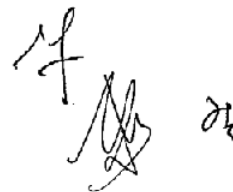


**Department of Medical Services
Ministry of Health
Thimphu: Bhutan.**

Specifications/options required in addition to the standard options.

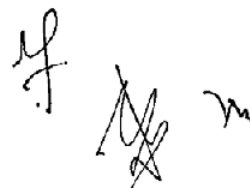
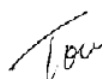
1. Toyota (ex-factor) Land Cruiser Ambulance Hard top (LWB 4.21 DIESEL, 6) Cylinder, 3 doors, 8 seat, 5-speed manual transmission, ordering code, HZJ78R- RJMRS Steering orientation: RHD)
2. Exterior Colour: White
3. Curtain (506 BV) or Frosted Window
4. First Aid Kit Plastic Type (244 EE)
5. Hand lamp & connector 55W (516 BO)
6. Intravenous feeding hook, 2 pcs (519 BD)
7. Main stretcher W/suspension bed instead of STD (521 CM)
8. Medicine Box (532 BB)
9. Oxygen Resuscitator Automatic Type + demand Type including oxygen cylinder W/O oxygen (263 AA)
10. Oxygen cylinder, without oxygen (532 BB)
11. Patient lamp, 10 W, flexible type (534 AW)



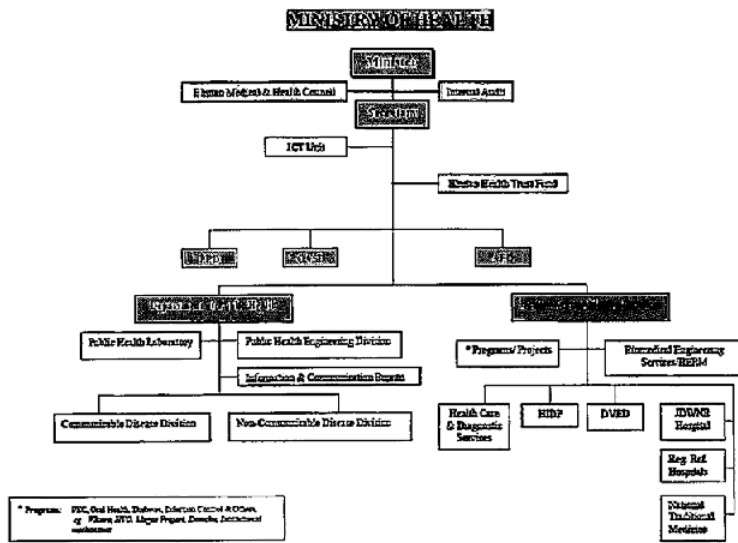
12. Roof sign board, English (543 BU)
13. Roof ventilator W/electric fan (544 BV)
14. Room Lamp, 10 W (additional) (545 AH)
15. Ambulance decals, back (Red Cross) (537 EZ)
16. Ambulance Decals, both sides (Red Cross) (538 EQ)
17. Beacon lamp, multi flashing red, instead of STD, electric siren amp and speaker 2 tone type W/microphone, (N/A with std Beacon lamp red and optional Beacon lamp blue and multi flashing blue) (525 BQ, 508 CT)
18. Sub stretcher (folding type) N/A with Cabinet stool with wash basin (549 BB) reconfirm in Japan.
19. Electric sucker (509 BJ)
20. Double fuel tank

Reviewed and finalised by Dr. Masayuki Suzukawa, Mr. Shigetaka Tojo, Mr. Yasuhiro Hiruma, Japanese mission team members and Mr. Nawang Dorji, Chief Program Officer, HC&DD on the 8th June, 2010 and deleted items from the original list is shown below.

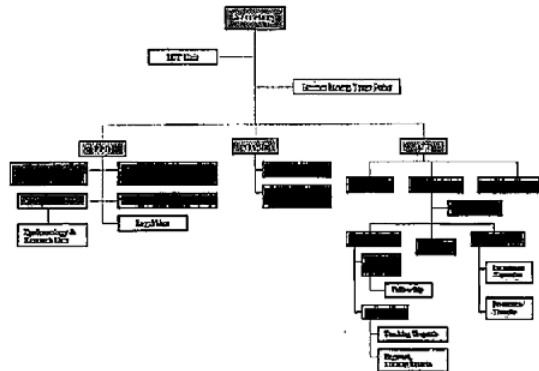
1. Ambulance decals, front (Red Cross) (539 EN)
2. Ambulance decals roof (Red Cross) (540 EP)
Reason: too many cross is un-necessary
3. One year spare parts kit
Reason: not permissible under Grant Aid Policy of Japan.



Organization Chart of the Ministry of Health



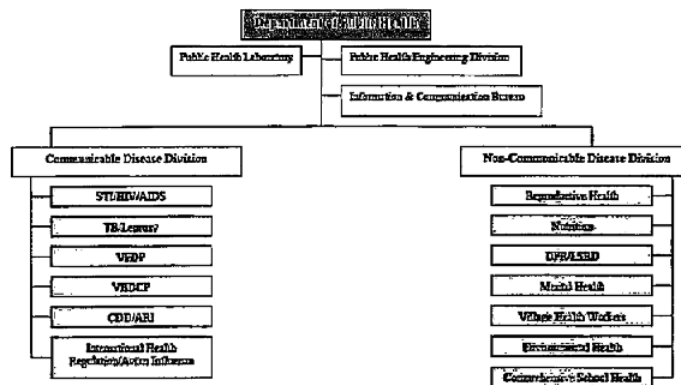
MINISTRY OF HEALTH
Secretariat



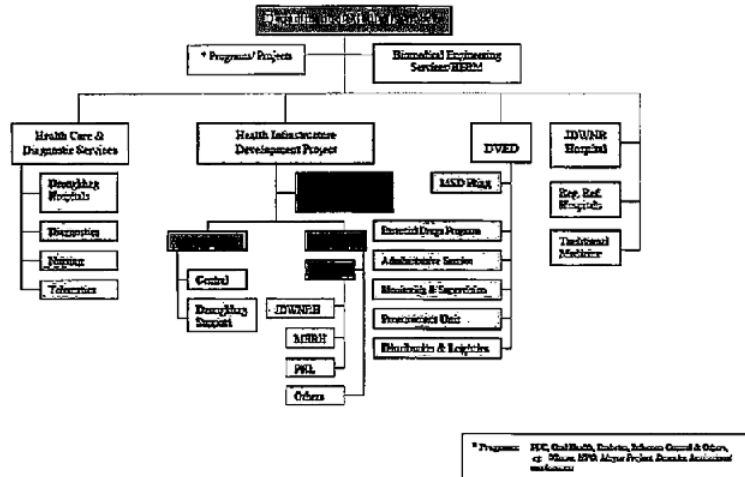
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26

**MINISTRY OF HEALTH
Department of Public Health**



**MINISTRY OF HEALTH
Department of Medical Services**



* Programs: HIV, Oral Health, Endomet, Tobacco Control & OTC, etc. * Other: HIV, Acute Project, Research, etc.

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Japan's Grant Aid scheme

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of operations of the Official Development Assistance (ODA), and as a part of this realignment, a new JICA law was entered into effect on October 1, 2008. Based on this law and the decision of the GOJ, JICA has become the executing agency of the Grant Aid for General Projects, for Fisheries and for Cultural Cooperation, etc.

The Grant Aid is non-reimbursable fund provided to a recipient country to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid procedures

The Japan's Grant Aid is supplied through following procedures:

- Preparatory Survey
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Authority for Determining Implementation
 - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the preparatory Survey is to provide a basic document necessary for the appraisal of the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the recipient country necessary for the implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of a basic design of the Project.

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- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA requests the Government of the recipient country to take whatever measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization of the recipient country which actually implements the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the Report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the appropriateness of the Project.

3. Japan's Grant Aid scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the recipient country to continue to work on the Project's implementation after the E/N and G/A.

(3) Eligible source country

Under the Japan's Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm are limited to "Japanese nationals".

(4) Necessity of "Verification"

The Government of the recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by JICA. This "Verification" is deemed necessary to fulfil accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as shown in the table on page 4 of this report.

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(6) "Proper Use"

The Government of the recipient country is required to maintain and use properly and effectively the facilities constructed and the equipment purchased under the Grant Aid, to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Grant Aid.

(7) "Export and Re-export"

The products purchased under the Grant Aid should not be exported or re-exported from the recipient country.

(8) Banking Arrangements (B/A)

- a) The Government of the recipient country or its designated authority should open an account under the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.
- b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

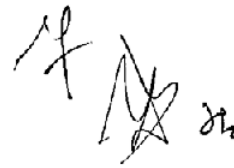
(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions paid to the Bank.

(10) Social and Environmental Considerations

A recipient country must carefully consider social and environmental impacts by the Project and must comply with the environmental regulations of the recipient country and JICA socio-environmental guidelines.

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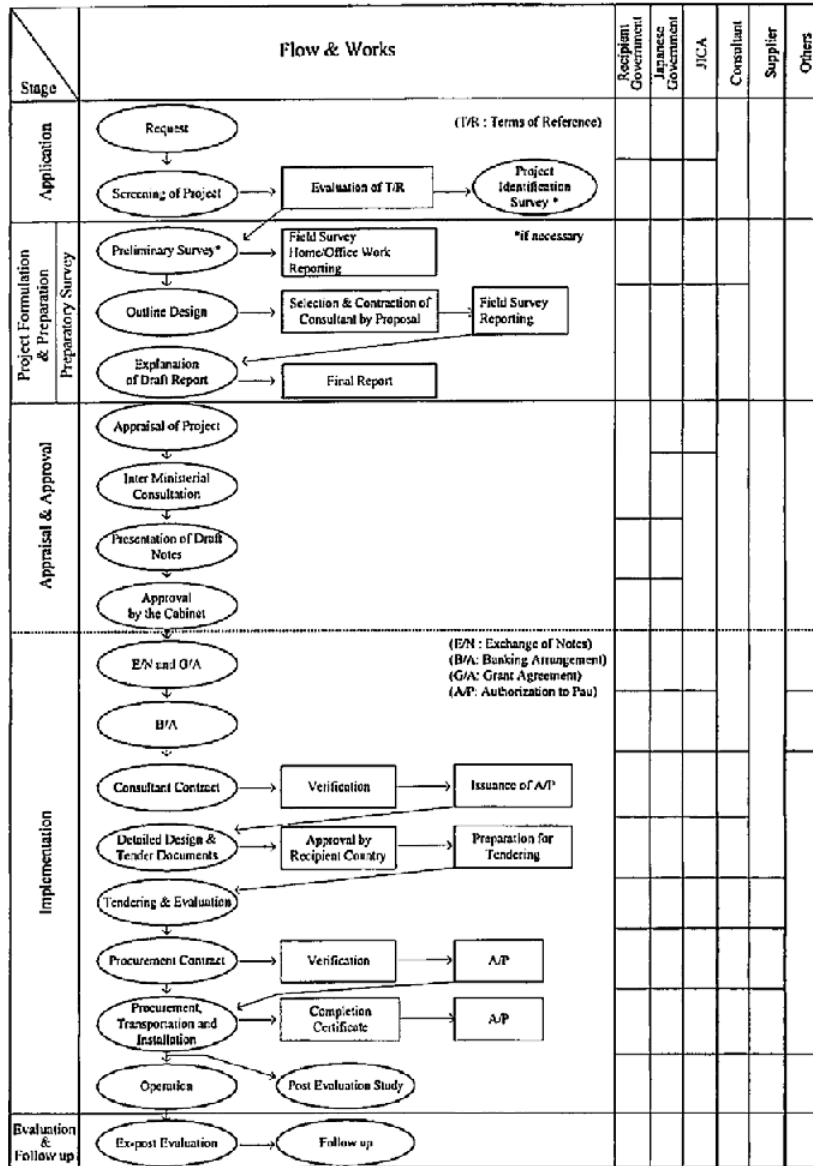
Major Undertakings to be taken by Each Government

No.	Items	To be covered by the Grant Aid	To be covered by the Recipient Side
1	To bear the following commissions to the Japanese bank for banking services based upon the B/A 1) Advising commission of A/P 2) Payment commission		• •
2	To ensure prompt customs clearance of the products and to assist internal transportation of the products in the recipient country 1) Marine(Air) transportation of the products from Japan or third countries to the nearest country of recipient country 2) Tax exemption and custom clearance of the products 3) Internal transportation from the bond warehouse to the project site	• (•)	 • (•)
3	To accord Japanese nationals, whose services may be required in connection with the supply of the products and the services under the verified contract, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		•
4	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts		•
5	To maintain and utilize the equipment provided under the Grant Aid properly and effectively		•
6	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for the transportation and installation of the equipment		•

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Flow Chart of Japan's Grant Aid Procedure



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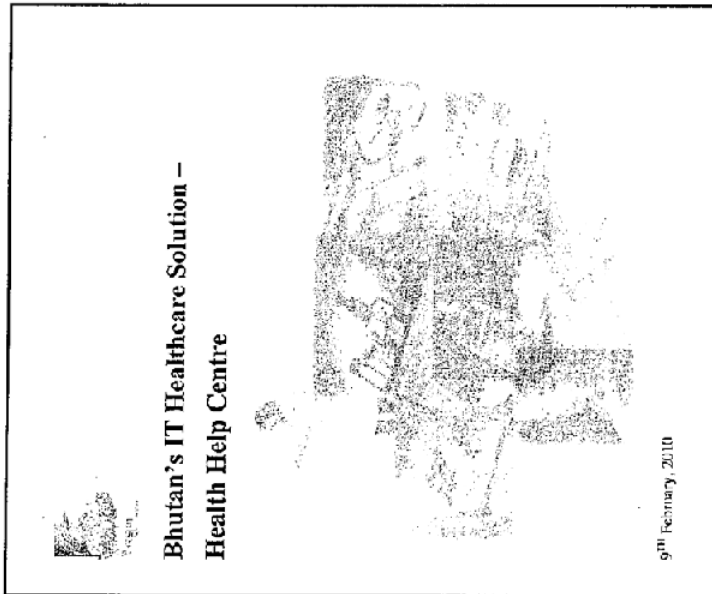
Schedule of Survey

The survey will be carried out as follows:

	2010							
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Preparation of Survey in Japan	<input type="checkbox"/>							
Field Survey in Bhutan		■	■					
Analysis in Japan (Preparation of draft final report)			▬	▬	▬			
Explanation of draft final report in Bhutan					■			
Preparation and submission of final report						▬	▬	▬ ▼

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Contents

Abbreviations	3
Preamble	4
1.0 Introduction	5
1.1 Requirement for ICT enabled healthcare technology in Bhutan	5
1.2: Value at Stake	11
2.0 Vision	15
2.1 Vision and Mission of ICT solution	15
2.2 Services to be offered	16
2.3 Prioritization of services	17
3.0 Operations and Harmonization with Bhutan's Healthcare system	19
3.1 Operation of Bhutan specific solutions	19
3.2 Harmonization with Bhutan's healthcare system	21
4.0 Budget Requirements	26
4.1 Details of opex and capex expenditures	26
5.0 Operational decisions	28
5.1 Governance	28
5.2 HR requirements	29
5.3 Call centre	30
5.4 Branding / Advocacy	31
5.5 Terms of reference and KPI's	31
6.0 Risks and Challenges	36

Abbreviations

AHB	Annual Health Bulletin
ANC	Ante-Natal Clinic
BHMIS	Bhutan Health Management Information System
BHU	Basic Health Unit
BLSS	Bhutan Living Standard Survey
MoH	Ministry of Health
NHS	National Health Survey
ORC	Out-Reach Clinic
PHCB	Population and Housing Census Bhutan
RIARD	Rapid Impact Assessment of Rural Development
SEDI	Socio-Economic and Demographic Indicators
VHW	Village Health Workers
HISC	Health Information Service Centre
MoIC	Ministry of Information and Communication
MoE	Ministry of Education
MoA	Ministry of Agriculture



Preamble

Round the clock and quick access to a healthcare professional is one of the key issues faced by citizens of Bhutan. This challenge is caused primarily due to the hilly terrain of the country, which requires several rural and remotely located communities to travel hours and sometimes days until they can reach a healthcare professional. It is for these reasons that the Ministry of Health is looking at ICT enabled healthcare solutions to utilize the existing healthcare workers in improving access to professional services, improving Access to Healthcare professional - a Ministry of Health's aspiration is detailed in the Performance Compact signed with the Prime Minister on 12th Dec, 2009.

This document aims at detailing the need for an ICT enabled healthcare solution as well as providing a comprehensive view of how the various ICT services will harmonize and integrate with Bhutan's existing healthcare system. Finally, in the spirit of implementation, this report also lays down the operational decisions that the MoH will have to take in order to realize the true impact of the initiative.

Despite the recommendation to also look into possibilities of starting the Charter 3 initiatives with alternatives such as improvement of the existing HISC (202, 212) and emergency ambulance (112) by increasing the number of telephonic lines with a multi-hunting facility, we found that there isn't really a case for consideration as quality and cost efficiency maybe compromised due to the existing manual ways of providing these services. This is further elaborated in section 3.2 - Harmonization with Bhutan's Healthcare System.



1.0 Introduction

1.1 REQUIREMENT FOR ICT ENABLED HEALTHCARE TECHNOLOGY IN BHUTAN

Bhutan's current healthcare system is well positioned to serve the needs of the population located in close proximity to health facility, however there are several issues, which make immediate availability of a healthcare professional / facility at any hour of the day a privilege only for few. Most of the data and discussion are taken from the study "Access to health services in Bhutan" conducted in September 2009. These issues are:

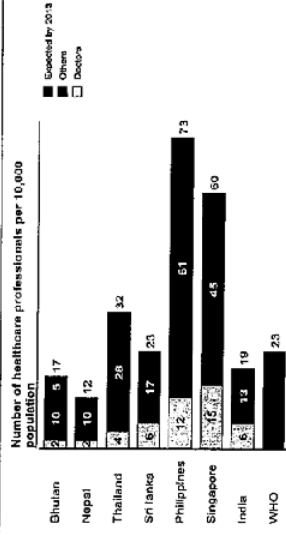
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1. **Significant shortage in Healthcare professionals on a 24x7 basis:** It is a non-debatable fact that the healthcare system is faced with a shortage of doctors, nurses and paramedics. It has been even quoted by a senior Health official at MoH that "if only the young girl received proper medical attention in time, could we have saved her life". These statements can be slowly eradicated by making available professional healthcare to all, 24x7.

As shown in *Exhibit 1*, there are about 12-13 healthcare professionals per 10,000 population in Bhutan, which is far behind the WHO suggested lower benchmark of 23 per 10,000.

The healthcare professionals at BHUs and hospitals work from 9 A.M. - 3 P.M., apart from emergency cases. By infusing the ICT-enabled solution, the accessibility to a healthcare professional will be 24x7 and optimally utilize the existing healthcare professionals.

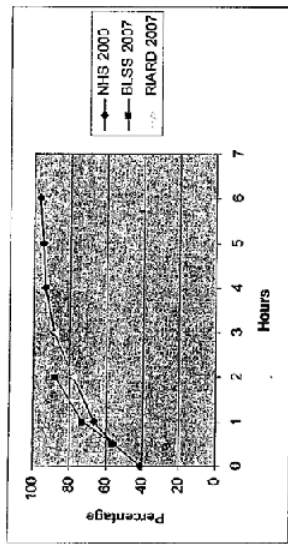
Exhibit 1: Source WHO, NHITS -3



2. **Limited access to healthcare facility and long lead times involved in reaching for professional care:** A number of surveys have been carried by MoH, to quantify the access to healthcare facility in rural and urban regions. The most recent study being the "Access to Health services in Bhutan - September 2009" from which a lot of empirical data has been captured, in summary, these studies have revealed that about 40% of population are more than 1 hour walk away from the closest modern healthcare facility. This puts a large mental burden on the family and a fairly substantial financial burden for transport.

The ICT-enabled solution will improve on the accessibility to a healthcare professional irrespective of the location of the health centre.

Exhibit 2: Cumulated % of population within walking distance to health care facilities (poor), by various data sources



Sources: BLSS 2007; NHS 2000; RIARD 2007

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The RIARD found that of those without access to health services, 36% live far from the road, 36% mid way and 28% near the road.

Exhibit 3: Geographical access to health care seeking behavior

Region	Percent with travel distance to nearest health facility		Percent of ill seeking care	Percent of ill seeking modern care
	Less than 1 hour	More than 3 hours		
Western	60	12	82	64
Central	62	12	82	72
Eastern	79	3	77	63
Total	67	9	80	65

Note: West - Chukha, Gasa, Haq, Faro, Punakha, Samtse, Thimphu, Wangdue; Central - Bumthang, Dagana, Surpang, Trongsa, Zhenzang; East - Lhuentse, Monger, Yangise, Tashigang, Penagatshe, Samdrup Jongkhar.

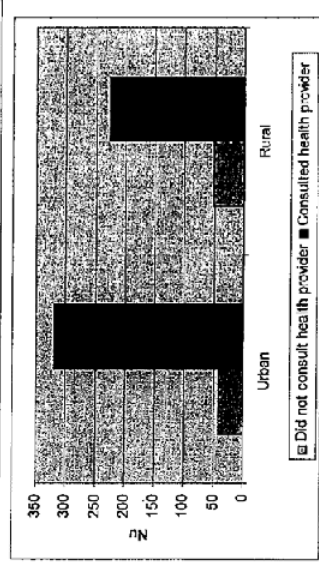
Sources: NHS 2000 - reanalysis of data.

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3. **Affordability and availability:** Average monthly household healthcare expenditures amounted to on an average 49 Nu per month, 65 Nu in urban areas as compared to 46 Nu in rural areas according to Household Income and Expenditure Survey 2000. Also according to the survey, 50% of their money was for transport, 30% for medicines and supplies, and 5% for consultation.

This solution will reduce the expenditure for transport and also for consultation since the call will be operated on a toll free number.

Exhibit 4: Average health care expenditures by residence in use of services

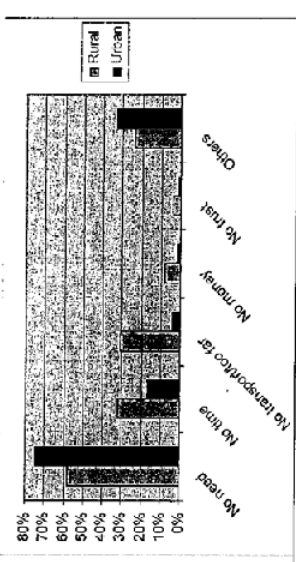


Source: BLSS 2007.

4. Traditional solutions ineffective in solving issues around access

Health & Limitations of traditional solutions	Challenges in attracting doctors to serve in remote primary healthcare facilities
Last mile reach	Challenges in attracting doctors to serve in remote primary healthcare facilities
Scalability	Complexity of ensuring effective and efficient service delivery across multiple demographics and geographies (especially given cultural mindsets and social practices).
Investment	Providing a BHU facility within 1 hrs reach of every citizen places significant infrastructure burden on state. This would imply building nearly 80-100 new facilities
Cost	Out of pocket expenses (eg. transport) or healthcare services can present an unbearable burden on low income segments of population (up to 50-70% of their income)
Time to market	Building necessary infrastructure, talent pool and awareness for healthcare services to every citizen can take a long time – especially outside urban centers
Reliable information	Challenges in rigorously tracking patient and resource information (including lack of vital event registration) lead to lack of measurable results and accountability

Exhibit 5: Frequency of reasons given for not seeking care



Source: BLS 2007

As shown in exhibit 5 which details frequency of the reasons for why people did not seek healthcare when sick, nearly 30% of the times, people said that they had no time to visit a health facility, or it was too far or they didn't have enough money.

The issue of about 60-70% of rural / urban people quoting that they had "No need" for healthcare can be addressed through this solution as well.

1. The advocacy of the healthcare helpline and emergency response system will create the required awareness for seeking medical attention.
 2. One of the hidden strengths of the system is the **privacy and confidentiality** this solution offers to the patient who can learn / get medical advice without being shy / ashamed of his sickness.
 3. Life-saving triage provided by the helpline or quick response of the ambulance to a fellow citizen, will ensure that the ICT solution will establish itself as a reliable healthcare solution.
 4. Outbound calls from the call centre to citizens tracked by healthworkers will also prompt citizens to use healthcare facilities.
- By the solution, there is no question of addressing the issues of no time, no transport or no money as any citizen can contact call centre through a toll free number anytime.

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1.2: VALUE AT STAKE

The introduction of ICT enabled healthcare solution will have a positive impact on both the citizen's lives as well as resource constraint of MoH. The following are the value at stake for this solution:

1.2.1 Create an alternate channel with 24x7 Access to supplement traditional channels in areas where they are not economically viable

As mentioned in the previous section, about 40 % of population are more than 1 hr away from the closest healthcare facility. Also these facilities are only open for half the day. The ICT solution will provide 24x7 access to a healthcare professional irrespective of location of the person

1. Citizens, be able to call a toll free number at any time of the day for various purposes
 - Medical triage and consultation
 - Health information and counseling
 - Emergency cases to call an ambulance and get immediate telephonic advice

2. Also, to provide similar services to citizens within 1 hrs reach using traditional methods (BHUs) would imply nearly 3-4 times the cost. As today with existing 178 BHUs and 521 ORCs about 60% of population are within 1 hr access. To expand this to 100% of population with minimum investment of 10 lakhs per BHU for 100 more BHU/ORCs would imply 3-4 times the costs involved than the ICT solution

- Also, due to low occupancy rates in some BHUs and high rates in others, the ICT solution will be best positioned to supplement the existing infrastructure and expand on what Bhutan already has. Thus not replacing but enhancing the existing system
- Further many healthcare professionals are not utilized to their full capacity as populations are dispersed across the landscape of the country, and a key role ICT will play is in aggregating the demand and streamlining the supply.

1.2.2 Create an ICT-enabled alternate channel to increase "reach" of healthcare at lower cost and higher speed

One of the main reasons for rural and remote populations not using healthcare facilities is because of long distances and affordability issues. However, the use of

toll free number accessible from a fixed line or mobile will help enable instant access to a healthcare professional

- Bhutan has approximately 150,000 households (98,000 in rural and 52,000 households in urban). Also, according to Bhutan Telecom and Mobile as per Oct, 2009 there are 26,000 connected fixed land lines and around 2,00,000 live mobile connections. This implies that atleast each household possibly has a mobile or a fixed land connection.
- Also, out of 1824 km of highway, 93% of roads are covered by mobile coverage as per source from Bhutan: mobile
- All dzongkhags have mobile coverage, with some as high as 70% area coverage (e.g., Pema Gatsel)
- For about 40% of population, the time taken to reach a healthcare professional was more than an hr. Now, the same population will have access within minutes, to a healthcare professional / doctor at the other end of a telephone line.

1.2.3 Serving a larger population with limited number of health professionals

Based on empirical research, the HMRI institute has identified that 60-70% of all outpatients did not require doctor intervention and of those who did, only 15% required the physical presence of a doctor.

What exhibit 7 implies, as well as what has already been proven at scale at HMRI is that only about 80-85% of all medical cases require the "physician" presence of a doctor. This means two things

- The traditional methodology of posting doctors in each health facility is not required and is not the most optimal use of the doctor's time. Although, not to undermine the Ministry's efforts in re-deploying healthcare professionals as per WHO guidelines
- On freeing up scarce resources, Bhutan can serve MORE with LESS. In fact, even at the call centre there is requirement only to keep 1 doctor on standby for medical emergencies as more than 80% of calls can be handled between a combination of paramedics and algorithm based intelligence system.

Exhibit 7: Doctor Degradacy

Health worker	Paranoid	Doctor
<ul style="list-style-type: none"> Treating/medication for chronic ailments Pregnancy Diabetes Asthma Hypertension 	<ul style="list-style-type: none"> Secondary/Tertiary diagnosis and medication for ailments Surgeries STDs 	<ul style="list-style-type: none"> Testing/medication for most of the acute ailments (e.g. <ul style="list-style-type: none"> Febrie illnesses Most Gastro-intestinal problems
	<ul style="list-style-type: none"> 10-15% 	<ul style="list-style-type: none"> 35-40% 25-30%
	Physical	Virtual

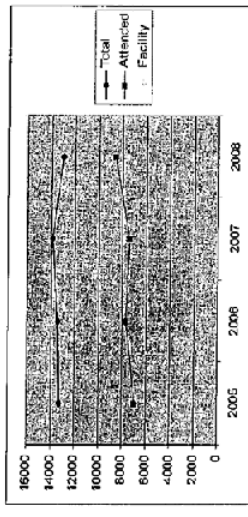
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L2.4 Improvement in MDG goals and response to illness

Through improvements in access and speed of delivery, there will be a substantial role played in **preventive public healthcare** by the ICT solution.

Using preventive healthcare methods such as monitoring of health by trained healthworkers who actively report health of pregnant women and children in rural and remote regions, MDG targets can be accelerated.

Exhibit 8: Number of total deliveries, attended deliveries and facility based deliveries 2005-2008



Source: AHBs 2006-2009.

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As shown in exhibit 8, still about 40% of the deliveries are unattended. Bhutan's MMR is around 215 per 100,000 population. Through active monitoring of pregnant women using monitoring cell phones, complications can be reduced. These health-workers will take periodic visits of their locality. They will be supplied with cell phones which allow them to easily send sms reports of those who they monitor. An electronic health record will simultaneously be created at the call centre consisting of vital health data of all those whose reports have been generated. This will allow early preventive actions against any alarming cases. Also through the helpline, deliveries can be guided over phone by a trained paramedic/doctor.

Similarly IMR and USMR targets can be accelerated through the various improvements brought about by ICT and the health-workers who monitor the key vital health indicators.

2.0 Vision

2.1 VISION AND MISSION OF ICT SOLUTION

Ehutan's ICT solution will further enhance the current healthcare system in terms of quality, accessibility and delivery of healthcare services through use of appropriate technology.

Vision	Access to Health Professional Services within 1 hr for 90% of population by 2013, 24x7 from Anywhere
Mission	<ul style="list-style-type: none"> Improve accessibility through Mobile / fixed line / physical access Strengthen curative (health helpline, referral, medical provisioning), preventive (maternal check ups, infant monitoring, disease surveillance) and proactive (emergency etc) health services. Up skilling of paramedics and effective use of scarce human resources such as doctors and specialists Provide access to health professional within 1 hr (technology enabled) to over 50% of population by 2013 Provision for access anytime : 24x7 Provision for access to healthcare from anywhere : Telephone based, online service

2.2 SERVICES TO BE OFFERED

The platform that will be put in place post the set up of the call centre with appropriate software and trained health-workers, will provide an enormous potential of services to be offered to citizens. Further these services once integrated under a common roof, will reinforce the effectiveness of each other. A glimpse at what the solution could entail over the coming years would be a combination of preventive, curative, protective and other solutions.

The Preventive services are:

- Healthcare counseling
- Monitoring of pregnant women and infants through empowered health-workers
- Disease surveying

The Curative and protective services are:

- Medical triage through the helpline
- Referral system for patients
- Health-worker awareness and guidance
- Telemedicine
- Virtual pharmacies
- Emergency response system

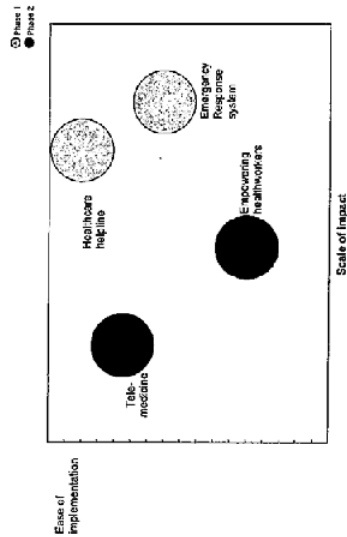
Other services

- Electronic health record systems
- Hospital appointment systems
- Medical supply chain management systems
- E-prescriptions
- Police and fire department linked medical cases

To bring these solutions to life it is important to realize the inter relation between each other. Consider the following example:-

- Health workers monitor the health of pregnant women and infants in remote areas and report status on health through sms generated reports

Exhibit 9: Prioritization of services (illustrative)



The basic infrastructure for the entire array of previously stated solution lies with the set up of two basic services for Bhutan:

1. **Healthcare helpline**
 2. **Emergency Response system**
- Once these services are in place, then any combination of additional services will only supplement the effectiveness of the previous. It is not necessary to take a decision on the services to be launched in phase 2 or phase 3, but rather set up half yearly dialogues to debate and assess the readiness and demand for a particular solution.

- The data centre then analyzes all data and creates a **Health record** of these patients
- On identifying any potential complication, the health worker is **referred to the nearest hospital / BHU** equipped to handle the case
- Until, the patient reaches the hospital, **simple and effective medical triage can be provided through the helpline.**
- Also, if the complication is serious, an **emergency ambulance** is sent to the closest road location near to the patient
- To minimize time of wait at hospital, the **hospital appointment system** will allow for appointments to be made before the arrival of patient
- If the health professional requires a specialist / expert opinion on the case, he or she can **contact the concerned person using tele-medicine set ups**
- Also, an **e-prescription** is sent to the patient, for further follow up visits

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2.3 PRIORITIZATION OF SERVICES

It is critical that Bhutan DOES NOT roll out all services at once. This is to ensure three things

- Adequate focus and effort is invested in the solutions that Bhutan rolls out initially
- There will be a time lag involved until each solution will be utilized to capacity, and hence giving users enough time to adjust mentally and physically to new options will be critical.
- It will also provide an opportunity to learn from one's experiences in rolling out a particular type of solution

The criteria for deciding the solutions to be implemented could be

- Scale of impact
- Ease of implementation

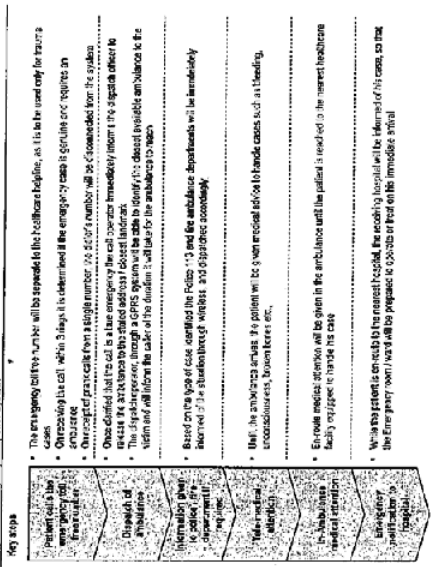
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3.0 Operations and Harmonization with Bhutan's Healthcare system

3.1 OPERATION OF BHUTAN SPECIFIC SOLUTIONS

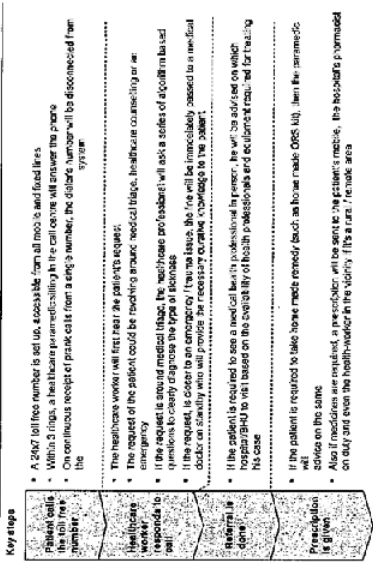
The operation of each solution will ensure full harmonization with the Bhutan's healthcare system. For the prioritized solutions, the operations will involve the following feature:

Exhibit 10: Emergency Response system



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Exhibit 11: Healthcare Judging operations



The other solutions such as tele-medicine and empowering health-workers can be detailed in the same way.

- Empowering Health workers:** Since most of the Village Health Workers (VHWs) are at least educated till middle school, many of them are capable of sending and receiving basic information through a cell phone (VHW program officer, MoH). Health-workers will be provided with an adapted phone capable of sending quick health reports. After pro-actively monitoring the health of pregnant women and infants through simple diagnostic tests, the health worker will submit the sms-based report back to the data centre which evaluates the reports and informs the health-worker of patients who have potential of developing complications. They can thus take preventive measures to save the person's life.
- Tele-medicine:** Especially aimed at far reaching BHUs and ORCs, Tele-medicine will depend on broadband connection to enable healthcare professionals to carry out complex tests / surgeries / triage for patients by referring to experts sitting in Referral hospitals in the country or else where. In some cases, the community information centers can also be used if equipped with the required bandwidth. The true impact of this solution will depend primarily on two aspects:

- The connectivity between the remote healthcare facility and the expert. According to the broadband master plan about 230 villages and gewogs will have broadband by 2011.
- Doctors and health workers must not only be trained but be convinced by the usefulness of the solution. Further they must be incentivized to use this solution, as many feel it as an additional burden.

3.2 HARMONIZATION WITH BHUTAN'S HEALTHCARE SYSTEM

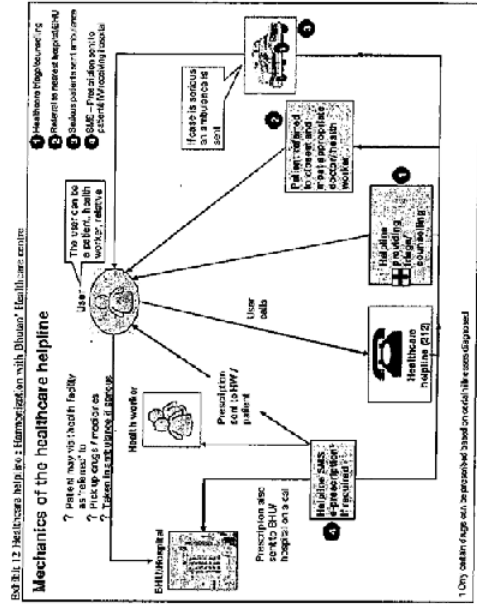
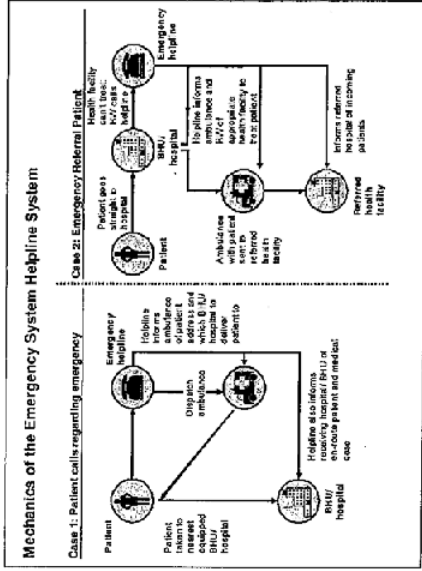


Exhibit 13: Emergency helpline: Harmonization with Bhutan's Healthcare system



There are several aspects of Bhutan's current healthcare system which will blend in, with the overall proposed ICT solutions. These are:

1. Existing Health-workers and Paramedics
 - The ICT solution will ensure that only Bhutanese healthcare professionals / doctors will be employed in the call centre. They will thus continue to be employees of RGoB, seconded to the ICT agency
 - They will be trained by Professional service providers and given 6-8 weeks courses in EMT.
 - The call centre will not require more than 3-4 paramedics initially and expand as needed to more paramedics and doctors. However, since these health workers will serve the entire population at a large, their overall utilization will be one of the highest among all health care professionals.
 - A rotation system of paramedics can be employed, where every year a batch of students are sent for training in EMT or bachelors and can then work at the call centre.

2. Ambulances and ambulance drivers

- Bhutan has received 10 new Indian Force Ambulances, along with another 10, 2009 model Japanese made ambulances. The ambulance fleet will be about 78 vehicles with about half the vehicles as new as 2009
- Of all these vehicles, about 60 will be active and functional. Initially 30 ambulances will be operated for 12 hrs and the other 30 will operate for the other 12 hrs for emergency services. This may be modified based on increase in demand / disasters
- These vehicles will thus require only minor modifications based on their existing specifications (appendix 1), and will also be fitted with GPS systems to track the whereabouts of the ambulances.
- These vehicles will then be managed by a single coordinating agency i.e. the call center and any irrelevant paper work regarding their release from hospitals at time of emergency will have to be done away with.
- The operating costs of running these vehicles, as well as the salaries of paramedics / drivers will continue to be funded under the individual dzongkhag hospital budget who will also be responsible for the ambulances as well as the drivers. Further supply of drugs and non drugs will be in line with the policy for ambulance operators prepared by DMS under the MoH. However, in the long run, as per the observational study of the professional body, the best mode of handling the situation will be adopted.
- Further, all existing ambulance drivers will need to be trained such that they can perform the basic work of a paramedic. They too, will go through a 4-6 week training.



3. HISC, EMS and other proposed ICT solutions

- The described ICT solution will help integrate the HISC and EMS and other preventive / curative ICT healthcare solutions under a single roof.
- With respect to HISC (202, 212) which today provides healthcare counselling on Aids and related disease can very easily be made a part of the overall healthcare helpline solution, under counseling services.



According to interview, they received only around 100 calls in the previous year and thus warrant consolidation

- Also the HINI helpline (107) can be similarly merged with the common helpline number.
- EMS, which seeks to perform the similar task as the emergency response system, will have all the aspects of an emergency system (trauma care, instant response, integrated police and fire department service) and yet be managed by professionals to ensure efficient management of all ambulances many of which are used only for transport and NOT for emergencies today.
- Also, the current 112 emergency toll free number does not seem to be functional as no one responds to calls.

There is thus a critical need to consolidate all ICT healthcare solutions in Bhutan, to ensure adequate awareness, professional management and efficient utilization of resources.

4. Referral system

- While receiving calls at the helpline, one of the major functions the system will provide is to evenly and optimally distribute the demand and supply of healthcare services in the country
- Patients, who call on the helpline will be advised to go to the closest and most appropriate hospital for them based on their needs and the availability of healthcare professionals and equipment at that hospital
- This system in itself, will drastically reduce the burden at the referral hospitals especially JDWNRH
- Also, for emergency cases, the ambulance will be directed to the closest health facility best suited to fulfill the requirements of the patient. All emergency referrals will be managed through the call centre

5. Village Health workers

- Once, VHWs are introduced into the system, they will be provided with mobile phones. This will allow them, not only to monitor the health of the rural population but also receive clients and education on health remedies.
- The drugs to be given to a patient can be sourced to them and they can then provide it to the patients after obtaining them from the local

hospital / BHU / pharmacy. VHW program officer in the Ministry confirm that the VHWs today, carry 10 drugs such as paracetamol, ORS, digene, etc.

6. Police and Fire Department service

- The police and fire department will be connected to the emergency response system and can have representatives sitting at the call centre who can dispatch help immediately on receipt of an emergency call.
- Citizens, will no longer need to remember various "3 digit" numbers for ambulance, fire, police, counseling etc, but rather have a common touch point for all.

7. Infrastructure for call centre

- The call centre can be set up in an existing location large enough to house 15-20 people. This could be either the top floor at JDWNRH or any other vacant government establishment. Also, if basic hardware such as desktops / handsets are readily available already with the MoH, these too could be used.

8. Toll free number

- If all ITC solutions are being combined, then there is no requirement for a new toll free number. Rather, the existing 112 number could be expanded to cover all emergency services in Bhutan and the 212 number could be expanded to medical triage and counselling.



4.0 Budget Requirements

4.1 DETAILS OF OPEX AND CAPEX EXPENDITURES

A large sum of the budget requirements comes from the upfront capital expenditure required in setting up such a facility.

1. **Capital Expenditure:** The main components of capital expenditure are the following

- **Hardware:** The hardware required entails the data servers, the switch, EPABX, desktops, handsets etc.,
- **Software:** The software will be used for both the healthcare helpline as well as the emergency service. The software will have two key components
 - Algorithm based intelligence, which will support the healthcare professional during triage. It should be a highly tested tool and customized to local disease patterns so that paramedics can quickly diagnose the patient's illness through simple questions. Also, all critical equipment and location of specialists will be mapped onto this system to allow optimal referral and even distribution of healthcare needs.
 - An emergency response, which allow tracking of ambulances to their present location. Further it will have GIS mapping which will navigate the ambulance drivers to the closest BHU / Hospital equipped to treat the patients. A landmark can also be included in the system to deal with the cons of present addressing system in Bhutan.
- **Refurbishing Ambulances:** Many of the old ambulances will require upgrade of their equipment and installation of GPRS tracking devices. This investment would have long term benefits.
- **Training:** There is a critical training component for the healthcare professionals sitting in the call centre, as well as paramedics and drivers who will be in the field. There will be 1 driver and 1 paramedic per ambulance.

2. **Operating Expenditures:** The operating expenditure will be a recurring expenditure year on year. Some of the assumptions included in operating expenditure are

- The fuel costs (for ambulances) will continue to be supported by the districts that actually will own the ambulance and the driver. However, the operation will be done from the call center.
- The salaries to be paid to newly recruited paramedics will also be borne by MoH/RGoB.

• The key additional components will be:

- **Management costs:** These are the costs incurred for salaries of the professional management who will operate this centre for a period of 6 months. It will have a CEO and supervisors/managers. Further, once the Bhutan team is trained, the external management can leave and allow the Bhutanese team to carry on operations in a true Build, Operate and Transfer model
- **Utility costs and overheads:** This includes rental for building, if required, utility costs (water, electricity), and other overheads such as travel, lodging etc.,
- **Advocacy:** It will be critical to launch an advocacy/marketing program to bring awareness of the ICT solutions to the citizens, especially those in rural and remote areas
- **Toll-free number –** There will be a minor cost incurred for the toll free numbers obtained for the healthcare helpline and emergency toll free numbers.

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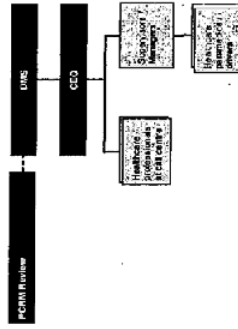
5.0 Operational decisions

5.1 GOVERNANCE

The proposed governance mechanism for the ICT healthcare solution will be as follows:

Exhibit 16: Governance.

Governance mechanism



- The DMS will be the key department from the Ministry of Health which will monitor and track the performance of the ICT agency run under the supervision of external professionals
- The overall progress review will be presented to at the monthly PCRMs reviews by the CEO. They will be tracked on targets and KPIs agreed on, in the MoU.
- Initially, CEO, will be appointed from the professional service provider. He/She will monitor the healthcare professionals, supervisors and will be responsible to achieve based on KPIs and targets defined. Over 3-6 months, he/she will train and hand over his/her responsibilities to a local candidate with suitable operational experience.

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5.2 HR REQUIREMENTS

The release of healthcare professionals from low / utilization regions or fields will prove greatly beneficial as these ICT solutions will be available to the entire population.

The number of healthcare professionals required for the call centre will be directly proportional to the volume of calls received. Also this is a 24x7 service and hence there will be atleast 2-3 shifts a day.

1. Calculation of estimated call volume

- For the healthcare helpline service, the estimated call volume for the entire country per year is estimated at 6000-7000 calls. (This was benchmarked with Andhra Pradesh, India where for a population of 75,000,000 they received around 5,00,000 calls early in the first year. Considering Bhutan's population of 752,700(NP), this number approximation was done factoring the rural and remote areas)

- For the emergency response system, Bhutan can expect 500-1000 calls in the first year. (Again, this was benchmarked with Meghalaya, where with a population of 25 lakh expected 1st yr call vol ~1500 growing to steady state of 6000 calls/yr. Hence Bhutan can expect about a third of this call volume considering similar economic and geographic conditions)

2. The capacity that can be handled by each healthcare professionals per year is around 1500-2000 calls a year. And hence Bhutan would require 3-4 healthcare professionals and working in 3 shifts and 2 doctors working over two shifts. The total requirement will be ~10 healthcare professionals (including 2 doctors) to cover the entire 24x7 hr shifts

3. In addition, the call centre will require 1-2 dispatch officer and manager who will coordinate with medical ambulances; however these do not need to be healthcare professionals.

4. The top management team will be initially from the service provider, however over time (3-6 months) they will train a local team to carry on the role of the senior management. A local CEO must be recruited from the very beginning to ensure he can take over once the external service providers leave

5. All the ambulance drivers and paramedics are employed by MoH. Since today each ambulance has 2 drivers (total of 120 drivers), some of these drivers will be retained who can be trained and are in good physical health. In total ~100 drivers will be need to operate 60 ambulances across 2 shifts. Further today no ambulance has a paramedic. Again 1 paramedic (class 10

graduate) will be required per ambulance and in order to account for multiple shifts (30 paramedics in day shifts and 30 in nights shifts) as well as for absences, MoH/RCSG will have to recruit 100 paramedics in total.

6. The requirements and TOR for CEO is as below:

- Requirements for CEO, Call Centre
 - Proven man management / operational skills
 - Good health knowledge, NOT necessarily a doctor
 - 100% time dedicated to the Health Help Centre
 - Possess the ability to make decision under pressure
- Roles and Responsibility:
 - Analyze the patient health records and apprise the Ministry of Health on the issues which may require immediate attention
 - As a chief trouble-shooter he/she initiates appropriate technical, administrative and financial actions, resolve conflicts and solve problems
 - CEO shall act as a support and an interface between the call centre and hospitals/dissatisfied patients / media and MoH
 - Manage performance of his team consisting of health professionals and supervisors. He will have hire and fire decisions for team members not performing as well as vacancies to be filled
 - Suggest improvements and refinements to the system periodically
 - He will overlook all training programs for healthworkers / supervisors / drivers and paramedics

5.3 CALL CENTRE

The Ministry of Health will play a pivotal role in deciding the location of the call centre.

- A few potential options of where this could be
 - JDWRNH: At the hospital there is existing space (in the old building) where some hardware could be leveraged.

- Existing Government location: There are still unoccupied locations with other ministries, who may avail of the call centre facility in the future.
- The existing HISC may NOT be suitable because of its limited size. However this option is yet to be explored.
- As an interim measure, operating the call centre from an existing establishment in Gwahabati, was also discussed with the Ministry. Although this option may temporarily save investments of ~Nu 25 million, there will be security concerns over having the data sit in a foreign server and therefore, the option is RULED OUT.

5.4 BRANDING / ADVOCACY

Once the services have been rolled out, actively advocating its use and 24x7 availability will be critical in gradually building momentum around the new initiative. As experience has shown in other countries, full capacity of the service line is realized only ~2 years as it takes time for people to "trust" and depend on tele advice. And most will do so, only when they hear success stories from others.

Advocacy can be done in several ways

- Fliers and posters at all health facilities
- Visual signage on ambulances, facades of buildings, bus stops
- Announcements through loud speakers, especially effective in population clusters
- Health-workers spreading the awareness through word of mouth
- AV and Text advertisements at cinemas and local TV channels

5.5 TERMS OF REFERENCE AND KPIS

The terms of reference which will be used to evaluate the bids will be created to best suit Bhutan's requirements. A first draft of this would read as below:

- Experiences in ICT health services for states / public health departments
 - Number of state / national governments worked with.
 - Number of people covered by services within an hr
 - Health Helpline established at scale with proven track record

- Emergency ambulance services dealing with atleast 50 ambulances
- Experience working in emerging economies with limited infrastructure
 - Exposure to emerging economies
 - Proven usage of existing infrastructure in ICT solution
 - Client references in existing markets
 - Rural and remote population coverage especially in hilly terrain
- Proven replicability of solution at scale in short duration
 - Existing SOPs and training program for staff
 - Time taken to ramp up and roll out and population covered in effort
 - Defined SLAs and metrics and quantifiable results in previous states
- Advanced quality of health technology solution
 - Service must provide triage and emergency response system
 - Ability to expand to other services e.g., Tele-medicine, electronic health record management, preventive healthcare solutions through health worker

Also, once selected the service provider will be monitored and tracked on a detailed list of KPIS, as agreed in the MoU. An illustrative example of what these would be is as follows:

Measure	MoM
Attrition	Percent
Time spent in training	Percent
Utilization	Percent
Waiting time in Service Provision queue	Number
Calls answered in less than 3 rings	Percent
Service Uptime	Percent
Calls terminated after registration	Percent
% Calls Abandoned at Server	Percent
Cost per service provided call	Number
Time between call and care	Number
Statistics	

Calls Served	Number
Resource Utilization	Number
Operational goals (Operations)	Number
Employee productivity measures (many)	
Call Volumes	
AT SERVER	
AT RO	
SERVICES PROVIDED	
URGENT CALLS	
Customer Satisfaction Measures	

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6.0 Risks and Challenges

Irresponsible and alcoholic drivers- There should be a clear code of conduct with compliance program for ambulance drivers to comply with to ensure prompt, effective and safe delivery of service. This has to be clearly understood by the drivers and concerned administrators should closely monitor compliance.

- Speed limit-** The ambulance drivers cannot be dis-ated to drive faster as per stated upper speed limit (60km/hr); it should be left upon the discretion of the driver based on the safety of those travelling.
- Death en-route-** If a patient dies on the ambulance on the way to the hospital, a situation that cannot be dismissed; then the paramedics cannot be held accountable for the death of patients, if patient care was extended with due diligence.
- Contagious disease-** There is always a risk for the paramedics and ambulance drivers getting infected with contagious diseases. Therefore, the call centre must warn them on the situation well in advance in order to avoid spread of infection and in some cases send a specially quarantine team
- Call centre referred health facility not matching patient's choice -** While the paramedics must deal with their patients with empathy, they must be firm and decisive in determining on the choice of hospital based on directives from the call centre
- SMS / E-prescriptions -** Prescriptions through sms will be only given to those hospitals if the health professional is fully convinced of the diagnostic and the sickness / drug falls within the defined drug list
- Ambulance in transit,** if witnesses an injury/health problem they have to attend to the patient and also inform the call centre immediately
- Prank calls-** The numbers of the prank callers will be tracked and action will be taken (such as barring calls from the number)

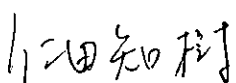
5. 討議議事録 (M/D) 誤記修正

**AMENDMENT
TO THE MINUTES OF DISCUSSIONS
ON THE BASIC DESIGN STUDY
ON THE PROJECT FOR REPLACEMENT OF AMBULANCES
IN KINGDOM OF BHUTAN**

In October 2010, JICA sent to Bhutan the Draft Report Explanation Team in order to explain the components of the draft report. In the course of explanation, both parties confirmed the main items described on the minutes of discussions, which was signed on 14th of October, 2010.

Regarding the above mentioned minutes of discussions, both parties confirmed that the amount of the estimated project cost borne by the Bhutan side has to be corrected along with the actual content of agreement when the minutes were signed, which is 494,320 Ngultrums (Japanese Yen 1.00 million) in total.

Thimphu, 8 December, 2010



Tomoki Nitta
Leader, Draft Report Explanation Team
Resident Representative
JICA Bhutan Office
Japan International Cooperation Agency



Dr. Dorji Wangchuk
Director General
Department of Medical Services
Ministry of Health
Royal Government of Bhutan

Annex-1 Project Cost Estimation

The estimated project cost, if this plan is to be implemented, is about 162 million yen, under the conditions described below. This estimation cost is provisional and would further be examined by the Government of Japan for approval of the grant.

(1) Project Cost borne by the Japanese side

Project cost borne by the Japanese side is estimated to be Japanese Yen 161.306 million. Table below shows the contents of the project cost.

item	Estimated Cost (million Yen)
(1) Equipment Fee	145.306 million Yen
(2) Consultant Fee	16 million Yen
Total	161.306 million Yen

(2) Expense Obligations for the Kingdom of Bhutan

Project cost borne by the Bhutan side is estimated to be 494.320 Ngultrums (Japanese Yen 0.73 million).

Item	Estimated costs	
(1) Insurance Fee	39,000 Ngultrums	78,000 yen
(2) Car Registration fee	73,320 Ngultrums	148,106.4 yen
(3) Passenger Fees	19,500 Ngultrums	39,390 yen
(4) Bank commissions	362,500 Ngultrums	730,000 yen
Total	494,320 Ngultrums	998,526.4 yen

The exchange rate of 1 ngultrum = 2.02 yen was used.

(3) Estimation Conditions

- ① Time of estimation : September 2010
- ② Foreign exchange rates : US\$ 1 = 92.35 yen, 1 Nu = 2.02 yen
- ③ Implementation period : Approx. 12 months
- ④ Other conditions : Cost is estimated within the framework of Japan's Grant Aid scheme

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6. 参考資料／入手資料リスト

番号	名称	形態 図書・ビデオ 地図・写真等	オリジナル・コピー	発行機関	発行年
1	Annual Health Bulletin 2009	図書	コピー	保健省	2008
2	Annual Health Bulletin 2010	図書	コピー	保健省	2009
3	世界子供白書	電子データ	コピー	UNICEF	2010
4	Country Health Profile Bhutan	電子データ	コピー	WHO	2007
5	ブータン人口調査	電子データ	コピー	UNFPA	2005
6	Schedule of Budget Appropriations 2009-2010	図書	コピー	保健省	2009
7	National Budget 2010-2011	電子データ	コピー	財務省	2010
8	Bhutan's IT Healthcare Solution - Health Help Centre	図書	コピー	保健省	2009
9	質問書回答	図書／電子データ	コピー	保健省	2010