of each chapter was presented by JICA Survey Team.

2. Natural Condition of the Project site (Mr. Yoshida)

- Overview of the natural condition including topography and geography of the project site was presented, and no question were raised.

3. Facility Planning (Mr. Nishikawa)

- Mr. Nishikawa explained the conceptual design which had been presented in February 2023.
- The conceptual design was agreed by Nagaland side. It will require schematic design and detailed design during the Project period.

- Dr. Kika shared infrastructure preparation status by Nagaland government side as follows: Water sources for NIMSR Kohima, there are plans to have three sources of water supply, rainwater harvesting, gravity source from nearby village river and groundwater supply. Power supply development for 5 MVA for the college site is divided into three phases. Phase 1 of 1.2 MVA has been done. Phase 2 will be implemented soon. These lifelines to connect NIMSR Kohima is to be responsible by Nagaland state government. Time schedule for completion of power and water supply structures is to be provided by DHFW to JICA Survey Team.
- For the point of the project site like connection road with loose soil part, retaining walls to be utilized and cost for this retaining wall utilization are included in cost estimation.
- Considering that Nagaland is included in the earthquake high-risk area, base-isolated structure is to be constructed. It is common in Japan and applied in India as well.

4. Medical Equipment Planning (Mr. Nozaki)

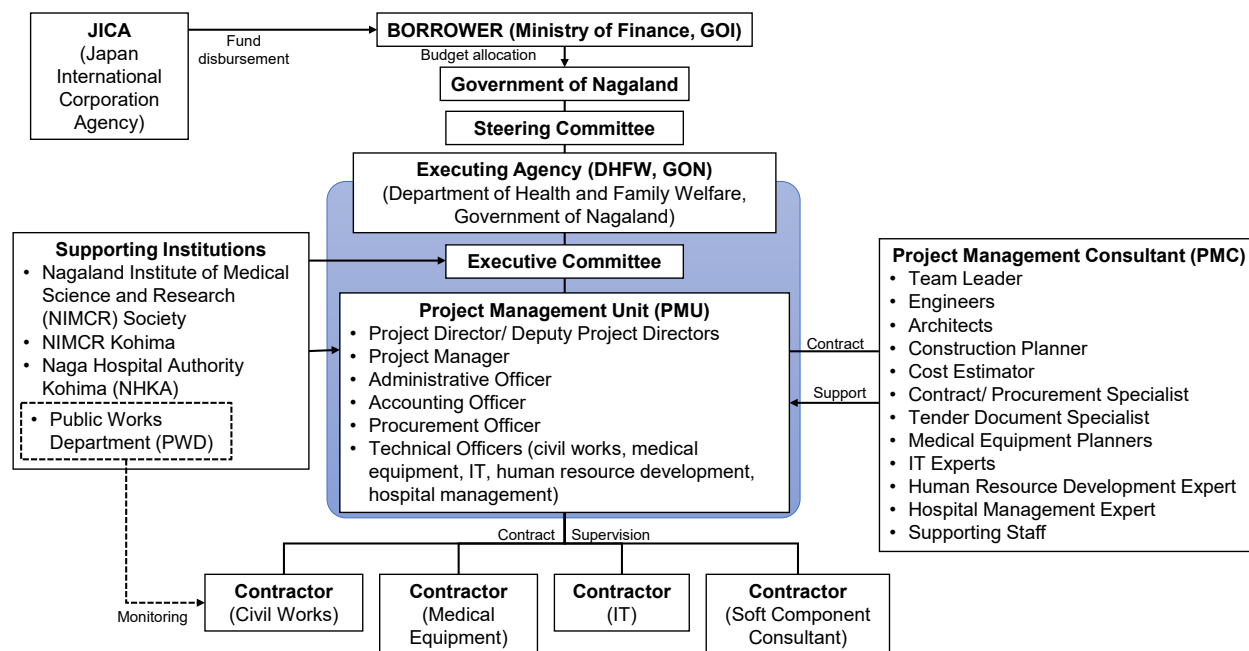
- Procurement issue was mainly explained as list of equipment had been agreed through the previous meetings.
- High-end equipment can be procured by ICB, Low end equipment can be by LCB. The packaging was agreed as follows:
 - ✧ Package A: Equipment for Diagnostic Imaging, Endoscope
 - ✧ Package B: Equipment for Operating Rooms, CSSD, Laboratory
 - ✧ Package C: Equipment for Ward, and Furniture
 - ✧ Package D: Oxygen Plant
- The contract will be all-in-one for each package for efficient contract negotiation and CMC.
- Civil works required for certain equipment will be covered in the procurement contract.
- Regarding announcement of bidding, single package bidding is recommended from NIMSR side. Meanwhile, direct procurement from manufacturer for high-end equipment was suggested by DHFW. Procurement with divided into several packages depend on item seems good.
- Procurement procedure of the Project will follow JICA guidelines.
- Regarding the maintenance, although DHFW has been applying outsourcing under National Health Mission (NMH). However, in-house engineer(s) will be considered for NIMSR Kohima.

5. ICT Planning (Mr. Matsuoka)

- ICT planning and issues were presented. HFWD basically agreed with the proposed planning.
- In terms of telemedicine in Nagaland, although eSanjeevani (doctor-to-doctor) is an effective telemedicine program, it is not properly working in the state. Proper orientation should be provided to especially people in rural area in order to ensure proper operation. (Dr. Soumya)
- The challenges of eSanjeevani (doctor-to-doctor) are rather operational matters than technical matters of the program itself such as the lack of clear hub-spoke system, operation structure, doctors in hub hospitals, hardware, infrastructure, etc. Those challenges should be resolved from the multiple perspectives such as human resource etc. (Mr. Matsuoka)

- Pharmacy module and MRD module (part of registration module) are included in the system. (Dr. Kika)
 - Blood bank module is included in the proposed software component of NHP System+ for NIMSR. (Mr. Matsuoka)
 - Under ABDM, data sharing among health facilities will be promoted. The data will be stored in digi-locker (cloud server). Prescription and other necessary data in the digi-locker shall be shared with health insurance fund in near future. (Dr. Kika)
 - To implement doctor's module, suggestion was made to provide doctors with digital writing tablets for entering information in order to eliminate handwriting as much as possible. (Dr. Kika, Mr. Matsuoka)
 - Currently, stable internet connectivity is not sufficient in Nagaland. Static IP not available in seven districts in Nagaland. Companies like Jio and Airtel have set up IP in District Headquarters, state government have requested them to make connections in hospital, but it might take time. (Dr. Kika)
 - Further discussion regarding connectivity to other telemedicine program, human resource deployment regarding ICT maintenance and matter related to hardware are necessary.
6. Project Cost Estimation (Mr. Kameda)
- Result of the cost estimated was presented in comparison with DPR. Major factors of such cost increase were: necessary items such as medical equipment, ICT, tax and duties, etc. were not included in DPR; a helipad and base-isolated structure were proposed.
 - The above factors were understandable for Nagaland side. However, if the unit rate per m² is higher than the other medical college hospitals, reasonable justifications should be presented to convince Department of Economic Affairs.
 - The revised DPR should be re-submitted to Ministry of Health and Family Welfare, Ministry of Finance, Ministry of Internal Affairs, Ministry of Foreign Affairs, and Niti Aayog. Such cost increase must be justified properly.
 - Fluctuating exchange rate will be covered by price escalation component. (Mr. Kameda)
 - GST fluctuates unexpectedly, and expert opinion on how to deal with such situation is required. GST was 12% but changed to 18% for all items in 2022, JICA Survey Team will recalculate with applying this change of GST amount. (Mr. Kameda)
 - JICA Survey Team will review the detailed breakdown and share the revised version with justifications by mid-May. JICA Survey Team will propose a sub-group meeting.
7. Financial & Economic Analysis (Ms. Kikuchi)
- Project is economically feasible.
 - Monitoring indicator should be realistic one, and if it is too ambitious it should be revised. (Mr. Sagawa)
 - Indicator "Number of referrals from district hospitals to hospitals outside Nagaland State" should be deleted.
 - JICA Survey Team will confirm if indicator for number of doctors per 1,000 population is realistic.

- For monitoring indicator regarding gender, “maintaining overall male/female ratio (not by position) as benchmark ratio of current Naga hospital” is suitable. (Dr. Kika)
8. Environmental & Social Consideration (Mr. Mitsumoto)
- The project is categorized as 8(a) according to the JICA environmental and social guidelines.
 - The rest of necessary information for environmental clearance would like to be acquired to finalize the report.
9. Technical Assistance (Ms. Nagai)
- Concept and contents of the technical assistances to be included in the Project were agreed by both sides as presented in PPT.
 - Key stakeholders will learn from Japan or other state (for ICT) prior to develop the training programme for NIMSR staff.
10. Human Resource (Ms. Oshima)
- Brief human resource deployment plan by total number, proposal for Nagaland-Japan medical exchange promotion and gender consideration were presented, and no question were raised.
11. Hospital Management (Mr. Mochizuki)
- Some findings from NHAK hospital operation were explained, and some samples of standard and guidelines for hospital operation and management in Japan which can be utilized in upcoming stages were introduced.
 - Projection of numbers of in-patient and out-patients were explained. Also, bed occupancy rate requirement for new medical college hospital was pointed out.
12. Project implementation (Ms. Nagai)
- PMU is very important and responsible for overall management of the project; therefore, the project manager and project director should be least or not changed during the duration of the whole project.
 - Setting up of PMU can be done before signing of MoU to ensure time management. (Mr. Sagawa)
 - TOR for setting up of PMU will be drafted by JICA Survey Team to assist DHFW.
 - Project implementation structure should be revised with following World Bank NHP project implementation structure; addition of executive committee, revision of steering committee composition to include the chief secretary as a chair and other related department.(Dr. Kika)
 - The revised structure and composition are as follows:



Proposed Steering Committee Members

Institutions	Proposed Members
Government of Nagaland	Chief Secretary – Chair
Department of Health and Family Welfare (DHFW)	Commissioner and Secretary
Department of Planning and Coordination	Development Commissioner
Department of Finance	Finance Commissioner
Department of Public Works and Housing	Commissioner Secretary
Department of Forest Environment and Climate Change	Commissioner Secretary
Department of IT&C	Commissioner Secretary
Department of Power	Commissioner Secretary
Department of Public Health Engineering	Commissioner Secretary

Proposed Executive Committee Members

Institutions	Proposed Members
DHFW	• Commissioner and Secretary Health – Chair
	• Principal Director
	• Director of Medical Education
	• Joint Director in-charge
	• Deputy Director in-charge
	• Executive Engineer
NIMSR Kohima	• Senior Account Officer
	• Director cum Dean
NHP	• Medical Superintendent
	• Deputy Director Administration
	• Project Director

*Chairmans of both committees can have special invitees according to the topics.

13. Implementation Schedule

- The proposed schedule is to be handed over at the end of October 2023. The construction period has been proposed with careful consideration on critical conditions such as high-rise building, base-isolated structure for earthquake high-risk area, long and heavy monsoon season, etc.
- Comparing NIMSR Mon which construction period is three years, site condition is different. The Mon will be build on flat and wider area.
- Time schedule for procurement of medical equipment for MCH should be earlier.
- The Loan Agreement (L/A) period would like to include comprehensive maintenance contract (CMC) period. Regarding medical equipment, the state government had to cover the amount for a part of equipment under annul maintenance contract (AMC) for the World Bank Project. In order to avoid this, paying upfront for CMC for certain years in advance or keeping some fund separately from loaned fund for CMC are suggested (Dr. Kika). The Loan Agreement (L/A) period will cover the CMC period. (Ms. Nagai)

- Schedule of the Project including construction should be accelerated to fulfil NMC renewal condition. Ensuring 430 bed teaching hospital will be required by the end of 2025 for the NMC third renewal in 2026. Also, the first batch students would like to benefit the new teaching hospital. Therefore, the project period should be shortened (Mr. Kikheto).
- To meet the above request, place of order should be issued by August 2025. Therefore, medical equipment for the maternal and child hospital (MHC Hospital) will be excluded from the Project. It will be procured under Nagaland government budget.
- If a request for proposal (RfP) will be issued just after L/A signature, the project management consultant (PMC) could commence the work a few months earlier.
- In terms of safety and quality, JICA Survey Team could never recommend shortening the design and construction periods. However, construction period could be included in one of evaluation criteria for the bidding.
- DPR resubmission by the end of July is required in order to sign L/A in September. (Mr. Sagawa)
- The revised DFR will be submitted mid-May after receiving JICA comments.

End

Attachment: List of Participants

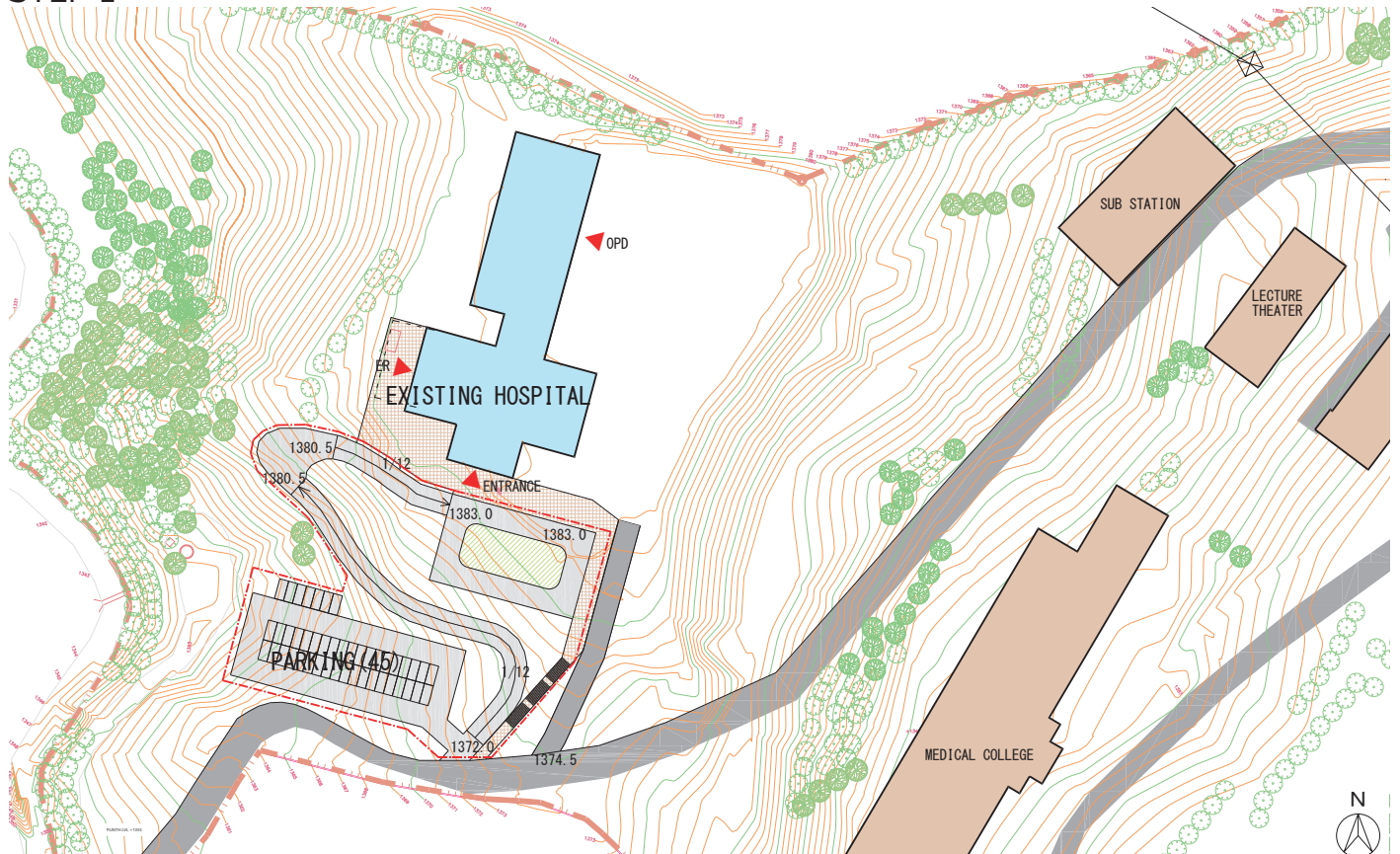
NAME	DESIGNATION	ORGANIZATION
Mr. Shri Y. Kikheto Sema, IAS	Commissioner and Secretary	DHFW
Dr Kikameren Longkumer	Joint Director	DHFW
Dr. Alemwabang Aier	Joint Director/ Nodal Officer for JICA survey team	DHFW
Dr. J. Hokugha Sema	Deputy Director (planning)	DHFW
Dr John Kemp	Deputy Director	DHFW
Dr Longnai	Deputy Director (IT & Medical Equipment)	DHFW
Er. Jemimah	Junior Engineer. MED	DHFW
Er. Sabu Abraham	Senior Engineer. MED	DHFW
Er. Asuile Liegise	SDO. MED	DHFW
Er. Akang Jamir	Junior Engineer. MED	DHFW
Er. Saumen Sahoo	PM. MED	DHFW
Ms. Purnungla Longkumer	Finance Consultant	NHP- DHFW
Dir. Prof. Dr. Soumya Chakraborty	Director cum Dean	NIMSR
Mr. Talitemjen Jamir	Procurement consultant,	NIMSR
Mr. Abeilie Solo	Hospital Administration	NIMSR
Mr. Rei Sagawa	South Asia Division 1, South Asia Department	JICA HQ
Mr. Hajime Taniguchi	Senior Representative	JICA India Office
Mr. Shusaku Takada	Representative	JICA India Office
Ms. Puri Aditi	Principal Development Specialist	JICA India Office
Ms. Keiko Nagai	Team Leader/ Medical Human Resource Development Planning	JICA Survey Team
Mr. Kohei Nishikawa	Deputy Team Leader/ Architectural Planning Building Design 1	JICA Survey Team
Mr. Hidenori Mochizuki	Hospital Management	JICA Survey Team
Ms. Yukari Oshima	Health and Medical Service Planning 1	JICA Survey Team
Mr. Tamotsu Nozaki	Medical Equipment Planning/ Cost Estimation	JICA Survey Team
Mr. Tatsuya Matsuoka	Information Management/ IT/ Telemedicine/ Digital Transformation in Health	JICA Survey Team
Ms. Risa Kikuchi	Economic and Financial Analysis	JICA Survey Team
Mr. Norikazu Kameda	Construction Planning / Cost Estimation 1	JICA Survey Team
Mr. Rang Emei Gonmei	Construction Planning / Cost Estimation (Healthcare Architect)	JICA Survey Team
Mr. Amit Malik	Construction Planning / Cost Estimation (Healthcare Architect)	JICA Survey Team
Ms. Sotisola Imkong	Hospital Management	JICA Survey Team
Mr. Kiron Moni	Medical Equipment	JICA Survey Team
Mr. Temjenyuba Pongener	Field Coordinator	JICA Survey Team

Appendix 2 Outline of Facility Plan

Nagaland Medical College Hospital Development Project

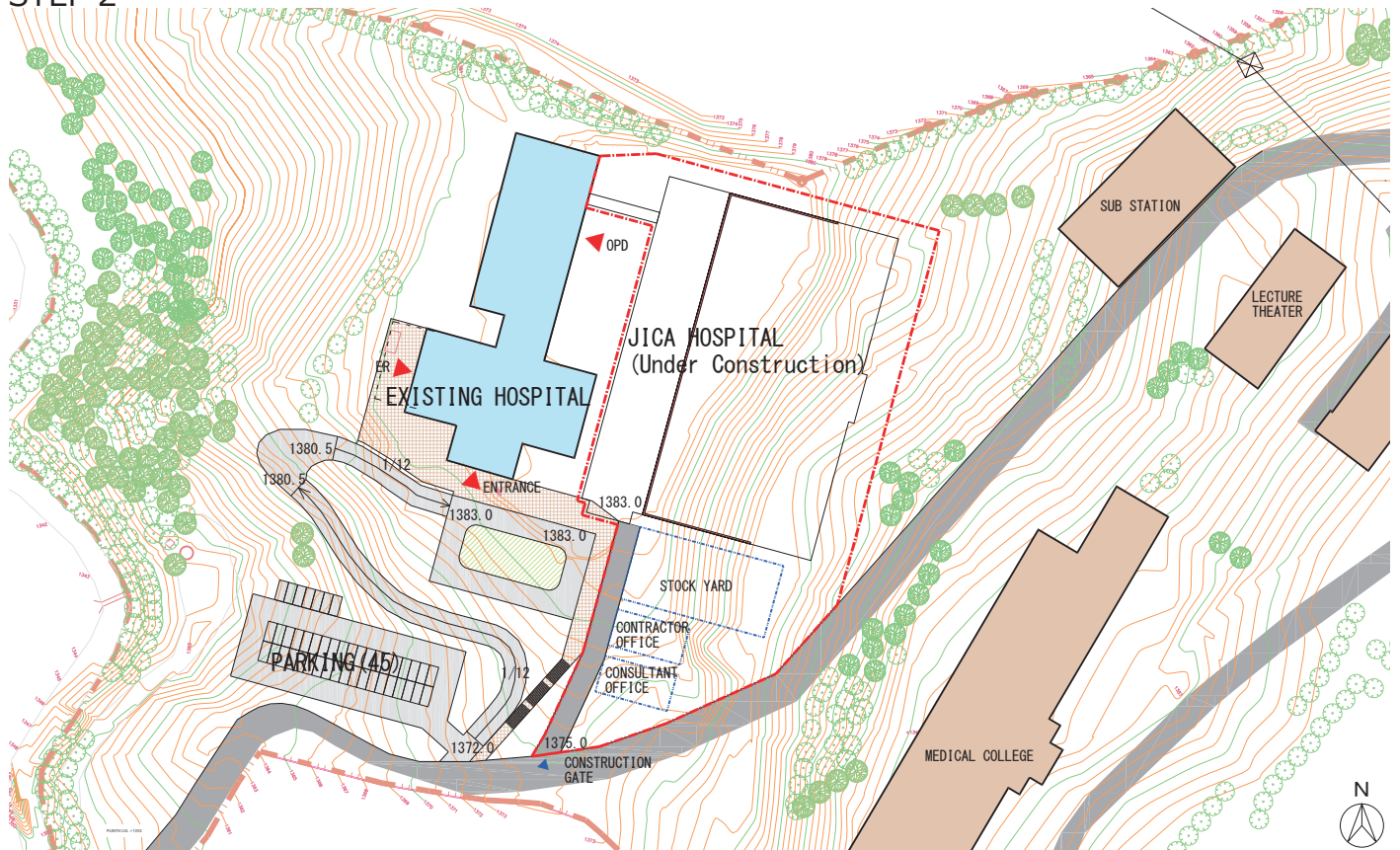
Construction Plan

STEP 1



1. At first, new drive way, new access road and new parking lots will be constructed.
2. During the construction of JICA hospital, those drive way, access road and parking lots can be used for the existing hospital.

STEP 2

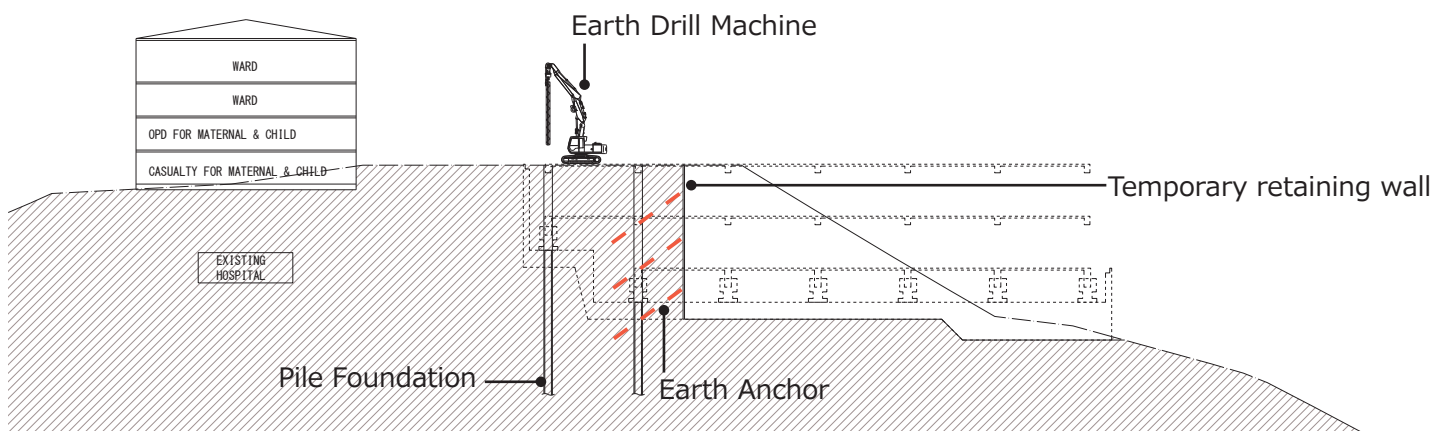
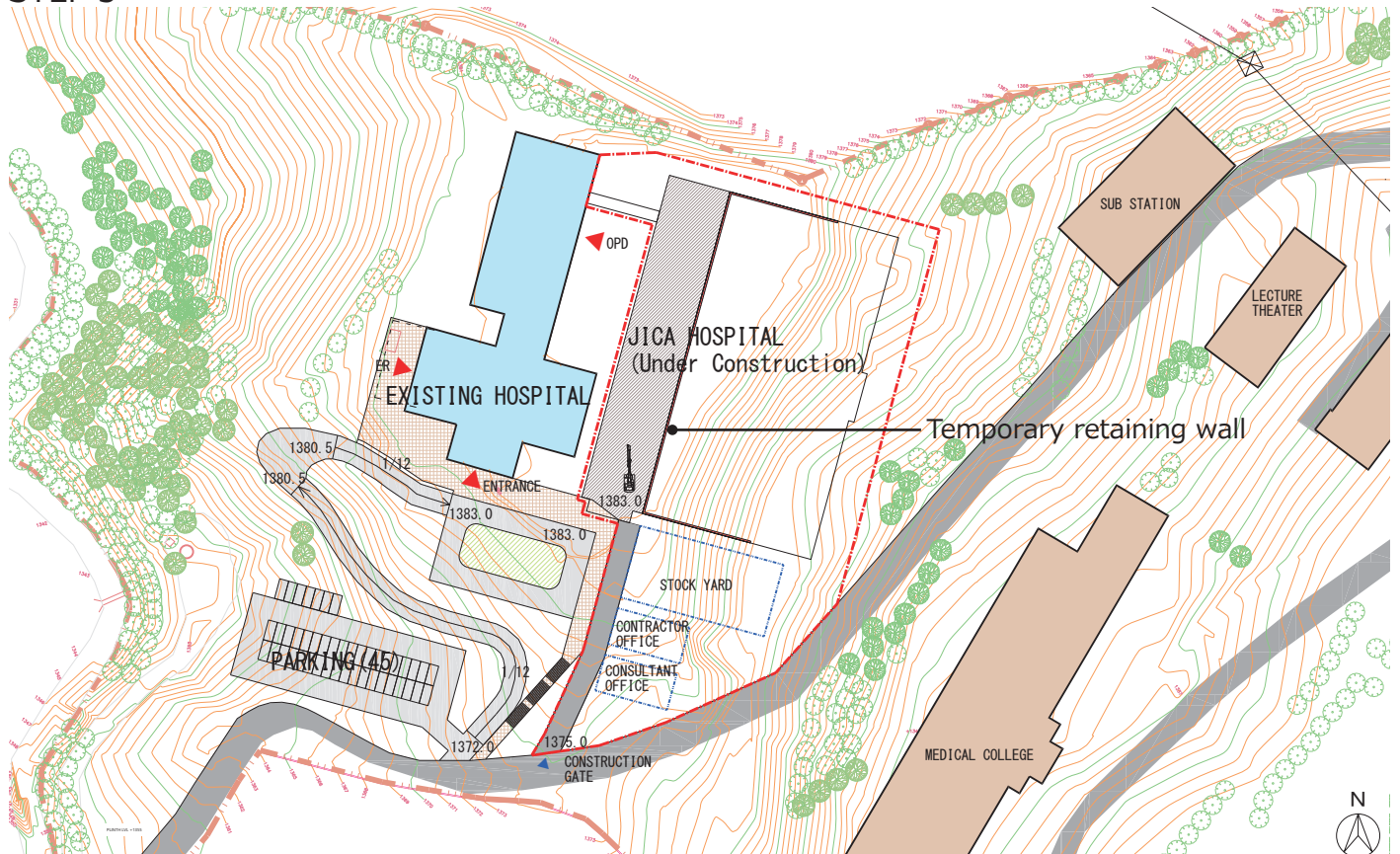


3. During the construction, the safety for the people who access to the existing hospital is secured by separating the approach to the hospital from the construction site.

Nagaland Medical College Hospital Development Project

Construction Plan

STEP 3

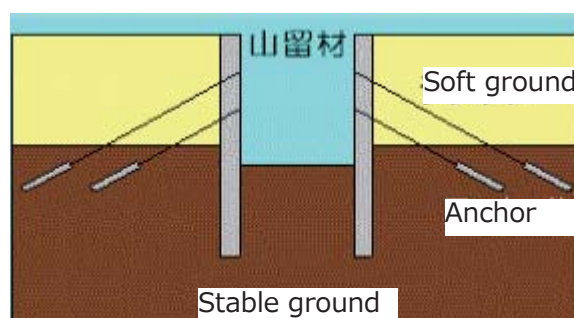


- ※ 1. Actual construction sequences will be determined by the awarded contractor.
 - ※ 2. Actual length and diameter of piles will be determined in the accordance of the result of the geophysical survey in the detailed design stage.
- This figure is just a reference.

4. Set the temporary retaining wall, while cutting the earth.
(In case the ground is hard, the temporary retaining wall may not be required.
Vice versa, in case the ground is soft, earth anchor will be installed.)
5. Pile foundation will be installed from the upper ground. (earth drilling method)



Temporary retaining wall image

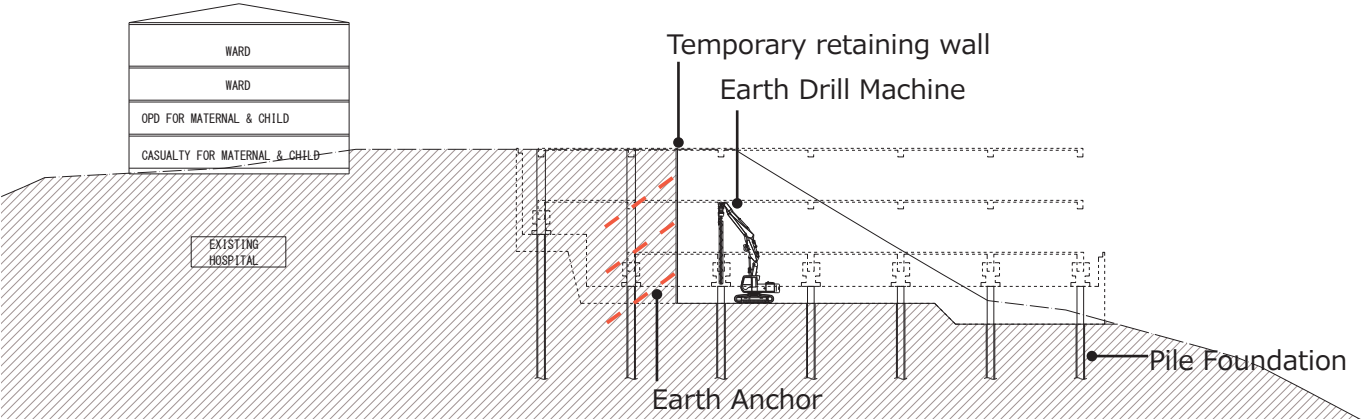
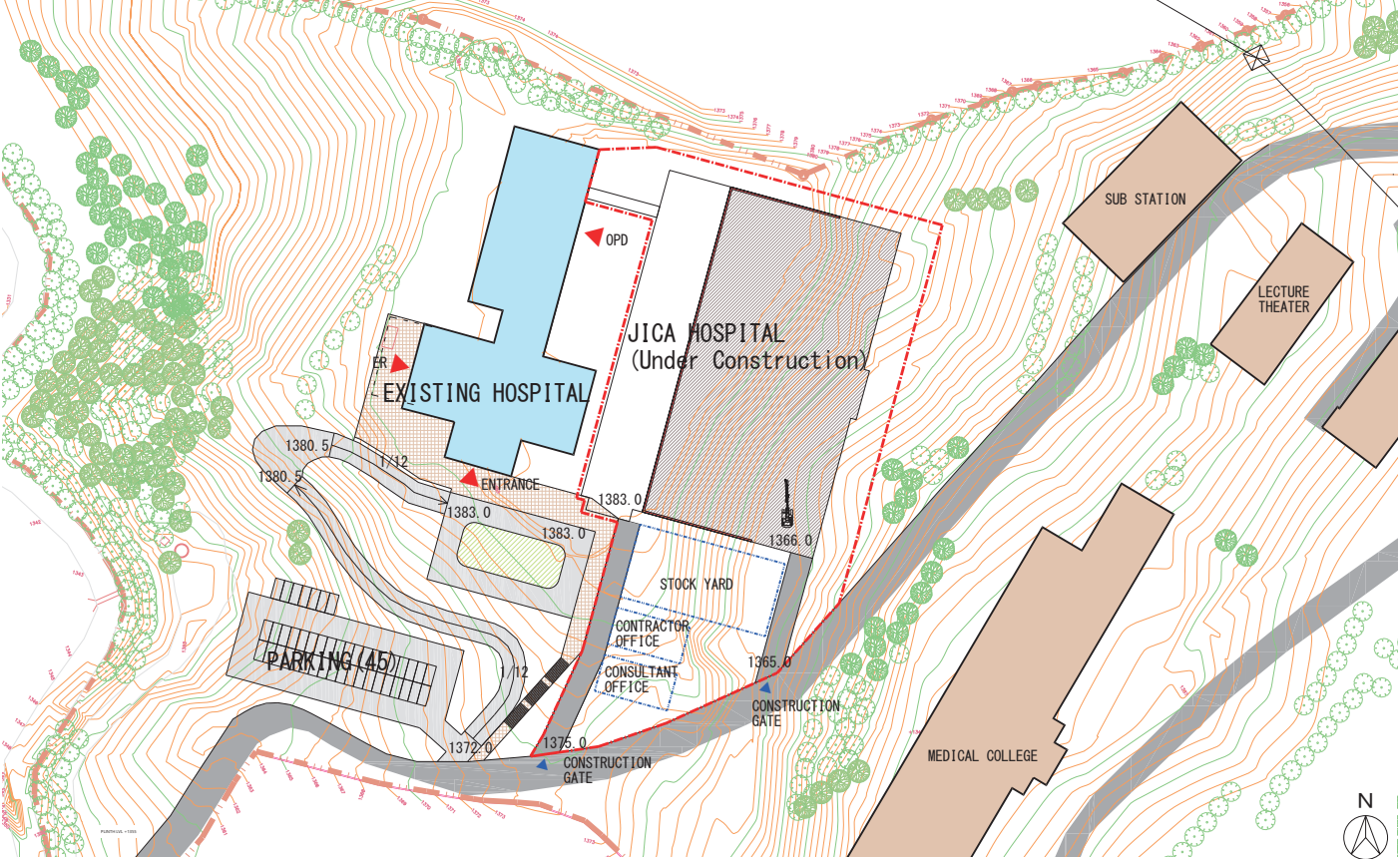


Earth anchor image

Nagaland Medical College Hospital Development Project

Construction Plan

STEP 4



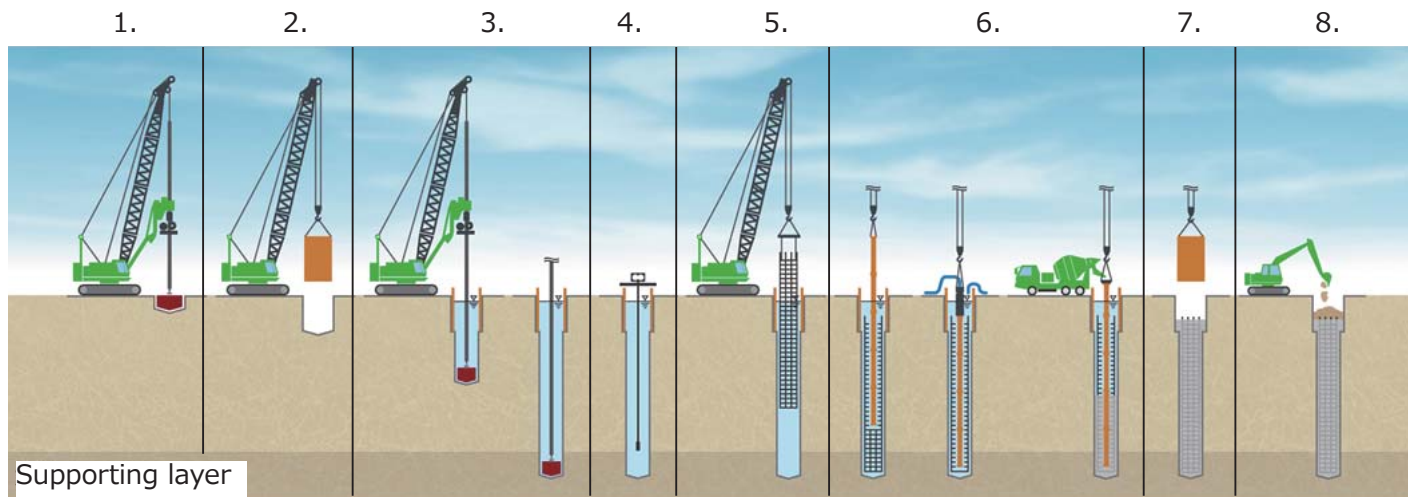
- 5. Temporary access road for the construction vehicles is set at the lower level of the site.
- 6. Pile foundation will be installed on the lower ground. (earth drilling method)



Earth drill machine image

- ※ 1. Actual construction sequences will be determined by the awarded contractor.
- ※ 2. Actual length and diameter of piles will be determined in the accordance of the result of the geographical survey in the detailed design stage. This figure is just a reference.

Earth Drilling Method



1. Drill hole in the ground by earth drilling machine.
2. Insert a thin-walled steel tube (so called casing) into the ground.
3. Remove all earth left inside the tube.
4. Measurement of the hole (confirmation of the misalignment with the design).
5. Install the precast steel reinforcement cage into the hall.
6. Install the tremie tube, then cast the pile by pouring wet concrete into the tube.
7. Remove the casing.
8. Backfilling.

Pile Foundation Merits

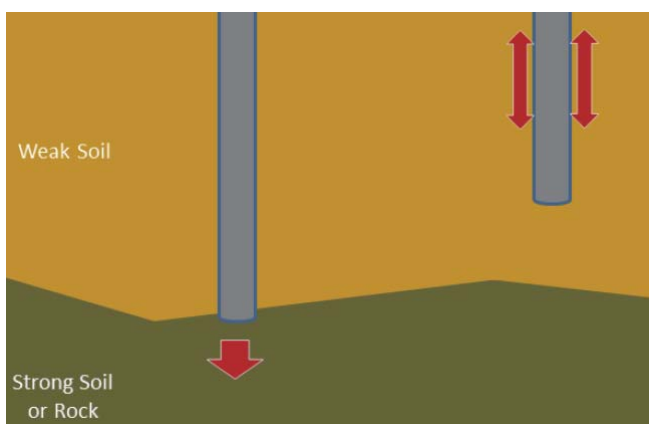
The pile foundation method is commonly used around the world including India as well.

1. Pile foundations are mainly used when a building has very heavy, concentrated loads, such as in a high rise structure.
2. Pile foundations are capable of taking higher loads than spread footings.

There are two fundamental types of pile foundations.(End Bearing Piles and Friction Piles)

In this project, End Bearing Piles are recommended.

3. In end bearing piles, the bottom end of the pile rests on a layer of especially strong soil or rock. The load of the building is transferred through the pile onto the strong layer. The key principle is that the bottom end rests on the surface which is the intersection of a weak and strong layer. The load therefore bypasses the weak layer and is safely transferred to the strong layer.



Appendix 3 Medical Equipment Plan

Basement Floor-2

Laundry

S. No.	Name of the Equipment	Q'ty
1	Washing Mchine	3
2	Drying Machine	3
3	Linen Cart	5
4	Linen Shelf	10
5	Work Table	3

Kitchen

S. No.	Name of the Equipment	Q'ty
1	Gas Rotary Kiln	3
2	Gas Table	3
3	High Speed Oven	2
4	Continuous Fryer	2
5	Electric Fryer	2
6	Food Cutter	2
7	Refrigerator	5
8	Freezer	3
9	3-part Sink	3
10	Ultrasonic Washer	2
11	Elevated Food Vessel Sterilization Storage	3
12	Catering Trolley	5
13	Tray Shelves	10

Oxygen Plant

S. No.	Name of the Equipment	Q'ty
1	Oxygen Plant (530 LPM package, 29 Nm3/hr.)	1

Basement Floor-1

Blood Bank

S. No.	Name of the Equipment	Q'ty
1	Blood Bank Refrigerator	4
2	Deep Freezer (-40 , -80)	4
3	Elisa Reader	2
4	Elisa Washer	2
5	Centrifuge	2
6	Weighing Machine	2
7	Sphygmomanometer	2
8	HB Meter	2
9	Blood Shaker	1
10	Microscope Laboratory	3
11	Incubator Laboratory	2
12	Donor Couch	6
13	Needle Destroyer	2
14	Stethoscope	2
15	Resuscitation Kit	2

Morgue

S. No.	Name of the Equipment	Q'ty
1	Mortuary Table (Stainless Steel)	2
2	P.M. Equipment set (set of 17 in wooden Box)	6
3	Weighing Machines, for Organs	2
4	Measuring Glasses, Liquids	4
5	Plastic Aprons, Disposable	10
6	PM Gloves, Pairs	20
7	Rubber Sheets	20
8	Lens	2
9	Spot Lights	4
10	Cold Storgae Cabinets	10
11	Dead Body Van	3
12	Diesel Generators, 250 kVA	5

Endoscopy Unit

S. No.	Name of the Equipment	Q'ty
1	Oesophago and Upper Gastrointestinal Endoscope Set	1
2	Lower Gastrointestinal Endoscope Set	1
3	Bronchoscope Set	1
4	Cystoscope (Flexible) Set	1
5	Endoscope Washer	1

Diagnostic Imaging

S. No.	Name of the Equipment	Q'ty
1	800 mA X-ray Machine with Image Intensifier TV	1
2	600 mA X-ray Machine	1
4	100 mA X-ray Machine Mobile	1
5	60 mA X-ray Machine Mobile	1
6	Ultrasound Machine Color Doppler with 4 Probes	1
7	Ultrasound Machine Obs & Gynae	2
8	CT Scan 128 slices	1
9	MRI 3.0 Tesla	1
11	Mammography Unit	1
12	Dental X-Ray Machine	1
13	Echocardiograph	1

Accessories for Diagnostic Imaging

Sl. No.	Name of the Equipment	Q'ty
1	Safe light X-ray dark room	4
2	Cassettes X-ray	20
3	X-ray Lobby Single	10
4	X-ray Lobby Multiple	1
5	X-ray Developing Tank	3
6	Lead Apron	8
7	Intensifying Screen X-ray	3

Emergency

S. No.	Name of the Equipment	Q'ty
1	Cardiac Monitor, EtCO2 Available	20
2	Pulse Oximeter with Probes	2
3	Defibrillator	10
4	ECG Machine	2
5	ICU Ventilators	10
6	Transport Ventilators	2
7	HHHFNC	2
8	Infusion Pumps	20
9	Ultrasound, Portable	2
10	100mA X-ray Machine, Mobile	1
11	Resuscitation Cart	10
12	Artificial Self-inflating Breathing Bag	20
13	Laryngoscope	4
14	Point-of-care Device for Cardiac Enzymes, ABG & Electrolytes	1
15	Oxygen Cylinders	20
16	Suction Machines, Portable	4
17	Ultrasonic Nebulizers	4
18	Spine Boards with Slings and Scotch Tape	2
21	Glucometer	2
22	ACLS, BLS and Airways Mannequins (Child and Adult)	1
23	Suturing Mannequin	2
24	Infant Radiant Warmer with Bassinet	2
25	Blood and Fluid Warmer	1
26	Electric Warming Blanket	1

Emergency Ward & Recovery (Ward: 30 Beds, Recovery: 10 Beds)

S. No.	Name of the Equipment	Q'ty
1	Bed	30
2	Bed, Recovery	10
3	Bedside Cabinet	30
4	Overbed Table	15
5	IV Stand	10

Obstetric & Gynecology Department Equipment (Examination)

S. No.	Name of the Equipment	Q'ty
1	Radiant Warmer	5
2	Phototherapy Unit	5
3	Emergency Resuscitation Kit-Baby	4
4	Colposcope	4
5	Fetal Doppler	10
6	CTG Machine	10
7	Proctoscope	6
8	Pulse Oximeter Baby & Adult	4
9	Cardiac Monitor Baby	2
10	Nebulizer Baby	3
11	Weighing Machine Adult Mechanical	1
12	Weighing Machine Baby Mechanical	1
13	Glucometer	2
14	Foot Pump	2
15	BP Apparatus Digital	2
16	Domestic Refrigerator	2
17	Suction Machine (Portable)	2
18	Electrocautery Machine	2
19	Blood Gas analyzer (ABG Machine)	1

Labour Room Equipment

S. No.	Name of the Equipment	Q'ty
1	Labour table	5
2	Normal Delivery Sets	15
3	Vacuum Extractor	4
4	Infusion Pump	4
5	B.P Apparatus Digital	4
6	Fetal Doppler	2
7	CTG Machine	5
8	Portable Ultrasound	2
9	Suction Machine (Portable)	2
10	Resuscitation Tray	2
11	Intrauterine Pressure Monitoring System	4
12	Radiant Warmer/Infant Warmer	4

Operation Theatre (2 Rooms)

S. No.	Name of the Equipment	Q'ty
1	OT Table	2
2	OT Light	2
3	Multi Channel Monitor	2
4	Camera Processor Unit	2
5	Electrosurgical Unit 300B	2
6	Anesthesia Machine	2
7	Diathermy	2
8	Suction Machine (Portable)	2
9	Diagnostic Laparoscopy Set	6
10	Operating Laparoscopy Set	4
11	Tuboplasty Set	6
12	Myomectomy Instruments	2
13	Hysteroscopy Set	4
14	Electro Co2Insufflator 30 LITER	6
15	Speculum & Retractors	70
16	Infusion Pump	6
17	Electric Cautery 300B	4
18	Humidifier	2

CSSD

S. No.	Name of the Equipment	Q'ty
1	Auto Clave HP Horizontal	1
2	Auto Clave HP Vertical	2
3	Autoclave with Burners, 2 Bin, Non Electric, Single Drum	3
4	Autoclave, Vertical, Single Bin, Non Electric, Double Drum	3
5	Flash Sterilizer	1
6	Instrument Sterilizer, 20" x 8" x 7"	1
7	Instrument Sterilizer, 16" x 4" x 4"	2
8	Instrument Sterilizer, 12" x 6" x 4"	3
9	Bowl Sterilizer, Big	3
10	Bowl Sterilizer, Medium	1
11	Ethylene Oxide Sterilizer	2
12	Microwave Sterilizer	1
13	Storage Cabinet	2
14	Instrument Cabinet	2
15	Laundry Cart	2
16	Work Table	2

Paediatrics (Examination)

S. No.	Name of the Equipment	Q'ty
1	Laryngoscope Infant	4
2	Laryngoscope Children	4
3	Drug Delivery Equipment / Catheter / Tube	10
4	Infant	4
5	Child	4
6	Neonates	4
7	Infantometer	3
8	Stadiometer	4
9	Measuring Tape	5
10	Shakir's Tape	5
11	Digital Thermometer Oral Digital	6
12	BP measuring Instrument with various cuff sizes Digital	6
13	Bone Marrow Needle	10
14	Lumbar Puncture (LP) Needles	10
15	Pleural Aspiration Needle	10
16	Vim-Silverman Liver Biopsy Needle	10
17	True Cut Renal Biopsy Needle	10
18	X-ray View Box	6
19	Glucometer	5
20	Ophthalmoscope	1
21	LED Phototherapy Unit	10
22	Resuscitation Kit	3
23	Laryngoscope Infant & Children	2
24	Suction Machine (Portable)	4
25	Pulse Oxymeter	4
26	BP Apparatus Digital	3
27	Stethoscope	3
28	Nebulizer	3
29	Room Heater	3
30	Electronic Weighing Scale	2
31	Cytoscope Pediatric	2
32	Rigid Bronchoscope (sets)	2
33	Esophageal Dilators (sets)	2
34	Pediatric Sigmoidoscope	2
35	Ventilator (Neonatal + Child)	4
36	Anesthesia Machine with Circle Absorber & Vaporizer	2
37	Boyles Apparatus	2
38	Drug Deliver Equipment's / Cather / Tube	5
39	Measuring Equipment's Infantometer	2
40	Infant Incubator	2
41	Ophthalmoscope	1

NICU / SNCU

S. No.	Name of the Equipment	Q'ty
1	Radiant Warmer/Infant Warmer	20
2	Phototherapy Unit	20
3	Infusion Pump	5
4	Weighing Machine	2
5	Multipara Monitor	4
6	Suction Machine (Portable)	2
7	Nebulizer	10
8	CPAP Machine	5
9	Infantometer	5
10	Room Warmer	10
11	Drug Trolley (Big) SS Framework	4
12	Ventilator (Neonatal + Child)	5
13	Infant Incubator	5

Immunisation

S. No.	Name of the Equipment	Q'ty
1	Weighing Machine Digital	1
2	BP Apparatus Digital	2
3	Stethoscope	2
4	ILR	1
5	Domestic Refrigerator 500 lit.	1
6	Crash Cart Trolley	1
7	Resuscitation Kit	2

Ward: Obs & Gynae: 50 Beds (25 Beds x 2 Blocks)

Staff Station for A Block

S. No.	Name of the Equipment	Q'ty
1	Work Table	2
2	Chair	14
3	Filing Cabinet	4
4	Storage Cabinet	4
5	Medicine Trolley	6
6	Suction Machine	2
7	Blood Pressure Meter Digital	2
8	IV Stand	7
9	Weighing Scale	2

Dirty Utility Room (Waste) for A Block

S. No.	Name of the Equipment	Q'ty
1	Bedpan	10
2	Bedpan Washer	1
3	Bedpan Rack	4

Ward: 25 Beds for A Block

S. No.	Name of the Equipment	Q'ty
1	Bed	25
2	Bedside Cabinet	25
3	Overbed Table	25

Staff Station for B Block

S. No.	Name of the Equipment	Q'ty
1	Work Table	2
2	Chair	14
3	Filing Cabinet	4
4	Storage Cabinet	4
5	Medicine Trolley	6
6	Suction Machine	2
7	Blood Presssure Meter, Degital	2
8	IV Stand	7
9	Weighing Scale	2

Dirty Utility Room (Waste) for B Block

S. No.	Name of the Equipment	Q'ty
1	Bedpan	10
2	Bedpan Washer	1
3	Bedpan Rack	4

Ward: 25 Beds for B Block

S. No.	Name of the Equipment	Q'ty
1	Bed	25
2	Bedside Cabinet	25
3	Overbed Table	25

General Services**Laundry**

S. No.	Name of the Equipment	Q'ty
1	Washing Mchine	3
2	Drying Machine	3
3	Linen Cart	5
4	Linen Shelf	10
5	Work Table	3

Kitchen

S. No.	Name of the Equipment	Q'ty
1	Gas Rotary Kiln	3
2	Gas Table	3
3	High Speed Oven	2
4	Continuous Fryer	2
5	Electric Fryer	2
6	Food Cutter	2
7	Refrigerator	5
8	Freezer	3
9	3-part Sink	3
10	Ultrasonic Washer	2
11	Elevated Food Vessel Sterilization Storage	3
12	Catering Trolley	5
13	Tray Shelves	10

Appendix 4 Minutes of Stakeholder Meeting

**MINUTES OF MEETING
OF
PUBLIC CONSULTATION ON
ENVIRONMENTAL & SOCIAL IMPACT
ASSESSMENT OF
NAGALAND MEDICAL COLLEGE HOSPITAL
PROJECT**

PROJECT	NAGALAND MEDICAL COLLEGE HOSPITAL
MEETING VENUE	CONFERENCE HALL, DHFW KOHIMA, NAGALAND
MEETING DATE & TIME	07.03.2023, 10:30 A.M.
MEETING TYPE	OFFLINE
COORDINATED & CONDUCTED BY	JICA SURVEY TEAM
SUPPORTED BY	DEPARTMENT OF HEALTH & FAMILY WELFARE, GOVERNMENT OF NAGALAND

MINUTES OF MEETING OF THE PUBLIC CONSULTATION ON ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT PREPARATORY SURVEY WORK FOR NAGALAND MEDICAL COLLEGE HOSPITAL PROJECT, PHRIEBA, KOHIMA, NAGALAND, INDIA	DOCUMENT NO.SBA/GC REVISION: 0 DATE OF ISSUE: 12.04.2023
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NOTICE FOR PUBLIC HEARING

**GOVERNMENT OF NAGALAND
DIRECTORATE OF HEALTH & FAMILY WELFARE
NAGALAND: KOHIMA**

No. DHFW-8/33/JICA/Pl/2022// 8521 //Dated Kohima, the 03rd March 2023

NOTICE FOR PUBLIC HEARING

It is for the information of all concerned that Directorate of Health & Family Welfare, Government of Nagaland proposes to establish a Medical College & Hospital at Phriebagic, Kohima, Nagaland. Japan International Cooperation Agency (JICA), while supporting the proposed project has taken up the Environmental and Social Impact Assessment (ESIA) in its Preliminary Survey Work to find out the Environmental & Social Setting of the Project Area and Surroundings. The ESIA will study the present scenario and will suggest the mitigation measures for adverse impacts and provide Environmental and Social Management and Monitoring Plan.

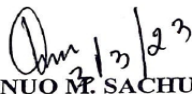
As a part of the procedure for ESIA, Environmental and Baseline and Social Survey has been carried out in the month of January 2023. Further, in order to purport the project details and findings of the survey conducted a Public Hearing for the above-mentioned project has been fixed for 07.03.2023 at 10:30 am at Conference Hall, DHFW Kohima, Nagaland.

Copies of the Executive Summary is available at the Office of the Principal Director, Directorate of Health and Family Welfare Department, Government of Nagaland, Kohima and can be obtained by the public from the same.

Notice is hereby given to all concerned to file suggestions, views, comments and objections, if any, on the proposed project, to The Principal Director, Directorate of Health and Family Welfare Department, Government of Nagaland, Kohima and PCCF & HoFF, Department of Environment, Forests & Climate Change, Government of Nagaland, Kohima

In this regard, a Public Hearing will also be held on the Date, Time and Venue mentioned above, which can be attended by any person including environmental groups, bonafide residents and others. Oral/written suggestions, if any can also be made during the Public Hearing.

No TA/DA will be admissible for attending the Public Hearing.


(DR. VIBUITUNUO M. SACHU)
 Principal Director
 Directorate of Health & Family Welfare
 Nagaland: Kohima

No. DHFW-8/33/JICA/Pt/2022//
Copy to: -

8521

//Dated Kohima, the 03rd March 2023

List of People / Officers for the Public Hearing

1. Commissioner & Secretary, HFW Nagaland
2. Principal Chief Conservator of Forest/ HoFF, Department of Environment, Forest & Climate Change, Kohima
3. Principal Director, DHFW
4. Deputy Commissioner, Kohima
5. District Forest Officer, Kohima
6. Member Secretary, Nagaland Pollution Control Board
7. Chief Engineer, PWD (Housing) Department
8. District Magistrate/ Sub-divisional Magistrate, Kohima
9. Mission Director, NHM
10. Director (Health), DHFW
11. Project Director, NHP
12. Director cum Dean, NIMSR
13. Dr. C. Tetseo, Additional Director DHFW
14. Dr. Toshirenl, Additional Director DHFW
15. Managing Director, NHAK
16. Medical Superintendent , NHAK
17. Dr. Neisakho Kere, Joint Director DHFW
18. Dr. Kikameren, Joint Director DHFW
19. Dr. M. C. Longai, Deputy Director DHFW
20. Dr. John Kemp, Deputy Director DHFW
21. Dr. J. Hokugha Sema, Deputy Director DHFW
22. Dr. Nitovi Shikhu, Deputy Director DHFW
23. Dr. Thritingla, Deputy Director DHFW
24. Executive Engineer, MED & Team
25. JICA Co-ordinator
26. Hospital Administrator, NIMSR
27. Village Council Chairman/ Members
 - a. P-Khel, Kohima Village
 - b. Thizama Village
 - c. Meriema Village
28. IEC, DHFW for photography/ videography


(DR. VIBUITUNUO M. SACHU)

Principal Director
Directorate of Health & Family Welfare
Nagaland: Kohima

MINUTES OF MEETING OF THE PUBLIC CONSULTATION ON ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT PREPARATORY SURVEY WORK FOR NAGALAND MEDICAL COLLEGE HOSPITAL PROJECT, PHRIEBA, KOHIMA, NAGALAND, INDIA	DOCUMENT NO.SBA/GC REVISION: 0 DATE OF ISSUE: 12.04.2023
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PUBLIC CONSULTATION PROCESS MODERATORS

SL. NO.	NAME	DESIGNATION / STATUS	ROLE PLAYED
1.	Sajjathe Sulthan	ESIA Coordinator, JICA Survey Team	Presenter
2.	Dr. E. Motsuthung Palton	Director (Health), Department of Health and Family Welfare	Presided over the Meeting
3	Dr. Kikameren Longkumer	Joint Director, Department of Health and Family Welfare	Project Coordinator

PUBLIC CONSULTATION PARTICIPANTS

The meeting was held at the Conference Hall of Department of Health & Family Welfare (DHFW), Kohima and was attended by the following participants:

SL. NO.	NAME	GENDER	GOVERNMENT / COMMUNITY	ADDRESS
1	Killhousetuo Rutso,	Male	Community	P. Khel Kohima Village, Chairman of Village Council
2	Wetemer	Male	Government	UDA
3	Sendongfeisnir	Male	Government	DHFW, Kohima
4	Dziesekuolie Kiso	Male	Government	DHFW, Kohima
5	Sudhan Sena	Female	Government	DHFW, Kohima
6	Thepmojoyo	Male	Government	DHFW, Kohima
7	Dr. Neisakho	Male	Government	DHFW, Kohima
8	Dr. Longai	Male	Government	Deputy Director, DHFW
9	Er. Jeminch Thong	Female	Government	DHFW
10	Akangmeren Imcher	Male	Government	Scientist 'B' Nagaland Pollution Control Board
11	Limitsa S. Sangtam	Male	Government	Scientist 'B' Nagaland Pollution Control Board
12	S Supongnukshi	Female	Government	Chief Conservator of Forests, Department of Forest

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13	Dr. John Kemp	Male	Government	Deputy Director, HFW
14	Abeille Solomon	Male	Government	Hospital Administrator, NIMSR
15	Dr. Sevano Seletu	Male	Government	Assistant Conservator of Forests, , Kohima Forest Division
16	Dr. Alem Wesary	Male	Government	SPO NPCDCS / North JICA
17	Khonthungo	Male	Government	Deputy Secretary, H/FW
18	Dr. E. Motsuthung Palton	Male	Government	Director (H), DHFW
19	Thinuohelie Sachii	Male	Government	Research Officer
20	Dr. Nitovi Shikho	Male	Government	Deputy Director, DHFW
21	Dr. Nyan Kikon	Male	Government	Deputy Director, NPCCHH
22	Temjenyuba	Male	Government	Field Coordinator, JICA Survey Team
23	Marsen	Male	Government	FWA, DHFW
24	Jean	Female	Government	Health Education Officer, DHFW
25	Merenunlo	Male	Community	Merima Village
26	Alugilo Jamir	Male	Government	District Forest Officer, Department of Forest
27	Veku	Male	Community	Thizama Village
28	Ngakulembo	Male	Community	Rusoma Village
29	Dr. Kikameren Longkumer	Male	Government	Joint Director DHFW
30	Irakong	Male	Community	Rusoma Village

MINUTES OF MEETING OF THE PUBLIC CONSULTATION ON ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT PREPARATORY SURVEY WORK FOR NAGALAND MEDICAL COLLEGE HOSPITAL PROJECT, PHRIEBA, KOHIMA, NAGALAND, INDIA	DOCUMENT NO.SBA/GC REVISION: 0 DATE OF ISSUE: 12.04.2023
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PROCEEDINGS OF THE PUBLIC CONSULTATION

Dr. E. Motsuthung Palton Director (Health) DHFW has presided over the Public Consultation Program and delivered the welcome address invitee all the participants present in the Public Hearing Hall. He had given the brief on the significance of the meeting and briefed about the salient features of the project. He emphasized the need of the medical college hospital project as, there are few public hospitals and medical facilities are in service for the public of the state of Nagaland. Moreover, he pointed out that there are no medical college present in the entire state of Nagaland and the aspiring students of Nagaland has to go away for obtaining medical education and hence the availability of medical professionals in the state is very much limited.

He said that the gathering is to conduct the public consultation for Social and Environment Impacts Assessment of the project. A comprehensive survey in this regard has been carried out. He asked all participants to share any suggestions and objections regarding the project. Then, he invited Mr. Sajjathe Sulthan to present the findings of the ESIA and deliberate the observations during the survey.

Mr. Sajjathe Sulthan thanked him for addressing the participants present and starting the public consultation. He asked the participants to make the program interactive and alive. He delivered the detailed features of the project and discussed the important factors about the project based on his teams' observations and analysis. He emphasized upon the basic requirement of the studies and the requirement of ESIA by JICA to form the support of the project. JICA is very much keen about the environmental and social impacts of the project. The study was conducted to identify the environmental and social setup of the project area and analyze the project components to arrive at the impacts caused upon the environment as well as the social well-being of the study area. The findings of the study were discussed in detail by presenting through a series of PowerPoint slides to the participants.

He briefed about the salient features of the project, the baseline observations, impacts, and mitigation measures undertaken and proposed. The essence of his presentation consists;

- He started with the briefing of basic details of Public Consultation like Public hearing date, time and place. He added by talking about the agencies executing the Project.
- Further he started with the Introduction about the project by telling the capacity of the Hospital which is of 500 beds. He added that it is a good opportunity for the students of the state of

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Nagaland to peruse their career in medical field in their own state and does not have to travel elsewhere. Along with career options, public also faces various issues for travelling far to get the medical aid and treatment for chronic / serious ailments, which can be avoided because of the establishment of hospital and it will also save the time for and lifesaving. It will help in reducing the mortality rate of the state. The objective of the Project is to establish tertiary level medical system and enhancing healthcare and human resources. It will serve as a useful entity for the entire Nagaland. Components of the project and new buildings, installation of medical equipment's. Development of Medical College, Institutional Infrastructure, Hostels and allied infrastructure. He explained that the survey is carried out in the beginning stages so that every aspect- design, etc. focuses to consider environment and social deeds as it is important to set-up a project and protect the environment as well. Sustainable model for establishing and operation of the project is considered in the earlier stage itself. Consider sustainable model for each and every project and it is started in the initial stage itself. Target area for the project benefits is the complete state of Nagaland.

- Moving onto the background of the project, Nagaland Medical College Hospital plays an important role in diagnosis, treatment, human resource, development, information dissemination and research. As the Healthcare cost of the private facilities are higher therefore majority of the public in Nagaland uses public health facilities which are less in number and reasonable medical care is important for a sustainable development. He informed that there are no medical college hospital in the Nagaland. District Hospitals are 12, Community Health Center- 34 and Primary Health Center are 142, Urban Primary Health center are 7, and sub-centers are 577.
- Further, the master plan of the Project was presented which shows the series of well-defined building blocks. In a master plan, everything has been pre-planned so that every medical facility will be placed in an orderly manner to work in a sequential manner and avoid any haphazard situation. According to the plan, boy's hostel, girl's hostel, library, adequate amount of parking area in the Hospital and pedestrian access will be there. Land will be utilized in a better way and far as carbon foot printing is concerned it will be taking care of to reduce the level of carbon emissions during construction as well as during operation by implementing the mitigation measures mentioned in ESIA report.
- Location of the project area is identified with the coordinates as well as google image.
- Various features of the study area are stated during the meeting which are as following:

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Site is connected via NH29 highway. It has the nearest airport in Dimapur. Kohima Zubza railway station is upcoming which 20.8kms from the project site is and currently Dimapur railway station is in use is 74.1kms from the project site. Educational institutions are there near the site. Nearby Hospital is Naga Hospital which is utilized and GIVF hospital which is in 6.3 kms distance. There are various churches and the nearest one is Agape Church in 5.5kms. There are no archaeological sites, there are no reserved and protected areas near the site. Kohima comes in Siesmic Zone-V and the total capacity of the hospital is 500 beds. So far 50 acres of land is acquired.

- In environmental and Social survey, firstly screening of the project was conducted to understand the impacts likely. He explains the purpose of conducting the ESIA study by adding: ESIA's goal is to identify and mitigate any potential negative social and environmental effects and to create an environmental and social management plan to ensure that there are no unfavorable effects and that development proceeds sustainably.
- For assessment and evaluation of environmental and social characteristics, the study area depicted and a 10-kilometer radius around it are taken. The samples of soil, ambient air, noise, and water, both groundwater and surface water. For social survey many people were surveyed to understand the socio-economic as well impacts caused by project to the society. There are extremely few sources of surface water. To collect the surface water sample, a nala has been discovered close to the project site.
- Ambient air monitoring was done, and all the important factors were considered. The monitoring findings were in compliance with the national ambient air quality standards. As the north-eastern states have the best air quality, it is crucial to preserve the state's air quality. It is important to consider the air quality as it will be concern in later stages. Therefore, early precaution is better.
- A 10 km radius around the region was covered for water, including surface water and groundwater. It was discovered that surface water was somewhat polluted. Despite the good water quality, coliforms were discovered in the water. At the very least, boiling the water is crucial if someone is using it. The majority of the water used there was contained water, which is acceptable for drinking purposes, but using surface water directly for drinking purposes is not recommended. The groundwater quality is good near to the project site and is within the limits set by IS: 10500-2012, and we'll keep it that way.

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- Both daytime and night time noise levels were assessed in accordance with the noise quality regulations. The project location has a somewhat loud noise level due to the construction going on.
- The type of soil sample is a sandy clay. The nature of soil is slightly alkaline and the organic carbon content is 0.55% in the sampling soil.
- The Kohima city's statistics are provided and according to the study conducted, the majority of people work for the Government or in the Private Sector. Business in various areas is the next prevalent occupation in and around the project site. Agriculture is the most prevalent occupation, coming in third.
- There is a good rate of literacy. However, it would be preferable if the graph were raised higher.
- When it comes to predicted effects and mitigation strategies, noise level is slightly high because it cannot be avoided during the construction period, but workers can be given certain safety precautions. To discourage the presence of public, announcements regarding the project site's boisterous and obtrusive activities should be made. Workers who are subjected to loud noise will be given hearing protection devices. Heavy machinery will only be used for a brief period of time.
- Motorized equipment should be in good working order to minimize dangerous emissions. The vehicles need to periodically undergo maintenance; otherwise, emissions will add to air pollution. Heavy trucks need to be covered or watered down to avoid. It is crucial to make sure that this approach is put into action. It is advised to cover open stockpiles of construction during rainy season. Routine maintenance and servicing of machinery is important. Use of erosion and sediment control techniques like silt barriers is also helpful.
- The workers' protection will be ensured by safety precautions.
- Any demolition materials that will be transported as solid waste should be separated and put in good use. Since construction is ongoing in the project site, there will be a generation of C&D waste; consequently, it is crucial to dispose of it effectively.
- One of the main issues is traffic, which makes it challenging to get from one location to another. If an elderly or seriously sick or injured person needs to go to the hospital, the traffic will make it challenging for them to go far. Therefore, it is crucial to monitor and handle traffic management.

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- Since it is a hospital, there will be a lot of water usage and the production of biomedical effluent and biomedical solid waste, so we must take care of it. Waste water treatment procedures will be prepared, and they must be followed for proper waste management.
- Using water-saving technologies for water consumption such as dual flush toilets and automation, whenever possible, is a disciplined way to practice water conservation. Rainfall occurs in heavy amount in the project site and as there is no source of surface water therefore rain water harvesting is suggested. Rain water harvesting is a good practice. It will help to rejuvenate the groundwater as well as will be utilized by the future generation.
- Coming to socio-economic part of the presentation following points were expressed-
 - Through improved access to specialized services, the future development will have a favorable effect on the health of local residents in the area. It will contribute to improving healthcare facilities. The ability to service a large number of individuals will also be improved. It will assist in generating income as well.
 - Employment opportunities will be provided to the local people.
 - About 33% of the entire area will be developed for the greenbelt.
- For Environment monitoring and management following points will be considered-
 - Waste generation, both hazardous and non-hazardous, will occur. Municipal authorities can receive solid waste, while authorized dealers can get hazardous waste.
 - For daily air quality monitoring, a continuous display configuration is crucial. Grab sampling will be used for monthly stack monitoring. Once every six months, the ambient air quality will be checked.
 - To assess the quality of the water, all of the water's parameters should be tested in-house every day and externally once a month. In terms of waste water quality, it is possible to test it once a week for all the characteristics outlined by the CPCB and NPCB.
 - For noise, it is necessary to examine both point source and ambient noise, as well as DG set noise.
 - Occupational health monitoring of employees needs to be carried out once in a year.

Above points were related to the study conduct by the survey team and to conclude Mr. Sulthan delivered the final points-

- ✓ The construction & operation of Hospital and College will bring a number of beneficial impacts such as improvement in the health care services, education and promotion of economic

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activities but it will also have some potential adverse impacts to human health and environment from the construction and operation.

- ✓ ESIA study has identified, predicted and evaluated the beneficial as well as adverse impacts. It has also suggested mitigation measures for the augmentation of the beneficial impacts and elimination or minimization of the adverse impacts.
- ✓ It was found that the beneficial impacts out-weigh the adverse impacts. It is also possible to eliminate or minimize the adverse impacts by carrying out the measures as suggested in the report.
- ✓ Statutory approvals need to be applied which includes Pollution Control Board, Fire Occupational Health for further processing and work.
- ✓ Considering these positive socio-economic and environmental benefits which will accrue as a result of the development, and the Environmental & Social report having found no major significant negative impacts to arise from the development, it is our recommendation that the project should be allowed to proceed on the understanding that the Nagaland Medical College and Hospital will adhere to the mitigation measures recommended herein and will further implement the proposed Environmental and Social Management and Monitoring Plan (ESMMP).

Mr. Sajjathe Sulthan anticipated that the management will put all efforts to implement the suggestions given in EIA report. There will not be any pollution problem from this project. He then sought public opinion on the project and express willingness to clarify their queries.

REPLY TO THE SUGGESTIONS / QUESTIONS RAISED FROM PARTICIPANTS

These suggestions/observations/recommendations/objections by the participants have been noted and the replies for each have been addressed and incorporated in ESIA report. The clarification for the comments/concerns regarding quarry is detailed below:

Sl. NO.	PARTICIPANTS COMMENTS	REPLY FROM THE DAIS
1.	Dr. Nyan Kikon, Deputy Director, NPCCHH • He asked about the activities that are polluting the ambient air quality of the state of Nagaland.	• Main reason for causing pollution in the state is because of automotive emission. Majorly because people are using old vehicle which are emitting pollutants in high quantity. It can be suggested to

	He also said that the use of fire-wood is common in the state	the Transportation department of the state for taking actions and care of old vehicles. LPG is suggested by the government but there is a cost difference which is making it difficult for the public to completely switch into use of LPG.
2.	Limitsa S. Sangtam, Scientist 'B' Nagaland Pollution Control Board NPCB - He discussed that the NPCB is monitor the air quality of the state and from last 5 years it is observed that the RSPM in Kohima is increasing, therefore what reasons are involved in this change? - He added that currently there is no Biomedical waste treatment facility in the state of Nagaland. As per Biomedical Waste Rule 2016, there should be a treatment facility in 75kms of radius. Therefore, is there any suggestions mentioned in the report regarding this? - He also asked about the ETP that the capacity generation is not very clear - He asked that the surface water sampling shown in the presentation is done from which source? - What will be the source of water for Hospital? Will the quantity be enough	- Main source of increasing pollution can be use of old cars as mentioned above as well construction work. Even in Kohima city lot of construction work is seen causing spreading of dust particles. - Currently there is no incineration facility but it is proposed in ESIA report that in-house biomedical waste treatment facility will be set-up in the hospital so that the dependency on other states for treatment of biomedical the waste will be terminated. Therefore, it will be done in-house facility and in a compact environment. Hence, it is necessary to encourage this set-up for future benefits. - Hospital staffs will be trained to segregate Biomedical Wastes and segregated waste will be stored in respective color-coded bins. - ETP capacity and all the Mitigation plan details will be mentioned in the ESIA

	from the source for consumption? In Kohima if rainwater harvesting is carried out, it will be sufficient to use as a source for water consumption as well as it will be used for recharging the groundwater?	report. Depending on the no. of beds and OPD the estimated amount of waste generation will be calculated and accordingly the ETP designing will be done. - It is not a major source of water, it is like a canal with some sewage as surface water sources are not available in the nearby area of Project Site. - Groundwater will be used for hospital as there are no other sources available that can be used for water consumption. If there are any sources available, they will be considered. - Rainwater harvesting is a good option but it will not be sufficient to fulfil the water requirement. Rainwater harvesting will be used for groundwater recharge as well.
3.	Supongnukshi, Chief Conservator of Forest - He queried that he would like to understand that why there is no proper public hearing is conducted as per EIA notification, 2006? - He added that energy is considered a big factor in the Nagaland. Alternative sources of energy like renewable, solar energy etc. should be utilized.	- For this project as per EIA, notification Environment Clearance is not mandatory as it is a hospital and college project which does not come under the EIA notification. Considering the project, Environment and Social impact assessment is done so that the impacts due to the project can be analyzed and mitigation measures, if there are negative impacts, can be pre-prepared. - Solar energy will be used as one of the

		source of power generation and other energy alternatives will be studied and considered by the JICA team as well.
4.	Kilhousetuo Rutso, P.Khel Kohima Village, Chairman of Village Council • He suggested that the name written of the village is not Phriebagie and instead it is Phriebea. • He said that the medical project is a big project, connecting approach road with the national highway road to this site. Therefore, unnecessary use of the road may create issues which should be handled properly and concerned authorities should consider this with priority. • He also added that the power supply should be increased as there will be increase in power load use when the hospital will be in full operation. • And he put forward the concern about the public turning the hospital area into a picnic spot and disturbing the other citizens as well as it may create a traffic congestion in later days for transportation. Therefore, he asked the authorities to look into the matter and consider the issues.	• The suggestion was appreciated and name of the village will be changed accordingly. • All other suggestions will be considered and discussed with the concerned authorities to prepare a plan for avoiding such issues in future. • For road congestion, concerned authorities are already approached and there will be a prior solution ready to face such issues in near future.
5.	Dr. Neisakho, DHFW,Kohima • He suggested during the consultation	• Cleanliness will be focused in the project site as it can not only create

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	that Nagaland state is into malaria elimination, therefore it is necessary that the project should also try to avoid creating places that can generate the mosquitos and avoiding spread of malaria.	place for mosquito breeding but can also be harmful in other ways. Workers will be employed to manage the cleanliness of the hospital and institutional premise.
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With above comments and suggestions, the Public Consultation was ended in the note of considering all the applicable points in ESIA as discussed during the meeting.

PHOTOS OF THE PUBLIC HEARING



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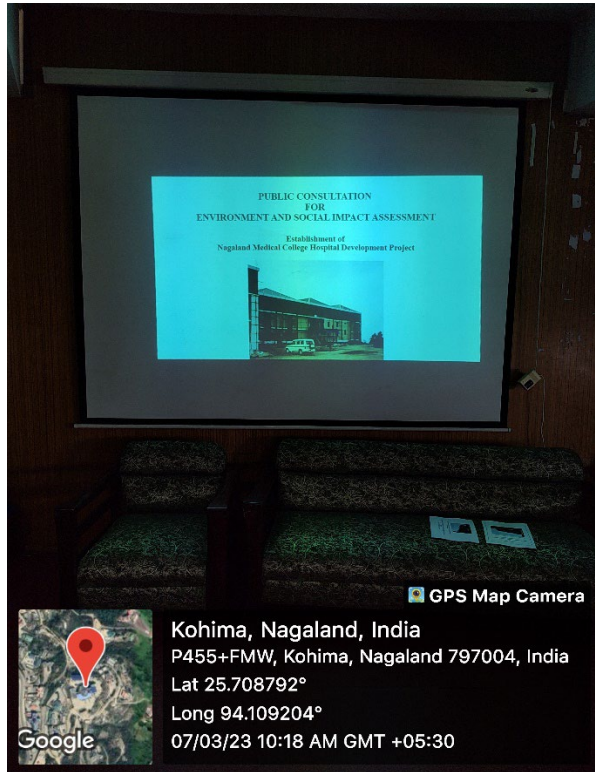
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Appendix 5 Human Resource Deployment Plan

Department	Position	2023 (LOP1)	2024 (LOP2)	2025 (LOP3)	2026 (LOP4)	2027 (LOP5)	2028 (Recognition)
1	Anatomy	15	15	15	15	15	15
	Professor	1	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst.Prof.	2	2	2	2	2	2
	Tutor/Demonstrator/Sr. Res	3	3	3	3	3	3
	Technician	1	1	1	1	1	1
	Dissection Hall Attendant	4	4	4	4	4	4
	Store Keeper/ Clerk/ Computer Op.	1	1	1	1	1	1
	Sweeper	2	2	2	2	2	2
2	Physiology	11	11	11	11	11	11
	Professor	1	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst.Prof.	2	2	2	2	2	2
	Tutor/Demonstrator/Sr. Res	3	3	3	3	3	3
	Technician	1	1	1	1	1	1
	Store Keeper/ Clerk/ Computer Op.	1	1	1	1	1	1
	Sweeper	2	2	2	2	2	2
3	Biochemistry	13	13	13	13	13	13
	Professor	1	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst.Prof.	2	2	2	2	2	2
	Tutor/Demonstrator/Sr. Res	3	3	3	3	3	3
	Technical Asst./Technician	2	2	2	2	2	2
	Store Keeper/ Clerk/ Computer Op.	1	1	1	1	1	1
	Sweeper	2	2	2	2	2	2
	Lab. Attendant	1	1	1	1	1	1
4	Pathology	3	20	20	20	20	20
	Professor	0	1	1	1	1	1
	Assoc. Prof.	1	2	2	2	2	2
	Asst.Prof.	1	3	3	3	3	3
	Tutor/Demonstrator/Sr. Res	1	4	4	4	4	4
	Technical Asst./Technician	0	4	4	4	4	4
	Lab. Attendant	0	2	2	2	2	2
	Stenotypist/ Computer Op.	0	1	1	1	1	1
	Store Keeper/ Record Clerk	0	1	1	1	1	1
	Sweeper	0	2	2	2	2	2
5	Microbiology	2	21	21	21	21	21
	Professor	0	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst.Prof.	0	2	2	2	2	2
	Tutor/Demonstrator/Sr. Res	1	4	4	4	4	4
	Technical Asst./Technician	0	7	7	7	7	7
	Lab. Attendant	0	2	2	2	2	2
	Store Keeper/ Record Clerk	0	1	1	1	1	1
	Stenographer/ Computer Op.	0	1	1	1	1	1
	Sweeper	0	2	2	2	2	2
6	Pharmacology	2	12	12	12	12	12
	Professor	0	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst.Prof.	0	2	2	2	2	2
	Tutor/Demonstrator/Sr. Res	1	3	3	3	3	3
	Lab. Attendant	0	2	2	2	2	2
	Store Keeper/ Clerk/ Computer Op.	0	1	1	1	1	1
	Sweeper	0	2	2	2	2	2

Department	Position	2023 (LOP1)	2024 (LOP2)	2025 (LOP3)	2026 (LOP4)	2027 (LOP5)	2028 (Recognition)
7	Forensic Medicine	2	15	15	15	15	15
	Professor	0	1	1	1	1	1
	Assoc. Prof.	0	1	1	1	1	1
	Asst.Prof.	1	1	1	1	1	1
	Tutor/Demonstrator/Sr. Res	1	2	2	2	2	2
	Technical Asst./Technician	0	2	2	2	2	2
	Lab. Attendant	0	2	2	2	2	2
	Stenotypist	0	1	1	1	1	1
	Store Keeper/ Clerk/ Computer Op.	0	1	1	1	1	1
	Sweeper	0	4	4	4	4	4
8	Community Medicine	2	17	17	17	17	17
	Professor	0	1	1	1	1	1
	Assoc. Prof.	0	2	2	2	2	2
	Asst.Prof.	1	3	3	3	3	3
	Statistician /Asst. Prof	0	1	1	1	1	1
	Tutor/Demonstrator/Sr. Res	1	3	3	3	3	3
	Epidemiologist/ Asst.	0	1	1	1	1	1
	Professor	0	1	1	1	1	1
	Medical Social Worker	0	1	1	1	1	1
	Technical Asst./Technician	0	1	1	1	1	1
	Stenotypist	0	1	1	1	1	1
	Record Keeper/ Clerk/ Computer Op.	0	1	1	1	1	1
	Store Keeper	0	1	1	1	1	1
	Sweeper	0	1	1	1	1	1
9	Rural Training Health Centre	0	9	9	9	9	9
	Medical Officer of Health	0	1	1	1	1	1
	Lady Medical Officer	0	1	1	1	1	1
	Medical Social Worker	0	2	2	2	2	2
	Public Health Nurse	0	1	1	1	1	1
	Health Asst. Male/ Health Inspector	0	1	1	1	1	1
	Health Educator	0	1	1	1	1	1
	Technical Asst./Technician	0	1	1	1	1	1
	Store Keeper/ Record Clerk	0	1	1	1	1	1
10	Urban Training Health Centre	0	11	11	11	11	11
	Medical Officer of Health	0	1	1	1	1	1
	Lady Medical Officer	0	1	1	1	1	1
	Medical Social Worker	0	2	2	2	2	2
	Public Health Nurse	0	1	1	1	1	1
	Health Inspector	0	2	2	2	2	2
	Health Educator	0	1	1	1	1	1
	Technical Asst./Technician	0	2	2	2	2	2
	Store Keeper/ Record Clerk	0	1	1	1	1	1
11	General Medicine	18	29	29	32	32	32
	Professor	1	1	1	1	1	1
	Assoc. Prof.	2	2	2	3	3	3
	Asst.Prof.	3	3	3	4	4	4
	Sr. Resident	3	3	3	4	4	4
	Jr. Resident	8	8	8	8	8	8
	E.C.G. Technician	1	1	1	1	1	1
	Technical Asst./Technician	0	3	3	3	3	3
	Lab. Attendant	0	4	4	4	4	4
	Store Keeper	0	1	1	1	1	1
	Stenotypist	0	1	1	1	1	1
	Record Clerk	0	2	2	2	2	2
12	Respiratory Medicine	2	8	8	8	8	8
	Assoc. Prof.	1	1	1	1	1	1

Department	Position	2023 (LOP1)	2024 (LOP2)	2025 (LOP3)	2026 (LOP4)	2027 (LOP5)	2028 (Recognition)
	Asst.Prof.	0	1	1	1	1	1
	Sr. Resident	1	1	1	1	1	1
	Jr. Resident	0	3	3	3	3	3
	Tuberculosis and Chest Diseases Health Visitor	0	2	2	2	2	2
13	Dermatology	2	6	6	6	6	6
	Assoc. Prof.	1	1	1	1	1	1
	Asst.Prof.	0	1	1	1	1	1
	Sr. Resident	1	1	1	1	1	1
	Jr. Resident	0	3	3	3	3	3
14	Psychiatry	2	8	8	9	9	9
	Assoc. Prof.	1	1	1	1	1	1
	Asst.Prof.	0	1	1	1	1	1
	Sr. Resident	1	1	1	1	1	1
	Jr. Resident	0	3	3	3	3	3
	Psychiatry Social Worker	0	2	2	2	2	2
	Clinical Psychologist	0	0	0	1	1	1
15	Paediatrics	2	16	16	17	17	17
	Professor	0	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst.Prof.	0	1	1	2	2	2
	Sr. Resident	1	2	2	2	2	2
	Jr. Resident	0	4	4	4	4	4
	Child Psychologist	0	1	1	1	1	1
	Health Educator	0	1	1	1	1	1
	Technical Asst./Technician	0	1	1	1	1	1
	Lab. Attendant	0	1	1	1	1	1
	Store Keeper	0	1	1	1	1	1
	Record Clerk	0	1	1	1	1	1
	Social Worker	0	1	1	1	1	1
16	General Surgery	17	28	28	31	31	31
	Professor	1	1	1	1	1	1
	Assoc. Prof.	2	2	2	3	3	3
	Asst.Prof.	3	3	3	4	4	4
	Sr. Resident	3	3	3	4	4	4
	Jr. Resident	8	8	8	8	8	8
	Technical Asst./Technician	0	3	3	3	3	3
	Lab. Attendant	0	4	4	4	4	4
	Store Keeper	0	1	1	1	1	1
	Stenotypist	0	1	1	1	1	1
	Record Clerk	0	2	2	2	2	2
17	Orthopaedics	2	13	13	15	15	15
	Professor	0	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst.Prof.	0	1	1	2	2	2
	Sr. Resident	1	1	1	2	2	2
	Jr. Resident	0	4	4	4	4	4
	Technical Asst./Technician	0	1	1	1	1	1
	Lab. Attendant	0	1	1	1	1	1
	Store Keeper	0	1	1	1	1	1
	Stenotypist	0	1	1	1	1	1
	Record Clerk	0	1	1	1	1	1
18	Oto-Rhino-Laryngology	4	12	13	14	14	14
	Professor	0	0	0	1	1	1
	Assoc. Prof.	0	0	1	1	1	1
	Asst.Prof.	1	1	1	1	1	1
	Sr. Resident	1	1	1	1	1	1
	Jr. Resident	0	3	3	3	3	3
	Technical Asst./Technician	0	1	1	1	1	1

Department	Position	2023 (LOP1)	2024 (LOP2)	2025 (LOP3)	2026 (LOP4)	2027 (LOP5)	2028 (Recognition)
	Lab. Attendant	0	1	1	1	1	1
	Store Keeper	0	1	1	1	1	1
	Stenotypist	0	1	1	1	1	1
	Record Clerk	0	1	1	1	1	1
	Audiometry Technician	1	1	1	1	1	1
	Speech Therapist	1	1	1	1	1	1
19	Ophthalmology	4	12	13	14	14	14
	Professor	0	0	0	1	1	1
	Assoc. Prof.	0	0	1	1	1	1
	Asst.Prof.	1	1	1	1	1	1
	Sr. Resident	1	1	1	1	1	1
	Jr. Resident	0	3	3	3	3	3
	Optometrist	1	1	1	1	1	1
	Technical Asst./Technician	0	1	1	1	1	1
	Lab. Attendant	0	1	1	1	1	1
	Stenotypist	0	1	1	1	1	1
	Store Keeper	0	1	1	1	1	1
	Record Clerk	0	1	1	1	1	1
	Refractionist	1	1	1	1	1	1
20	Obstetrics and Gynaecology	6	23	23	23	23	23
	Professor	1	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst.Prof.	2	2	2	2	2	2
	Sr. Resident	2	2	2	2	2	2
	Jr. Resident	0	8	8	8	8	8
	Social Worker	0	2	2	2	2	2
	Technical Asst./Technician	0	2	2	2	2	2
	Lab. Attendant	0	2	2	2	2	2
	Stenotypist	0	1	1	1	1	1
	Record Clerk	0	1	1	1	1	1
	Store Keeper	0	1	1	1	1	1
21	Radiodiagnosis	4	20	21	21	21	21
	Professor	0	0	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst.Prof.	1	1	1	1	1	1
	Sr. Resident	2	2	2	2	2	2
	Jr. Resident	0	3	3	3	3	3
	Radiographic Technicians	0	8	8	8	8	8
	Dark Room Asst.	0	2	2	2	2	2
	Stenotypist	0	1	1	1	1	1
	Store Keeper	0	1	1	1	1	1
	Record Clerk	0	1	1	1	1	1
22	Anesthesiology	5	20	22	25	25	25
	Professor	0	0	0	1	1	1
	Assoc. Prof.	2	2	2	2	2	2
	Asst.Prof.	2	2	3	4	4	4
	Sr. Resident	1	1	2	3	3	3
	Jr. Resident	0	4	4	4	4	4
	Technical Asst./Technician	0	8	8	8	8	8
	Stenotypist	0	1	1	1	1	1
	Record Clerk	0	1	1	1	1	1
	Store Keeper	0	1	1	1	1	1
23	Physical Medicine and Rehabilitation	27	30	36	36	36	36
	Professor	0	1	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst.Prof.	1	1	1	1	1	1
	Sr. Resident	2	2	2	2	2	2
	Jr. Resident	4	4	4	4	4	4
	Physiotherapists	2	2	2	2	2	2

Department	Position	2023 (LOP1)	2024 (LOP2)	2025 (LOP3)	2026 (LOP4)	2027 (LOP5)	2028 (Recognition)
	Occupational Therapists	2	2	2	2	2	2
	Speech Therapist	1	1	1	1	1	1
	Prosthetic and Orthotic Technicians	2	2	2	2	2	2
	Workshop Workers	6	6	6	6	6	6
	Clinical Psychologist	1	1	1	1	1	1
	Medical Social Worker	1	1	1	1	1	1
	Counsellor	1	1	1	1	1	1
	Multi-rehabilitation Therapist / Public Health Nurse / Rehabilitation Nurse	1	1	4	4	4	4
	Stenotypist	0	1	1	1	1	1
	Record Clerk	0	1	1	1	1	1
	Store Keeper	1	1	1	1	1	1
	Class IV Workers	1	1	4	4	4	4
24	Dentistry	5	8	9	9	9	9
	Professor	0	0	0	0	0	0
	Assoc. Prof.	0	0	1	1	1	1
	Asst.Prof.	1	1	1	1	1	1
	Sr. Resident	1	1	1	1	1	1
	Jr. Resident	1	1	1	1	1	1
	Dental Technician	2	4	4	4	4	4
	Store Keeper/Clerk	0	1	1	1	1	1
25	Emergency Medicine	8	16	20	20	20	20
	Professor	0	0	1	1	1	1
	Assoc. Prof.	1	1	1	1	1	1
	Asst.Prof.	1	1	1	1	1	1
	Sr. Resident	6	6	9	9	9	9
	Jr. Resident	0	8	8	8	8	8
26	Medical Education Unit (NMC Circular dated 22-3-2023)	16	16	16	16	16	16
	Coordinator / Experienced Faculty as per NMC (No additional recruitment)	1	1	1	1	1	1
	Members (Experienced Faculty as per NMC / No additional recruitment)	8	8	8	8	8	8
	PS to Director Cum Dean	1	1	1	1	1	1
	Supportive Staff	2	2	2	2	2	2
	Stenotypist	1	1	1	1	1	1
	Computer Op.	1	1	1	1	1	1
	Technicians in Audio-visual Aids, Photography and Artist	2	2	2	2	2	2
27	Central Library	11	11	11	11	11	11
	Librarian	1	1	1	1	1	1
	Assistant Librarian	2	2	2	2	2	2
	Library Assistants	4	4	4	4	4	4
	Documentalist	1	1	1	1	1	1
	Stenographer/ Computer Op.	1	1	1	1	1	1
	Peon	2	2	2	2	2	2
28	Central Sterilisation Service Department	33	33	33	33	33	33
	Matron	1	1	1	1	1	1
	Nurse	4	4	4	4	4	4
	Technical Assistant	8	8	8	8	8	8
	Technician	8	8	8	8	8	8
	Ward Boys	8	8	8	8	8	8
	Sweeper	4	4	4	4	4	4

Department	Position	2023 (LOP1)	2024 (LOP2)	2025 (LOP3)	2026 (LOP4)	2027 (LOP5)	2028 (Recognition)
29	Nursing Service	200	250	250	375	375	435
	Nurse - ANS, DNS, NS, CSSD Matron, Nurse	200	250	250	375	375	435
30	Central Record Section	15	15	15	15	15	15
	Medical Record Officer	1	1	1	1	1	1
	Statistician	1	1	1	1	1	1
	Coding Clerk	4	4	4	4	4	4
	Record Clerk	6	6	6	6	6	6
	Peon	2	2	2	2	2	2
	Stenotypist	1	1	1	1	1	1
31	Central Workshop	10	10	10	10	10	10
	Superintendent Engineer	2	2	2	2	2	2
	Sr. Technician	2	2	2	2	2	2
	Jr. Technician	2	2	2	2	2	2
	Carpenter	1	1	1	1	1	1
	Blacksmith	1	1	1	1	1	1
	Attendant	2	2	2	2	2	2
32	Laundry	26	26	26	26	26	26
	Supervisor	2	2	2	2	2	2
	Dhobi/Washerman/Women	12	12	12	12	12	12
	Packer / Laundry Assist	12	12	12	12	12	12
33	Dietetic Services	22	22	22	22	22	22
	Dietician	1	1	1	1	1	1
	Headcook (Therapeutic Kitchen)	2	2	2	2	2	2
	Cook	6	6	6	6	6	6
	Cookmate	13	13	13	13	13	13
34	Blood Bank	22	22	22	22	22	22
	Professor/ Asso Prof (Blood Bank Experienced)	1	1	1	1	1	1
	Assist Prof (Blood Bank Experienced)	1	1	1	1	1	1
	Blood Bank Technician	6	6	6	6	6	6
	Blood Bank Lab Attendant	6	6	6	6	6	6
	Store Keeper	6	6	6	6	6	6
	Record Clerk	2	2	2	2	2	2
35	Pharmacy Services 24x7	13	13	13	13	13	13
	Chief Pharmacist	1	1	1	1	1	1
	Sr. Pharmacist	3	3	3	3	3	3
	Pharmacist	9	9	9	9	9	9
36	Bio Medical waste 24x7	Outsourced	Outsourced	Outsourced	Outsourced	Outsourced	Outsourced
37	ART Centre	Operational	Operational	Operational	Operational	Operational	Operational
38	Operating Theatres	30	30	30	30	30	30
	OT Assistant	20	20	20	20	20	20
	OT Technician	10	10	10	10	10	10
39	Administrative Department	23	109	109	109	109	109
	Director Cum Dean	1	1	1	1	1	1
	Medical Superintendent	1	1	1	1	1	1
	PS to Medical Superintendent	1	1	1	1	1	1
	Additional MS (No additional recruitment)	1	1	1	1	1	1
	Deputy MS (No additional recruitment)	1	1	1	1	1	1
	Deputy Director Admin	1	1	1	1	1	1
	Deputy Director Finance	1	1	1	1	1	1

Department	Position	2023 (LOP1)	2024 (LOP2)	2025 (LOP3)	2026 (LOP4)	2027 (LOP5)	2028 (Recognition)
	Officer Superintendent	2	2	2	2	2	2
	Upper Division Clerk	5	35	35	35	35	35
	Lower Division Clerk	5	25	25	25	25	25
	Multi Tasking Staff	4	40	40	40	40	40