

Project Study on Utilization of Information Technologies for Maternal and Child Health

Final Report

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JAPAN INTERNATIONAL COOPERATION AGENCY

**PADECO Co., Ltd.
HANDS**

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Abbreviations and Acronyms

3G	Third generation of mobile telecommunications technology
ANC	Antenatal Care
API	Application Programming Interface
ASEAN	Association of South - East Asian Nations
B to B	Business to Business
B to C	Business to Consumer
CSR	Corporate Social Responsibility
DoH	Department of Health
EHR	Electronic Health Record
EMR	Electronic Medical Record
FDA	Food and Drug Administration
HIS	Health Information System
IVR	Interactive Voice Response
LAN	Local Area Network
LMS	Learning Management System
MCH	Maternal and Child Health
MoH	Ministry of Health
NCD	Non-Communicable Disease
NORAD	The Norwegian Agency for Development Cooperation
OD	Operational District
PNC	Postnatal Care
SIM	Subscriber Identity Module (Card)
SMS	Short Message Service
SNS	Social Networking Service
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
USAID	United States Agency for International Development
VPN	Virtual Private Network
WHO	World Health Organization

1. Study Background and Objectives

1.1 Study Background

1.1.1 Health Situation and Challenges

Each year, about 290,000 women lose their lives due to pregnancy and delivery related causes, and about 6.9 million children die before they turn five. 99% of these maternal and childhood deaths occur in developing countries. The three major infectious diseases, namely HIV/AIDS, tuberculosis and malaria, also kill 3.35 million people each year. In many countries, especially in sub-Saharan Africa, these diseases hinder economic and social development.

Among the eight Millennium Development Goals (MDGs) set in 2000, three goals put the health sector front and center; Goal 4 (reduce child mortality), Goal 5 (improve maternal health), and Goal 6 (combat HIV/AIDS, malaria and other diseases).

To achieve these goals, lower income countries have been making an effort to improve the situation, with their governments increasing expenditure on health and reducing out-of-pocket health expenditures. In the same period, the international community has significantly increased its development assistance for health; the United States and other countries increased their bilateral funding, while new multilateral funding mechanisms such as the Global Fund to Fight AIDS, Tuberculosis and Malaria emerged. Private foundations including the Bill & Melinda Gates Foundation have also played an important role.

With these efforts, the health of people in the developing world has improved. For example, 12.6 million children under age five died in the 1990s; twenty years later, that number has decreased to 6.9 million in 2011. However, especially in lower income countries, improvements in maternal and child health, and in infectious disease control, have been too slow. In some countries, the MDGs are unlikely to be achieved by 2015. In others, country-wide health indicators have improved, but the level of disparity within the country remains unacceptable. This inequality in health especially affects the poor, people in dire need of health services, and people living in remote areas.

1.1.2 Utilization of Information Technologies

In recent years, the rapid growth of the data communication industry, or mobile market, has prompted official development assistance to promote the effective utilization of ICT to achieve the Millennium Development Goals (MDGs). Information Technologies (IT) / Information and Communication Technologies (ICT) involve information processing and information communication. In other words, IT/ICT refer to technology, industry, services and more in various sectors related to computer and networks. In this report “IT” is used as a general term for IT/ICT.

In the health sector, international organizations have promoted a variety of approaches with the private sector, aimed at effective utilization of ICT to solve health related problems, called eHealth/mHealth¹. The World Health Organization (WHO) designed the eHealth strategy at their 58th general assembly in 2005. The mHealth Alliance was established in 2009, hosted by the United Nations Foundation and funded by the private sector, NGOs, governmental organizations and academic societies. It has been founded to promote the effective utilization of ICT to improve health services in low-income countries, and also to accumulate and evaluate used cases.

¹ WHO defines eHealth (electronic health) as utilization of IT within the field of the health care and mHealth (mobile health) as health activities with the use of mobile technology. Building Foundations for eHealth: Progress of Member States: reports of the WHO Global Observatory for eHealth, World Health Organizations, 2007

Also, Japanese companies are running a variety of related businesses in the domestic and overseas markets, such as image transfer systems for telemedicine, health related information delivery systems via mobile devices, and so on.

1.1.3 eHealth/mHealth Contribution to the Reduction of the Inequity Gap to Achieve the MDGs

eHealth is noted as one of the important means in efforts to solve problems in the health sector, especially for the improvement of the disparity in achieving the MDGs. In recent years, eHealth, through the use of ICT that takes into account cost-safety, is expected to contribute to the improvement of health care services, health surveillance, health education, health care human resources education, and research etc.² (see table 2.4). Notably, it is highly expected that eHealth will lead the change of the current situation efficiently and effectively, in the area of improvement of access to health services and health information (the use of mHealth and the introduction of telemedicine), and the improvement of human resources for health to work in rural areas (the use of the supervision system and distance education).

1.2 Objectives

In this study, maternal and child health (MCH) are selected as a focus area from the health sector. From the viewpoint of "how IT is utilized to improve MCH in developing countries", this study aims to discuss practical and sustainable business models, through the research of issues of MCH and the IT environment of developing countries. This study, therefore, can be rephrased as a study on eHealth/mHealth in MCH.

JICA has assisted in developing and disseminating the Maternal and Child Health Handbook (MCH-Handbook; Boshi-kenko-Techo) in developing countries for a long period and this shall be one of the important tools to enhance MCH services. It shall be examined to enhance the sustainability and effectiveness of the MCH Handbook through the utilization of IT.

1.3 Study areas

In this study, both domestic and foreign cases related to the utilization of IT in MCH were examined and analyzed. Study areas were Palestine, Cambodia and the Philippines. It pays special attention to Palestine, since the MCH Handbook is distributed to 90% of mothers in all of the autonomous areas of Palestine. The field survey for the Philippines was canceled due to the typhoon in November 2013, and therefore only a literature review was conducted.

²mHealth Compendium: Volume Two: Technical Report, USAID, 2012

1.4 Study Methods

(1) Team Members

Table 1.1 Team Members

Names	Positions / Tasks	Field Schedule	Affiliation
Yuji Ozaki	Leader / IT (1)	Palestine : August 17 - August 27, 2013 Cambodia : August 28 – September 7, 2013	PADECO Co., Ltd.
Yoshie Mizogami	Maternal and Child Health (1)	Palestine : August 17 - August 27, 2013 Cambodia : August 28 – September 6, 2013	HANDS
Etsuko Ueno	Maternal and Child Health (2)	None	HANDS
Yoshinori Kurachi	IT (2)	Palestine : August 17 - August 27, 2013 Cambodia : August 28 – September 7, 2013	Asnew Systems Inc.

(2) Field Schedule and Places

The field schedule and interviews for the study in Palestine and Cambodia were conducted as follows:

Table 1.2 Field Schedule (Palestine)

Date and Time	Interviewees' Affiliation	Interviewee	Place	
August 17	Arrival in Israel (Move to Palestine at 8/18)			
August 18	9:30	PHC and Public Health Department	Dr. As'ad Ramlawi	MoH HQ (Ramallah)
	11:00	PMRS (Palestinian Medical Relief Society)	Dr. Khadija Jarrar	PMRS - Al Balou' ; Al Bireh(Ramallah)
	12:30	JICA Palestine Office		Ramallah
	13:30	Provision Co.	Mr.Omar Shamali	Ramallah - Rukab Str. - Nasser Bldg. (Ramallah)
	14:30	Ougarit Group	Ms.Amal Masri	Almasayef - Ougarit Bldg(Ramallah)
August 19	9:00	UNRWA	Dr.Umaiye Khammash Dr. Elias Habash	UNRWA HQ(Jerusalem)
	10:30	Community Health Department	Dr. Ghadyan Kamal	MoH HQ (Ramallah)
	12:30	PRCS	Ms. Fatima Skaik Ms. Maha El Aqtash	PRCS HQ (Albireh - Jerusalem Str. - 6th floor, Ramallah)
	15:15	Jawwal Co.	Mr. Ma'moun Khadir Mr. Munadel Al Ghoul Ms. Rawya Na'am Abu Laben	Jawwal HQ - Albalou'(Ramallah)

Date and Time		Interviewees' Affiliation	Interviewee	Place
	15:30	PMRS	Dr. Mustafa Barghouthi	PMRS - Al Balou' ; Al Bireh (Ramallah)
August 20	9:00	UNICEF	Kamal Ben Abdallah Najwa Rizkallah	UN (Jerusalem)
	11:00	Women's Health and Development Directorate, MoH	Dr. Souzan Abdo	(JICA Palestine Office)
	12:30	HWC	Hanan Abo Gosh Dr. Mohamad Jaber	Sateh Marhaba - DCI Bldg (Ramallah)
	14:30	Al Wataneyya Mobile Co.	Saleh Dawabsheh	Alwataneyya HQ - Sateh Marhaba - Al Bireh (Ramallah)
	16:00	Private Clinic	Dr. Amin Shak'a	Al Israa Bldg - Al Irsal Str.(Ramallah)
August 21	9:00	SoukTel	Mr.Jacob Korenblum Mr.Mahmoud Shayeb	SoukTel HQ
	10:15	PFPPA (Palestinian Family Planning & Protection Association)	Ms.Aminah Ewidat Mr. Mithkal Jaber	Jerusalem- industrial zone
	14:00	UNFPA	Dr. Ali Shaar	(JICA Palestine Office)
	16:30	JICA Tel Aviv Office		Tel Aviv
August 22	8:30	UNRWA (Aqabet Jabr)	Dr. Ahmad Jubeh	Aqabet Jabr Refugee Camp (Jericho)
	11:00	PRCS Hospital (Albireh)	Mr.Mohammad Shafi Dr. Mohamad Nobani	Al Bireh (Ramallah)
	12:30	PHC Center		Bir Zeit (20 km north from Ramallah)
	15:30	USAID	Ms. Larisa Mori	USAID (Tel Aviv)
August 23	Day Off			
August 24	Day Off			
August 25	9:00	Gynecologists Society	Dr. Walid Barghouthi	Future Hospital (Ramallah)
	10:00	Nursing Department, PHC	Ms. Lubna	MoH HQ(Ramallah)
	12:00	Health Education & Promotion Department, PHC	Ms.Lubana Salameh Daddder	MoH (Nablus)
	13:00	Directrate of Computer and Network	Dr.UmaiyeH Abujana	MoH (Nablus)
August 26	9:00	Wataneyya Co.	Mr. Hadeel Abushalbak Mr. May Abu Awwad Mr. Osama Abu Hilal	Wataneyya HA (Ramallah)
	11:00	Nutrition Department, PHC	Mr.Alaa Abu Rub	MoH - MCH Office (Al Bireh)
	13:00	Italian Development Corporation	Dr.Emanuela Benini	Mujeer Eddin St (Jerusalem)
	16:00	UNRWA (Director of Health Programming)	Dr. Akihiko Seit	American Colony Hotel (Jerusalem)
August 27	10:00	UNRWA (Information System Office)	Mr. Nassar Najjar	UNRWA (Jerusalem)
	12:15	Ramallah Medical Complex	Ms Salam Al-Ratrout Mr. Raed M. Radwan	Ramallah Medical Complex
	16:00	JICA Tel Aviv		Tel Aviv
	Move to Cambodia			

Table 1.3 Field Schedule (Cambodia)

Date and Time	Interviewees' Affiliation	Interviewee	Place	
August 28	Arrival to Cambodia			
August 29	10:15	Kampong Cham Provincial Hospital	Dr. Mesa Chea	Kompong Cham Province
	14:15	Kampong Cham Regional Training Center	Dr. Pem Mardy	Kompong Cham Province
August 30	9:15	Romeas Heck District Referral Hospital and Kampong Trach Health Center	Dr. Pheav Sosota Dr. Ream Setha Dr. Chay Chanthoon	Romeas Heck, Svay Rieng Province
August 31	Day Off			
September 1	Day Off			
September 2	8:00	MoH Director General	Dr. Tep Lun Ms. Khol Khemravy	MoH (Phnom Penh)
	10:00	National Maternal and Child Health Center (NMCHC)	Dr. Rathavy	NMCHC (Phnom Penh)
	10:00	Young Entrepreneurs Association of Cambodia (YEAC)	Mr. Ken Chanthan	Phnom Penh
	14:00	JICA Cambodia Office		Phnom Penh
	15:30	JICA MANECA Project	Dr. Yuriko Egami Ms. Sakuya Uchiyama	Phnom Penh (NMCHC)
September 3	9:10	MoH (Department of Human Resource Development)	Ms. Keat Phuong	Phnom Penh (MOH)
	8:30	MoH (Department of Planning and Health Information)	Dr. Lo Veasnakiry	Phnom Penh (MOH)
	14:30	CHUUN HONG GROUP	Mr. Te Samnang	Phnom Penh (MoH)
September 4	9:10	Kmouch Health Center	Dr. Chhay Kry	Phnom Penh
	14:00	National ICT Development Agency	Mr. Kensaku Suzuki	Phnom Penh
	14:00	Mobitel Co., Ltd.	Mr. Ian Watson	Phnom Penh
	15:00	JICA project for Strengthening Human Resources Development System of Co-medicals	Dr. Noriko Fujita Mr. Shinichiro Kojima	Phnom Penh (MoH)
September 5	8:30	UNICEF	Ms. Penelope Campbell, Mr. Try Tan Mr. Hong Rathmony	Phnom Penh
	10:00	USAID	Ms. Monique Mosolf	Phnom Penh
	14:00	InSTEDD Innovation Lab	Mr. Julian Wimbush Ms. Channe Suy	Phnom Penh
	15:30	URC	Mr. Hong Roith Mr. Jerker Liljestrand	Phnom Penh
	Move to Japan (Ms. Mizogami) / Arrive on Japan at 9/6			
September 6	8:00	WHO	Dr. Rasul A. Baghirov	Phnom Penh
	10:00	UNFPA	Mr. SOK Sokun	Phnom Penh
	15:00	JICA Cambodia Office		Phnom Penh
	Move to Japan (Mr. Ozaki and Mr. Kurachi)			
September 7	Arrival in Japan (Mr. Ozaki and Mr. Kurachi)			

2. IT Utilization in the Field of Healthcare

In the field of health care, IT has been utilized since the early stages for individual health care operations. Radio communications or telephones for remote diagnosis have been utilized as Telemedicine since the early 1900s. The word “Telehealth” has been popularized through a series of projects to investigate the values of Telemedicine with the use of telecommunication technologies, conducted by the U.S. federal government and state governments from the middle to late 1990s. After that, “eHealth” was formed by transferring the know-how acquired through Telemedicine or Telehealth to the Internet, since the late 1990s³.

In 1993, the U.S. National Cancer Institute started to deliver the latest information about cancer management from their database via e-mail, free of charge. This activity should be categorized as “eHealth” today, but there was no word “eHealth” in those days. Since around 1999, the word “eHealth” was popularized as the delivery of health care by using the Internet (and/or other information networks).

2.1 eHealth/mHealth

The classifications, effects, case examples and issues of eHealth and mHealth are summarized in this section. We are able to regard mHealth as one of the styles of eHealth.

2.1.1 eHealth classifications

According to the WHO / ITU, eHealth is classified as shown in Table 2.1.

Table 2.1 eHealth Classifications

IT Classification	Type of eHealth	Contents
Media	Mobile health, mHealth	- mHealth describes services and information provided through mobile technology, such as mobile phones and handheld computers.
Applications	Distance learning, eLearning	- eLearning services comprise education and training in electronic form for health professionals. eLearning can improve the quality of education, increase access where learning resources are unavailable, or use new forms of learning.
	Telemedicine, Telehealth	- Telemedicine supports the provision of health-care services at a distance; that is, the individual and health-care providers need not be in the same location.
	Decision support systems	- Decision support systems assist health-care providers in making diagnosis and treatment decisions.
	Chronic disease management services	- Chronic disease management services are designed to improve coordination and management of care for individuals with chronic conditions.

³ “E-Health, Telehealth, and Telemedicine” (Jessey-Boss, 2001)

	Health information systems (HIS)	Electronic records	Electronic medical records (EMR)	- An EMR is a computerized medical record used to capture, store and share information between health-care providers in an organization, supporting the delivery of health services to patients.
			Electronic health records (HER)	- An EHR is a computerized health record used to capture, store, access and share summary information for a patient between health-care organizations and providers.
			Personal health records (PHRs)	- A PHR is a computerized health record created and maintained by an individual who is proactive in the management of her or his own health. The record can be private, or made available to health-care providers. PHRs can store a diverse range of information such as an individual's allergies, adverse drug reactions, chronic diseases, family history, illnesses and hospitalizations, medications, diet and exercise plans, and test results.
		Practice, patient and clinical management systems		- Practice, patient and clinical management systems refer to the computer systems that health-care organizations use to manage the delivery of care to individuals. They system form one of the foundations required for collecting, recording and sharing electronic information across a country's health sector (can be foundation of Evidence based medicine).
		Electronic medication services		- Electronic medication services benefit health-care professionals and the general public. Services such as electronic prescribing allow the electronic transmission of prescription information from the health professional to the pharmacy, reducing medication errors and replacing paper based system.
	Health knowledge resources		- Health knowledge resources encompass those services that manage and provide access to trusted information to support health-care providers and individuals. Resources include international electronic journals and resource collections, national electronic journals, and national open archives.	
Devices	Medical Devices		- Surgical robot, diagnostic equipments such as MRI, Blood test related equipment (hardware)	

Source: National eHealth Strategy Toolkit, WHO/ITU, 2012

In light of IT, mHealth is classified as “media”, distance learning/eLearning, Telemedicine/Telehealth decision support systems, Health Information System (HIS), and health knowledge resources are classified as “applications” and medical devices are classified as

“devices”. “Media” refers to a measure or a device generally used for recording, transfer and storage. Therefore, the classification of mHealth is restricted to media.

“Applications” means an aggregate of processes which perform specific tasks on a terminal of devices, computers and communication networks. Software (programs) to regulate the processes, media, devices and others are included in the elements composing applications.

The types of eHealth refer to the purpose of applications. “Devices” usually refer to medical devices apart from computers. In recent years, medical devices include the function of computers and medical devices which can connect to a network. Devices not only function by themselves but are also elements composing applications.

2.1.2 Descriptions of eHealth Classifications

(1) Mobile Health (mHealth)

mHealth describes services and information provided through mobile technology, such as mobile phones and handheld computers. mHealth emerged rapidly in developing countries as a result of the large penetration of mobile phones and the lack of other, modern health infrastructure. Examples include the use of mobile devices for: a) data collection for surveillance and public health (e.g. outbreak investigation); b) real-time monitoring of an individual’s health; c) treatment support, health advice and medication compliance; d) health information to practitioners, researchers and patients; e) health education and awareness programmes; and f) diagnostic and treatment support, communication for healthcare workers.

(2) Distance Learning and eLearning

Distance learning and eLearning services comprise education and training in electronic form for health professionals. Examples of use include continuing medical education for doctors and nurses, and training in preventative services at the household level for community health workers. eLearning types vary widely, and may allow interaction between the learner and instructor, access to digital libraries and online courses, networks to share experiences, or the use of mobile devices to access information to support the delivery of care.

(3) Telemedicine and Telehealth

Telemedicine supports the provision of health-care services at a distance. Examples of telemedicine services include;

- Store-and-forward services involving acquiring medical data (e.g. doctor or medical specialist) for offline assessment and treatment recommendation (teleradiology, telepathology etc.)
- Remote monitoring services, which enable health care providers to monitor an individual’s condition remotely, using technologies such as implanted devices and sensors with wireless or wired connections
- Interactive services, which enable real-time interaction between an individual and their health care provider through means such as telephone, web conference, video conference, and other forms of online and remote communication (Psychiatry and mental health services etc.)

(4) Decision Support Systems

Decision support systems assist health care providers in making diagnosis and treatment decisions. These systems combine an individual's current and historical health information with the health-care provider's knowledge, to provide advice intended to result in better quality care and outcomes for the individuals. For example, in the area of medication management, decision support tools draw on electronic knowledge sources, such as clinical practice guidelines and knowledge bases, and apply this knowledge to local patient and clinical data through expert rules to guide medication decision making.

(5) Chronic Disease Management Services

Chronic disease management services are designed to improve coordination and management of care for individuals with chronic conditions. Better tracking of health status, test results, and other parameters enables closer management and prevention of episodes of acute illness or decline in status. Information tracked over time supports individual care planning as well as programme design, resource allocation and research on disease states, benefiting clinicians, administrators, managers and researchers.

(6) Health Information System (HIS)

HIS is a system for the collection/processing of data from various sources, and using this information for policy making and management of health services. The health information of the system includes information about infections, disease statistics, human resources and financial indicators⁴.

Examples of HIS in the context of eHealth are electric records (EMR, EHR and PHRs), practice, patient and clinical management system, and electronic medication services. It is possible to introduce each system separately as a different system, but through the computerization process it is also possible to combine them into one system. If the information or data can be shared in this way, duplication of data or data input work can be economized and it will be possible to develop a more efficient and effective HIS. To introduce eHealth into HIS effectively, it is important that the gap between the stages of HIS below and the level of achievement from a budget and time constraint perspective is reduced. Different countries are at different stages of HIS, and according to their level, effective intervention can be selected.

Table 2.2 shows the different stages of HIS. Stage 1 is the most basic, fundamental level, and gradually the level goes up to Stage 5. Effective use of IT in HIS partly starts from Stage 2, and the whole HIS will be computerized in Stage 5. Most of the developing countries are still in Stage 1 or Stage 2, and paper based information collection is still ongoing in these countries. However, eHealth has already been introduced partly in some developing countries too. In these countries, the transition from Stage 2 to Stage 3 or 4 have been observed⁵.

⁴<http://seesaawiki.jp/w/jaih/d/%ca%dd%b7%f2%b0%e5%ce%5%be%f0%ca%f3%a5%b7%a5%b9%a5%c6%a5%e0>
(Japan Association for International Health)

⁵ The research referred to in this report explained each stage by choosing some countries as an example of each stage. Bangladesh, Haiti and Mozambique are explained as a example of Stage 1, and Ghana, India, and Indonesia were explained as countries which are transforming from stage 1 to stage 2 or stage 3 in the period in which the research was conducted. Mexico and Ethiopia were explained as countries in Stage 3, and Belize was chosen as a country in Stage 4 (in 2009).

Table 2.2 Stages of Health Information Systems

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Data collection	Paper base/hand writing			Electronic base/Direct input by PC	
Data storage	Paper base		Partly electronic base	Electronic base	
Efficiency	Multiple redundant formats	Focus on using existing systems to collect optimized and smaller set of data, with a view to increasing data quality and, relevance		Gradually integrate management system information addition to the clinical data	Integrate all stages of health care system information
Data quality	Low quality, delay in reporting	Improvement of quality, can use the data promptly	Improvement of data storage, automated reporting system, improvement of data analysis	Systematic business process analysis ⁶ required, complex reporting	Evidence-based decision making and data-driven management, complex reporting
Utilization of the data	Not much use	Use for decision-making on management		Access to information from all levels of service delivery network possible and encouraged	Use daily in decision making process in management, medical examination and treatment practices
Resources	Paper, pen etc.		Computer, data storage media		
Computer literacy	Little or no computer literacy at local level	Little or no computer literacy at local level	Limited computer literacy required for data entry at local level	Moderate to significant computer literacy required for a larger number of users	Significant computer literacy required for most users
Scope	Capture only district indicators	Capture only district indicators	Capture only district indicators	Greatly expanded with inclusion of patient-level data from health system transactions (EMR), and resource data (personnel, medical supplies)	Maximized, with Stage 4 data integrated with public health data
Scale	Can be country-wide depending on compliance and follow-through (which is often spotty)	Can be country-wide depending on compliance and follow-through (which is often spotty)	Projects often begin with one or two districts, but aim for nationwide deployment	Sub-national because of increased resource and capability requirements	National, entire population included

Source: Health Information System in Developing Countries-A Landscape Analysis, VITAL WAVE CONSULTING, May 2009

(7) Health Knowledge Resources

Health knowledge resources encompass those services which manage and provide access to trusted information, to support health care providers and individuals. Resources include

⁶ Systematic business process: conduct comprehensive analysis on medicine and medical supplies, clinical examination, human resources and medical financing management and find out appropriate amount of activities and service supply effectively and efficiently.

international electronic journals, resource collections, national electronic journals, and national open archives.

(8) Medical Devices

While according to the definition of eHealth by WHO/ITU, medical devices refer to hardware apart from computers; in Japan and the Western countries a legal regulation for medical devices may regard applications, such as decision support systems and Electronic Medical Records (EMR), as medical devices. Thus the difference should be addressed.

In Japan, medical software has been called a medical device by being combined with a hardware device. However, in the near future the medical software will be sold as a medical device under the revised Pharmaceutical Affairs Law issued on the 20th of November, 2013, even if the medical software is not combined with the device⁷.

2.1.3 Expected Effects of eHealth

As mentioned in the former section, eHealth has been developing in various types of forms. It is commonly described as a means to ensure that “the right health information is provide to the right person ant the right place and time in secure, electronic form to optimize the quality and efficiency of health care delivery, research, education and knowledge⁸”. Details of such expected effects are shown in Table 2.3.

Although these expected effects interact with each other, they will not be achieved immediately by simply introducing eHealth activities. By utilizing eHealth, it creates new possibilities to various activities for improving health situation.

Table 2.3 Expected effects of eHealth

	Benefit areas	Examples
(1)	Access to services	<ul style="list-style-type: none"> - Ability to deliver basic and enhanced health services to rural and remote communities - Ability for patients to locate health care providers that offer the services they require - Access to second medical opinion from remote specialists
(2)	Efficiency gains in health services delivery	<ul style="list-style-type: none"> - Enhanced health workforce productivity due to greater efficiencies in obtaining patient information, record keeping, administration and referrals - Improved utilization of health workforce through remote health care delivery models
(3)	Quality and safety of care	<ul style="list-style-type: none"> - Increased adherence to best practice by health care providers, reduced instance of medically avoidable adverse events - Improved ability to monitor compliance with medications and other treatment regimes
(4)	Health monitoring and reporting	<ul style="list-style-type: none"> - Improved ability to support surveillance and management of public health interventions

⁷After 2014 during which a new legal regulation will be issued, it is probable that a guideline for medical software, based on the international standard, will be established.⁸ National eHealth Strategy Toolkit, WHO/ITU, 2012

⁸ National eHealth Strategy Toolkit, WHO/ITU, 2012

		- Improved ability to analyze and report on population health outcomes
(5)	Access to health knowledge and education	- Improved access to health care provider knowledge sources , including medical literature, education, training and other resources - Improved access to consumer health knowledge sources, including health education and awareness, and prevention information for certain health conditions
(6)	Operation planning and management	- Improved access to quality data sources to inform health care services and workforce planning and development
(7)	Empowering individuals	- Improved participation of individuals in self-monitoring and chronic disease management - Improved access to trusted health knowledge sources
(8)	Innovation and growth	- Increased standardization of information exchange and communication between different segments, agencies and organizations - Increased opportunity for market innovation through access to eHealth standards

Source: National eHealth Strategy Toolkit, WHO/ITU, 2012

In addition, Table 2.4 describes the example of the expected effects of eHealth by each stakeholder. As mentioned in this table, eHealth has an impact on various stakeholders such as citizens, academic professionals, and the private and public sectors. It also enables us to fill the gap within the country (e.g. urban and rural, rich and poor) as well as the gap between developing and developed countries.

Table 2.4 Examples of the Expected Effects of eHealth by Stakeholders

Stakeholders	Impact of eHealth
Citizens	- Enables personalized care, throughout the health system and across the lifespan - Makes health care available at home, at work, or in school- not just the hospital or clinic - Focuses on prevention, education and self management - Facilitates reaching out to peers for advice and support
Professionals in research and practice	- Gives access to current, specialized, accredited knowledge for clinical care, research and public health, and to research , publications and databases - Enables communication between patients and providers - Makes high quality distance learning for basic and continuing professional education readily available - Allows remote consultations with patients, for second opinions, and with professional networks
Hospitals, academia and public health	- Establishes hospitals as a virtual network of providers, connecting all levels of the system - Monitors quality and safety, improves care processes and reduces the possibility of medical errors - Assists mobility of citizens and their medical records-providing patient information when and where needed - Opens new opportunities in basic and applied research, from health knowledge to

Stakeholders	Impact of eHealth
	<ul style="list-style-type: none"> - policy action - Extends collaboration and shared computing power (eg. Grid and cloud computing) - Delivers services despite distance and time barriers - Standardizes ordering and delivery of drugs and supplies
Health related businesses	<ul style="list-style-type: none"> - Provides health content as a commodity to public and health professionals - Facilitates research and development of new products and services: electronic health records, information systems, and clinical registries - Enables broad and cost effective marketing for health products and services to businesses and governments, locally and abroad
Governments	<ul style="list-style-type: none"> - Delivers more reliable, responsive and timely reporting on public health, as health becomes increasingly central to economies, security, foreign affairs and international relationships. - Creates enabling environments rather than technology limitations - Offers new roles for stakeholders, health professionals, authorities, citizens and others - Identifies disease and risk factor trends, analyzes demographic, social and health data, models diseases in populations

Source: National eHealth Strategy Toolkit, WHO/ITU, 2012

2.1.4 Case Examples of eHealth

In Table 2.5, various cases of eHealth in the world are described based on the classification of eHealth mentioned above. mHealth is a kind of media, and it covers many types of eHealth. In this section, mHealth replaces one of the eHealth cases.

As the table describes, eHealth has started to be used in many countries regardless of their economic situation. In both developing and developed countries the cases of eHealth have been accumulated. In developing countries, there are pilot projects, and small and limited areas are supported by the United Nations or development partners. In developed countries there are the cases performed by the private sector and local governments, and performed as the national system. The majority of the cases are developed and administered by private companies.

The cases of mHealth have remarkable points. In developing countries more cases of mHealth are implemented than other types of eHealth. When eHealth, such as electronic HIS, especially district-wide health information network, is introduced, barriers such as initial introduction costs exist. On the other side, mHealth can reduce the barriers through the utilization of mobile phones.

Table 2.5 Case Examples of eHealth

Types of eHealth	Developed Countries	Developing Countries
Distance learning, eLearning	<ul style="list-style-type: none"> - USA : Distance learning (University of Michigan, Medical School) (★) 	<ul style="list-style-type: none"> - Bangladesh : Project for Nursing education, (NGO Future Code) - Ethiopia, Ghana, Rwanda, Kenya, et al : Health Education and Training Programme (African Medical and Research Foundation, et al)(●) - Ghana : e-learning midwifery education programme(UNFPA) (●)
Telemedicine, Telehealth	<ul style="list-style-type: none"> - Germany : Telemedicine 	<ul style="list-style-type: none"> - India : Aravind Eye Care System

		(BaumullerReparaturwerk GmbH & Co.) - Japan : Tono municipal birth center “ Net-Yuricago“ (●)	- Philippines : RxBox (National Telehealth Center) - Mongolia : Telemedicine Support of Maternal and Newborn Health to Remote Provinces of Mongolia (UNFPA) (●) - Tanzania : Using Cell Phones for Obstetric Emergencies (maternal Health Task Force)(★●)
	Decision support systems	- Japan : ”Hospi-Net” SECOM Medical System Co., Ltd.	
	Chronic disease management services	- Japan : Supporting System of Cronic Diseases (Association for Research in Supporting System of Cronic Diseases) - USA : care4life (diabetes) (Voxiva. Inc.) (★)	- South Africa : SIMpill Medication Adherences Solution (SIMPill)(★)
Health information systems (HIS)	Electric records	Electronic medical records (EMR)	- Various countries : Electronic medical records (EMR) at health facilities - Kenya : MCH-EMR Pilot Project in Nyanza Province (JICA)(●) - Rwanda : Open Medical Record System (OpenMRS)(Partners In Health)
		Electronic health records (HER)	- Japan : ”Ajisai-Net” (Saga prefecture) - Japan : “Electronic Perinatal Record Network System (ihatov)” (Iwate prefecture) (●) - UK : National Network Service Spine (National Health Service) - Zambia : Zambia Electronic Perinatal Record System (University of Alabama-Birmingham (UAB)) (●) - Philippines : Wireless Access for Health(WAH) project_Community Health Information Tracking System (Qualcomm Incorporated)(★) - Ghana : District-wide Health Information Management System(DHIMS)(Ghana Health Service, etal)
		Personal health records (PHRs)	- USA : WebMD(WebMD LLC.) - Japan : “Sukoyaka Oyako Denshi Techo” (Tono-city, Iwate prefecture) (●) - Japan : Website “Sukoyaka Oyako Denshi Techo” (Kagawa university hospital Perinatal medical center) (●) - Japan : Digital version of Mother and Child Health Handbook, “Yukari” (Tokyo National College of Technology,) (★●)
	Practice, patient and clinical management systems	- USA : Dicon (The Lauren Ancel Meyers Reserch Group)	
	Electronic medication services	- UK : Electronic Medication Management (iCare Health)	
	Health knowledge	- Various countries : electronic	- China (Hong Kong) : Health Phone

resources	<ul style="list-style-type: none"> journal, searching system - USA : Mobile Midwife HER (DALY ENTERPRISES. INC.) (★●) - USA : text4baby (National Healthy Mothers, Healthy Babies Coalition) (★●) 	<ul style="list-style-type: none"> (Health and Education Trust) (★) - Congo : La LigneVerte Family Planning Hotline (USAIDS/Population Service International)(★●) - Ghana : Mobile Midwife 8Grameen Foundation et al. (★●) - Ghana : Text Me!Flash Me! Call Me!(USAID)(★●) - Malawi : K4Health Mobile Learning Pilot (USAIDS/Johns Hopkins University)(★●) - Philippines : Wireless Access for Health (WAH) project_the Mobile Midwife and SPASMS (Synchronized Patient Alert via SMS) applications (Qualcomm incorporated) (★●) - Tanzania, Kenya : Mobile 4 Reproductive Health (m4RH)(USAID)(★) - Uganda : Workplace-based SMS Awareness Campaign(USAID)(★) - Malaysia : The use of text messaging to improve attendance in primary care(Randamized Controlled Trial) (★)
Medical Devices	<ul style="list-style-type: none"> - Various countries : Many types of medical devices 	<ul style="list-style-type: none"> - India : laboratory examination services in Kerala (Public Health Foundation of INDIA)

★mHealth cases, ●eHealth cases for maternal and child health

2.1.5 Challenges of eHealth

As mentioned above, the utilization of eHealth leads to various effects, and it is a useful tool for development of health sector and improvement of human health. However, there are a variety of challenges when eHealth is introduced as mentioned in Table 2.6. Therefore, it is necessary to carefully consider the challenges.

Table 2.6 Challenges of eHealth

Types of eHealth	Challenges
Mobile health, mHealth	<ul style="list-style-type: none"> - Depends on the rate of spread of mobile phones, and the network of mobile phones. - Barriers because of many kinds of existing mobile phones. - Literacy rate affects mHealth when mHealth approach for citizens is introduced.
Distance learning, eLearning	<ul style="list-style-type: none"> - Limits the contents of education
Telemedicine, Telehealth	<ul style="list-style-type: none"> - Difficulty of ensuring the quality of services - Many legal regulations; e.g. clinical consultations may be forbidden apart from in person.
Decision Support Systems	<ul style="list-style-type: none"> - Reliability of the data

Chronic disease management services		- Protection of personal information (patient's agreement is needed when their information is shared at multiple health facilities).	
Health Information System	Electronic records	Electronic medical records	- Interoperability between systems - Permanence of recorded data - Capacity of system users (Computer literacy)
		Electronic health records	- Simultaneously participant of related health facilities - Protection of personal information (patient's agreement is needed when their information is shared at multiple health facilities)
		Personal health records)	- Interoperability between systems - Permanence of recorded data - Capacity of system users (Computer literacy)
	Practice, patient and clinical management systems	- Protection of personal information (patient's agreement is needed when their information is shared at multiple health facilities) - Linkage with electronic records	
	Electronic medication services	- Protection of personal information (patient's agreement is needed when their information is shared at multiple health facilities) - Linkage with electronic records	
Health knowledge resources		- Reliability and accuracy of the data	
Medical Devices		- High cost to import and export the medical devices due to regulations - Medical devices with telecommunication functions may have interoperability issues	

Source: Study Team

2.2 eHealth for Maternal and Child Health (MCH)

The purpose of Maternal and Child Health (MCH) is to maintain and promote mothers and their children's health. Additionally, that of the MCH is to respect and protect a sense of responsibility as a mother, called "bosei" (motherhood), and it is an important factor for children to be born and grow up healthy, and to assist in order to develop the inherent ability of children to grow up and develop. The goal of the MCH is to maintain and promote a mother and her children's health as well as the health conditions in their community. Hence, people who are related to the development of children, such as medical doctors, midwives, public health nurses and nurses need to cooperate to attain the mentioned above goals.

As for maternal and child health issues, while the Maternal Mortality Ratio (MMR) and under five mortality rate have improved, they are still global issues. The main causes of maternal deaths are pregnancy complications, obstetric hemorrhages, uterine ruptures, eclampsia, obstructed labor and infections, which means that these deaths may be prevented if Emergency Obstetric and Neonatal Care in health facilities are provided by skilled health care providers. Neonatal deaths account for the majority of deaths of children who are under the age of five. Proper health care services for mothers during delivery are important to reduce the number of neonatal deaths.

eHealth has started to be utilized in diverse countries and areas as a tool to improve the above mentioned situation in Table 2.3. Table 2.5 shows eHealth cases of maternal and child health. Table 2.7 shows significant case examples in developing countries.

2.2.1 Case examples of eHealth for MCH in developed countries

(1) “text4baby” in the United States⁹

“text4baby” is a mobile information service for pregnant women and mothers with their infants, using mainly text messaging. The base of the system uses SMS to provide information services. text4baby provides information services based on data from the Centers for Diseases Control and Prevention (CDC) throughout the United States, and at the end of 2013 an evaluation of the service will be undertaken.

(2) “Tono Municipal Birth Center¹⁰” in Tono City of Iwate Prefecture

The population in Tono city is about 30,000, and the problems of depopulation and falling birthrate are getting worse. By 2002, all the hospitals in the city closed their maternal wards. Therefore, pregnant women have to give birth at hospitals outside of the city. The city is located in a mountain area, and it takes more than one hour to go to hospitals outside of the city one way by car. During the winter season snow and the frozen roads cause pregnant women anxiety about giving birth, and the burden of going to hospitals so far away.

Tono municipal birth center “Net-Yuricago“, which provides antenatal care services by using mobile CTG (cardiotocogram) monitoring devices, web-based electronic medical records and a video conference system through the internet, was established in December 2007. Midwives have provided antenatal care at patient's houses and a health center in the city, and the results of antenatal care are transferred to PCs and mobile phones at hospitals in Iwate prefecture through the internet. When the midwives in the municipal birth center enter the patient's data into the web-based electronic medical records, the data is shared by health care workers at affiliate hospitals in the prefecture. Moreover, pregnant women feel like they are receiving antenatal care at a hospital despite the distance, because they can communicate with medical doctors through the use of online live videos.

The telemedicine network system decreases the burden of going to hospitals, and the anxiety of pregnant women, and improves maternal and child health services. Additionally, the telemedicine network system contributes to the early detection of pregnancy complications and an early referral to the hospitals when necessary.

(3) “Electronic Perinatal Record Network System (Ihatov)”^{11,12} in Iwate Prefecture

The Electronic Perinatal Record Network System is a networking system between health facilities and municipal offices which enables health care workers and municipal officers to share the medical records of pregnant women. In March 2009, the system was established, and Iwate prefecture launched the system in April 2009. The background of the system is the fact that hospitals without maternity wards have increased, and the prefecture considered the misdistribution of obstetricians a serious problem.

⁹<https://text4baby.org/>

¹⁰Kikuchi Y, et al. New challenges in an area without obstetrician (Sankaiga inai tiikideno aratana challenges), 2012.

¹¹http://www.applic.or.jp/app/pdf/futuer_15/02/2-2.pdf

¹²http://www.applic.or.jp/pdf/futuer_15/05/2-1.pdf

The system aims to develop an environment in which pregnant women can deliver with security, to reduce medical expenses by sharing the results of medical examinations, and to decrease medical expenses for the referral¹³.

The system recovered immediately after the earthquake in March 2011. The information of pregnant women who lost maternal and child health handbooks were left in the “ihatov” and this problem was properly solved¹⁴.

2.2.2 Case Examples of eHealth for MCH in Developing Countries

Table 2.7 shows four cases, considered effective interventions, among these eHealth cases. Additionally, the effectiveness is compared to examples of the eHealth benefits in Table 2.3.

(1) “Mobile Midwife”^{15,16} in Ghana

Financial support from Grameen Foundation, Bill & Melinda Gates Foundation, United States Agency for International Development (USAID), Norway government, Grand Challenges Canada, World Bank

Mobile Midwife is a part of the Mobile Technology for Community Health (MOTECHE) project. The purpose of the intervention is to improve antenatal care services and neonatal care services in rural poor areas, and empower women to manage their own health.

Pregnant women and their families obtain relevant health information through voice or text messages during their pregnancy period. The voice or text messages every week encourage them to take antenatal care services. After deliveries, they obtain health information about immunization against infections and serious diseases for their children. The health information was translated into some local languages used in Ghana. Community health workers keep electronic records and gather patients’ information with their mobile phones.

This intervention sends messages to pregnant women as well as people who support their decision-making, such as their father and mothers-in law, which could contribute to the improvement of maternal and child health care services¹⁷. That the regional characteristics are reflected in the message is considered to be important in promoting behavioral change¹⁸.

(2) “La LigneVerte Family Planning Hotline”^{19,20} in the Democratic Republic of the Congo

Financial support from United States Agency for International Development (USAID)

In the Democratic Republic of the Congo, it has been difficult for people to obtain accurate information about family planning over the past decade, due to conflict, political instability and the decrease of the accessibility of media. This situation has caused a low prevalence of contraceptive use.

¹³http://www.applic.or.jp/pdf/futuer_15/05/2-1.pdf

¹⁴ <http://mitla.co.jp/works/ihatov.html>

¹⁵<http://www.mhealthinfo.org/project/mobile-midwife>

¹⁶USAID, mHealth compendium, 2012.

¹⁷Grameen foundation, Mobile technology for community health in Ghana, 2012.

¹⁸Grameen foundation, Mobile technology for community health in Ghana, 2012.

¹⁹USAID, mHealth compendium, 2012.

²⁰Gurman, TA. Et al, Effectiveness of mHealth behavior change communication interventions in developing countries: a systematic review of the literature, 2012.

This project was launched in 2005. When people call a toll-free number, trained educators provide health information about birth spacing, the correct use of family planning methods, side effects and how to avoid unwanted pregnancy. The telephone service is open from 8am to 4pm, Monday to Friday.

During three years more than 80,000 people used this hotline, and about 80% of the hotline callers were men. The duration of a call was limited as the conversation per call could not last more than two minutes due to the contract with the telephone company. Only two minutes were not enough to answer all the questions of hotline callers. In the Democratic Republic of the Congo, the hotline service was not expanded properly and 20% of the calls were not related to family planning.

(3) “K4Health Mobile Learning Pilot”²¹ in Malawi

Financial support from United States Agency for International Development (USAID)

In Malawi, health managers and health care providers could not update information about HIV/AIDS. The existing information was too technical and difficult to access for community health care workers. Health care workers used previous health information even after new guidelines and protocols were introduced to upper level health managers.

This project provides up-to-date health information about family planning and HIV/AIDS to community health workers through mobile phones. The system allows community health workers to send SMS by mobile phones to other electronic devices. Moreover, the project provides new resources, training opportunities, changes in protocols and public health activities in their district to community health workers. Community health workers are also provided with mobile phones and solar chargers.

The following positive results were confirmed in this project;

- Improvement of reliability of clinical information and early detection and prevention of stock-outs
- Increase of community health workers’ self-confidence and client trust
- More effective referrals

(4) “Zambia Electronic Perinatal Record System (ZEPRS)”^{22,23} in Zambia

Financial support from Bill & Melinda Gates Foundation

The Zambia Electronic Perinatal Record System (ZEPRS) is the first web-based electronic medical records and referral system in Sub-Saharan Africa. The ZEPRS is used at 24 public maternity clinics and the University Teaching Hospital in Lusaka to improve health care services.

The major objectives of the ZEPRS are the following;

- To improve the accessibility of patient records
- To improve the quality of patient records
- To improve information for research and analysis
- To provide useful information to Zambian health administrators to better manage health facilities and allocate resources

The ZEPRS achieves its objectives by providing the following services.

- Sharing electronic patient records among health facilities

²¹USAID, mHealth compendium, 2012.

²²<http://www.rti.org/page.cfm?objectid=23558795-6ED4-438D-85E1B26A59F918A1>

²³<http://www.ictedge.org/node/113>

- Providing a system that guides health care workers through the Zambian standard of care
- Providing intelligent rules which alert health care workers to problems and the timing of referrals
- Providing standard and ad hoc reporting for supportive supervision, surveillance and analysis
- Providing the first electronic system used by health care workers during health care services
- Providing an effective electronic referral system

(5) “Health Education and Training (HEAT)”²⁴ in Ethiopia

Financial support from UNICEF

Health Education and Training (HEAT) launched the HEAT programme in collaboration with the Ethiopian Federal Ministry of Health, African health experts, UNICEF and the African Medical and Research Foundation (AMREF) in 2011. The objective is to improve the skills of health extension workers who provide community health services in rural areas. The HEAT programme, therefore, can lead to a reduction in the Maternal Mortality Ratio (MMR) and the under five mortality rate.

The programme is providing training composed of 13 modules, such as maternal and child health, immunization, nutrition and hygiene, and this training uses the internet. The HEAT programme has been implemented in Ethiopia as well as Ghana, Rwanda, Kenya, South Africa, Nigeria, South Sudan, Uganda, Tanzania and Zambia.

(6) “The Use of Text Messaging to Improve Attendance in Primary Care: Randomized Controlled Trial”²⁵ in Malaysia

Financial support from International Medical University (IMU)

In Malaysia, non-attendance is a common problem in health facilities which provide primary care services. This research paper describes how previous studies have reported mailed reminders and reminders by telephone are effective in reducing broken appointments.

The purpose of this study was to explore whether reminders by text message are effective at improving attendance in primary care. At seven primary care clinics in Malaysia a randomized controlled trial was performed. While two intervention groups received text messages and mobile phone reminders, each from 24 to 48 hours prior to scheduled appointments, a control group did not receive any interventions.

The results included 993 enrolled participants, and attendance rates of the control group, the text message and mobile phone reminder groups were 48.1%, 59.0% and 59.6% respectively. The attendance rate of the text message and mobile phone reminder groups were significantly higher compared with that of the control group. There was no significant difference in attendance rates between the text message reminder and mobile phone reminder groups, and the cost of the text message reminder was lower than that of the mobile phone reminder. The researchers concluded that the text message reminder was effective in primary care clinics.

²⁴<http://www.open.ac.uk/africa/heat/>

²⁵Leong KC, et al. The use of text messaging to improve attendance in primary care: randomized controlled trial, 2006.

(7) “e-learning Midwifery Education Programme”²⁶ in Ghana

Financial support from UNFPA

UNFPA and Jhpiego, which is an affiliate of Jones Hopkins University, provide three modules of an e-learning programme for midwives and health care providers who need midwifery skills. The modules were developed by UNFPA, Jhpiego, Intel and WHO. This programme utilizes the “Intel skool Healthcare Education Platform²⁷”, and multimedia content delivery and assessment solutions that enable education to take place anywhere or anytime using low cost computers.

The e-learning modules address pregnancy complications, such as hemorrhage, prolonged and obstructed labor, and eclampsia. The modules include quizzes which help track the progress of health workers. The quizzes can be performed offline and the students can find the results when they go online. The additional e-learning modules are planned to be about life-saving skills, family planning and essential newborn care.

(8) “Telemedicine Support of Maternal and Newborn Health to Remote Provinces of Mongolia”^{28,29} in Mongolia

Financial support from UNFPA, Luxembourg government

Mongolia is one of the least densely populated countries in the world. The low population density leads to difficulty in maintaining a high quality of health care services and health care providers. The government of Luxembourg and UNFPA launched a telemedicine project to deal with maternal and child health issues for achieving the MDGs.

This project was implemented from 2007 to 2011. The objectives of this project were to establish a functional telemedicine network of maternal and child health, build the capacity of health care workers to enable the Maternal and Child Health Research Center (MCHRC) to assist rural health care workers in delivering quality case management to rural populations of selected provinces. As for technology, the project provided modern diagnostic and telemedicine equipment. Campus Medicos was used as the software platform, and it provided a collaborative platform for the exchange of medical knowledge and distance consultations.

The results of the project were as follows:

1) Improved Quality and Accessibility of Maternal and Neonatal services

Although medical doctors in rural areas could not have used high quality ultrasound machines and digital cardiotocograph before this project, they could utilize these medical devices with the help of the project.

2) Improved Networking between Rural and Urban Health Professionals

798 study cases were discussed on a tele-consultation platform (64.2%: obstetric cases, 21.7%: gynecologic cases, the rest: neonatal cases). 86% of all the cases were available to be managed on the tele-consultation platform in rural areas, and the rest (14%) were referred to upper level health facilities. Therefore, the network between rural and urban health professionals widely improved.

3) Improved Diagnostic Capacity of Remote Physicians on Fetal Conditions

²⁶<http://www.ghananewsagency.org/health/ghana-pilots-e-learning-midwifery-education-programme--60539>

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<http://www.intel.com/content/dam/www/public/us/en/documents/corporate-information/intel-skool-hc-ed-platform.pdf>

²⁸Baatar, T, et al. Telemedicine Support of Maternal and Newborn Health to Remote Provinces of Mongolia, 2012.

²⁹http://obgyn.telemedicine.mn/pdf/report/Annual%20report_2008.pdf

Prior to this project, fetal malformation was diagnosed only in the labor room after births. However, after the project, the diagnoses in the early period of pregnancy (before 22 weeks of gestation) are possible for rural doctors. The training and medical equipment contributed to the above mentioned results.

4) Reduced Pregnancy and Childbirth Complications

In 2009 the proportion of pregnancy complications out of total deliveries was 15.4%, which had decreased from 19.1% in 2005. Additionally, the percentage of complications during deliveries had also decreased from 25.7% in 2007 to 9% in 2009.

5) Reduced Numbers of Unnecessary and Costly Referrals and Emergency Calls

The number of unnecessary referrals in project provinces declined between 2005 and 2009.

(9) “UAMUZI BORA, MCH-EMR Pilot Project in Nyanza Province”³⁰ in Kenya

Financial support from Grand Challenges Canada, Vestergaard Frandsen, (given support as a part of JICA project)³¹

Uamuzi Bora is a Maternal and Child Health – Electronic Medical Record (MCH-EMR) which uses open source software called OpenMRS. The OpenMRS has been introduced in Kenya, and it was applied for the MCH in this pilot project. The project had been implemented in five health facilities in Kisumu West district from April to June of 2013. 926 pregnant women, 194 deliveries, 301 children and 66 women who received ART were registered in the MCH-EMR by the end of June 2013.

Although in health facilities information about pregnant women and children had been recorded, it had been difficult to follow up specific patients before the pilot project, because the majority of the patient records had not been written per patient. The MCH-EMR is an electronic maternal and child health handbook managed in health facilities. Hence, health care providers can find patient records easily, and access patient information.

This pilot project could not contribute to an improved maternal and child health situation, as the period of this pilot project was short, and the project focused on the feasibility of entering data and the quality of data entered.

The possible functions of the MCH-EMR are SMS reminder services for antenatal care clients and mothers with infants, and clinical reminder services for health care providers in order to provide necessary care for patients.

(10) “The Mobile e-system for Safe Motherhood Program”³² in the Philippines

Financial support from International Development Research Center (IDRC) Canada

Since November 2010, “The Mobile e-system for Safe Motherhood Program³³”, a project utilizing IT in ANC and MCH services, has been implemented by the Molave Development Foundation, Inc. (MDFI), a nonprofit organization based in the Philippines. The town of Roxas, located in Mindoro Island, a remote area with a population of about 50,000, was selected as one of the pilot areas. This town consists of 20 villages, and there is a Health Center staffed with 2 physicians, 1 nurse and 8 midwives.

³⁰ [https://uamuzibora.org/resources/reports/\[Uamuzi%20Bora\]%20MCH%20EMR%20Final%20Report%20240613.pdf](https://uamuzibora.org/resources/reports/[Uamuzi%20Bora]%20MCH%20EMR%20Final%20Report%20240613.pdf)

³¹ <https://uamuzibora.org/about/partners/index.html>

³² <http://newswatch.nationalgeographic.com/2011/05/10/safe-motherhood-mobile-healthcare-in-the-philippines/>

³³ <http://newswatch.nationalgeographic.com/2011/05/10/safe-motherhood-mobile-healthcare-in-the-philippines/>

The following are the features of the activities:

- Maternal health reporting (Prenatal and postnatal registry)
- Listing of registered women per barangay for sending broadcast messages
- Broadcasting of necessary maternal health information in a text format on areas such as Baby Development, Maternal Nutrition, Pregnancy Care, Pregnancy Complications, Common Problems in Pregnancy, Breastfeeding, Postnatal Care, Baby Care and Family Planning
- Responds to questions asked by mothers through text by providing advice
- Promotes complete prenatal visit, facility-based childbirth and postnatal visits
- Records all sent messages by the System and archives received messages from registered patients

Within the 3 month period of pilot activity, 100 pregnant women were enrolled. Each pregnant woman was sent a total of 100 texts during her entire pregnancy. As a result, in one pilot area, there was an increase of 34% in facility based births. Further positive impacts are expected, such as health benefits for more women from the services provided by UHC, the decrease of obstetric complications, a reduction in the maternal and neonatal mortality rate, and ultimately helping to achieve the MDGs for maternal and child health.

(11) “Wireless Access for Health (WAH) Project; the Mobile Midwife and SPASMS (Synchronized Patient Alert via SMS) Applications”³⁴ in the Philippines

Financial support from USAID, Zuellig Family Foundation (ZFF)³⁵

The WAH project, which is a multi-stakeholder partnership of industry-academic-government, focuses on streamlining the reporting process and improving access to accurate and timely patient information for clinicians in clinics and hospitals in the Philippines. The project is built upon and strengthened through the existing Community Health Information Tracking System (CHITS), an electronic medical records system utilizing 3G wireless technology, developed by the University of the Philippines, Manila.

Since the project began in July 2009, WAH partners have established CHITS as their own electronic medical records (EMR) platform. Health facilities introducing CHITS have gradually increased in Tarlac province located in Luzong Island. As of April 2012, more than 109,000 patient records have been obtained by the system. As a result, the system has dramatically reduced the time needed to search paper records, and so the numbers of patient visits have increased. Tarlac provincial government has committed staffing and financial resources to replicate the project in all 38 provincial health clinics.

Tarlac province is the first and only province in the Philippines to have all of its health clinics interconnected and running on a health information system.

The expansion of the WAH project also includes province-wide pilot testing of the Mobile Midwife and SPASMS (Synchronized Patient Alert via SMS) applications. Mobile Midwife enables data to be captured electronically during patient visits via Smartphone, tablets or laptops and instantly sends patient data to the CHITS system.

SPASMS is an automated alert and health promotions system that sends patients' information related to important health milestones such as prenatal care and child immunization. To date, 26 midwives are participating in the Mobile Midwife program and 1,100 SPASMS have been sent to more than 250 patients.

³⁴<http://www.multivu.com/mnr/56382-qualcomm-wireless-access-for-health-project-tarlac-clinics-philippines>

³⁵<http://www.philstar.com/health-and-family/2013/04/09/928767/wireless-access-health-seeks-countrywide-expansion>

(12) "Using Cell Phones for Obstetric Emergencies"³⁶ in Tanzania

Financial support from Maternal Health Task Force (Bill & Melinda Gates Foundation, John D. & Catherine T. MacArthur Foundation, Hansen Family Foundation and others)

This project was implemented by Ifakara Health Institute (IHI) in cooperation with mobile phone company Zain and district councils to improve access to emergency care for Tanzanian women. From 2011 to 2013, the Maternal Health Task Force (MHTF) has supported this project.

This project is expected to facilitate consultations, counseling, referrals and resupply services in remote areas. Moreover, the aim of this project is to evaluate how mobile phones and service plans are provided with mid-level health care providers who might improve communication between those providers and senior medical staff to improve the health situation at the district level.

³⁶http://can-mnch.ca/wp-content/uploads/2012/06/Life-Saving-Commodities-New_Concept_Note1.pdf

Table 2.7 Effective eHealth Cases in Developing Countries

eHealth Cases for Maternal and Child Health	Types of eHealth	Effectiveness	Examples of Expected Effects of eHealth (Table 2.3)
<p>Mongolia</p> <p>“Telemedicine Support of Maternal and Newborn Health to Remote Provinces of Mongolia”</p>	<p>Telemedicine</p>	<ul style="list-style-type: none"> - <u>Improved Quality and Accessibility of Maternal and Neonatal services</u> Although medical doctors in rural areas could not have used high quality ultrasound machines and digital cardiocotograph before this project, they could utilize these medical devices with the help of the project. - <u>Improved Networking between Rural and Urban Health Professionals</u> 798 study cases were discussed on a tele-consultation platform. (64.2%: obstetric cases, 21.7%: gynecologic cases, the rest: neonatal cases) 86% of all the cases were available to manage on tele-consultation platform in rural areas, and the rest (14%) was referred to upper level health facilities. Therefore, the network between rural and urban health professionals had widely improved. - <u>Improved Diagnostic Capacity of Remote Physicians on Fetal Conditions</u> Prior to this project, fetal malformation was diagnosed only in the labor room after births. However, after the project, the diagnoses in the early period of pregnancy (before 22 weeks of gestation) are possible for rural doctors. The training and medical equipment contributed to the above mentioned results. - <u>Reduced Pregnancy and Childbirth Complication</u> In 2009 the proportion of pregnancy complications out of total deliveries was 15.4%, which means that the percentage had decreased from 19.1% in 2005. Additionally, the percentage of complications during deliveries had also decreased from 25.7% in 2007 to 9% in 2009. - <u>Reduced Numbers of Unnecessary and Costly Referrals and Emergency Calls</u> The number of unnecessary referrals in project provinces declined between 2005 and 2009. 	<p>(1), (2), (3), (8)</p>
<p>Malawi</p> <p>“K4Health Mobile Learning Pilot”</p>	<p>Health knowledge resources (mHealth)</p>	<ul style="list-style-type: none"> - Improvement of reliability of clinical information and early detection and prevention of stock-outs - Increase of community health workers’ self-confidence and client trust - More effective referrals 	<p>(2), (3), (5)</p>

eHealth Cases for Maternal and Child Health	Types of eHealth	Effectiveness	Examples of Expected Effects of eHealth (Table 2.3)
Philippines “The Mobile e-system for Safe Motherhood Program”	Health knowledge resources (mHealth)	Within the 3 months period of pilot activity, 100 pregnant women were enrolled. Each pregnant woman was sent a total of 100 texts during her entire pregnancy. As a result, in one pilot area, there was an increase of 34% in facility based births.	(1)
Malaysia “The use of text messaging to improve attendance in primary care”	Health knowledge resources (mHealth)	The results were 993 participants were enrolled, and attendance rates of a control group, text messaging and mobile phone reminder groups were 48.1%, 59.0% and 59.6% respectively. The attendance rate of text messaging reminder and mobile phone reminder were significantly higher compared with that of the control group. There was no significant difference in attendance rates between text messaging reminder and mobile phone reminder groups, and the cost of the text messaging reminder was lower than that of the mobile phone reminder.	(1)

Source: Study Team

Expected Effects of eHealth (See Table 2.3 for details);

- (1) Access to services
- (2) Efficiency gains in health services delivery
- (3) Quality and safety of care
- (4) Health monitoring and reporting
- (5) Access to health knowledge and education
- (6) Operation planning and management
- (7) Empowering individuals
- (8) Innovation and growth

2.2.3 Challenges of eHealth for MCH

Although the use of eHealth for health care services includes many challenges, eHealth is expected to improve the health services as well as the maternal and child health situation. Global public health issues are related to the high MMR and IMR, and eHealth might be one of the useful interventions to deal with these maternal and child health problems.

According to eHealth case studies (Table 2.11), mHealth has often been utilized for maternal and child health services, such as antenatal care, delivery, postnatal care and family planning. In developing countries, IT infrastructure has been not developed, but a mobile phone is a common communication tool. Therefore, in developing countries, mHealth is easier to be implemented than eHealth.

When mHealth is introduced, there are some problems, such as the spread of mobile phones, the burden of the charge of SMS or call, and the literacy rate. In the case of this study some solutions are implemented; distribution of mobile phones to community health workers, making them free of charge, providing information in multiple languages, and providing voice mails. However, “people who should obtain interventions to improve maternal and child health” are not always included in “people who can usually use mobile phones”. Therefore, the effectiveness of mHealth might be limited by this.

In addition to mHealth, e-learning, telemedicine, health information systems, and electronic maternal and child health handbooks have been used for improving maternal and child health services. While many pilot projects and research of eHealth have been implemented, there are few projects which have shown evidence of improvement in the maternal and child health situation through eHealth interventions. Therefore, further research on eHealth, and follow-up of projects, are necessary to find results which show behavioral changes³⁷.

2.3 MCH Handbook and eHealth

2.3.1 Overview of MCH Handbook

(1) Characteristics

Based on the contents of the Mother and Child Health Handbook (MCH Handbook) in Japan and other countries, characteristics usually common in MCH Handbooks are summarized as follows:³⁸

- The MCH Handbook is a Home Based Record
- The MCH Handbook is designed to cover the integrated services provided to mothers and children, from pregnancy to delivery, immediate postnatal period and childhood (Maternal Newborn and Child Health: MNCH) which each country sets as a minimum standard (or overall goal)

(2) Functions and Contents

The MCH Handbook has various functions; however, it is mainly categorized into three functions: 1) Portable Medical Record; 2) Health Education Tool; and 3) Health information Tool. Details of its functions and targets are described in Table 2.8

³⁷Foster R, Review of developing country health information systems, 2012

³⁸JICA Human Development Department, “Study on utilization of Mother and Child Handbook- knowledge, lessons learned, challenges, March 2012

Table 2.8 MCH Handbook: Target and Function

Function		Target
1. Portable Medical Record	<ul style="list-style-type: none"> - Monitoring tool (used for patient management by referring the services which the person received before or to check the person's health condition) - Referral tool (used for referrals among health facilities in cases when the mother receives health services at a different facility than usual or in the case of emigration etc) 	<ul style="list-style-type: none"> 1) Mothers, Children and Family 2) Health care providers
2. Health Education Tool	<ul style="list-style-type: none"> - Tool to take home health information (used to encourage health behavioral change of mother and family) - Tool to encourage childcare at home (used to enhance communication within the family and participation of the father in childcare by sharing the information and records of the child) - Tool for health guidance and communication (used as a material by health care providers to provide information to mothers and families. It is also utilized as an education material which enhances the awareness of mothers and to ask necessary questions) - Tools to encourage the parenting of the next generation (the child uses it to realize the relationship with his/her parent. The child enhances awareness for future parenting by looking at his/her own MCH Handbook and by recording his/her own health status)³⁹ 	<ul style="list-style-type: none"> 1) Mothers, Children and Family 2) Health care providers
3. Health Information Tool	<ul style="list-style-type: none"> - Surveillance tool (e.g. gathering data for immunization coverage etc) 	<ul style="list-style-type: none"> 1) Policy makers of Maternal and Child Health

Source: JICA Human Development Department, "Study on utilization of Mother and Child Handbook- knowledge, lessons learned, Challenges, March 2012

In many countries, the MCH Handbook generally contains records of antenatal care, delivery, postnatal, immunization and growth monitoring of the child. In addition, basic health education information about the course of pregnancy, delivery, newborn and child care, and family planning is usually included⁴⁰. Meanwhile, there are contents which the country includes according to its typical situation, such as a record of birth registration (Indonesia), health guidance for Prevention of Mother to Child Transmission of HIV and deworming (Kenya).

³⁹Shuji Fujiuchi, "What does the user of Mother and Child Handbook expects", Journal of Health Science(Hoken no Kagaku) Vol54. No3, 2012

⁴⁰ JICA Human Development Department, "Study on utilization of Mother and Child Handbook- knowledge, lessons learned, Challenges, March 2012

2.3.2 Case Examples of MCH Handbook in eHealth

(1) “Sukoyaka Oyako Denshi Techo”⁴¹ by Tono City, Iwate Prefecture

Since 2007, Tono city (Iwate Prefecture, Japan) has developed the website “Sukoyaka Oyako Denshi Techo” (digital version of parents and children health handbook) as one of the activities of the Regional ICT Use Model Building Project by the Ministry of Internal Affairs and Communications. “Sukoyaka Oyako Denshi Techo” is a tool which pregnant woman (residents of Tono city) can utilize after registering the notification of pregnancy. Both the pregnant woman and the staff of Tono city can browse and type the data of medical records, such as the results of the antenatal care, postpartum and postnatal checkups, and immunization⁴². By digitizing its contents, “Sukoyaka Oyako Denshi Techo” resolved some of the challenges faced within the usual paper version of MCHHB such as expanding the recording space and extending the target to even school age children. In addition, pregnant women and their families can also utilize the website as their diary by uploading photos of their child. Furthermore, by strictly limiting the website user accounts to only private members, data is shared with family members such as grandparents, who are usually living too far away to follow the growth of their grandchildren. While general childcare resources are flooded and are easily available through different types of media and publications these days, this website can be specialized in providing childcare resources which are particular to Tono city.

Compared with the paper version of the MCH Handbook, “Sukoyaka Oyako Denshi Techo” enables the accumulation of information (e.g. in addition to health records of mother and child, it can save photos, and be utilized as a diary which notes how the parent felt during pregnancy and delivery etc.). It can also be utilized as a communication tool among family members and multiple health providers, if necessary. Meanwhile, Tono City has developed the website “Sukoyaka Kenko Zoshin Denshi Techo”, which is an electronic health handbook targeting adults who are aged above 19 years old and below 65 years old. Additional websites which cover each age and enables the resident to self manage his/her own health throughout his/her life cycle are expected to be developed in the near future too.

(2) “Oyako Kenko Techo Sukusuku”⁴³ by Kagawa University Hospital, Perinatal Center

Since 2007, Kagawa University Hospital, Perinatal Center (Kagawa Prefecture, Japan) has collaborated with Kagawa Prefecture and developed the website “Oyako Kenko Techo: Sukusuku” (digital version of parents and children health handbook) to support parents who have children with special needs.⁴⁴ The website has been introduced to be used in conjunction with the paper version of the MCHHB, in order to provide interactive support and childcare guidance to mothers who have a preterm or low birth weight baby, have been administered antidepressants, or who have a strong anxiety towards child rearing.

So far, people can use “Oyako Kenko Techo Sukusuku” without charge regardless of the places in which they are living. After the users are registered in the system, they select health facilities for deliveries and for their children, and they can obtain relevant information.

⁴¹ https://book.city.tono.iwate.jp/sukoyaka_b/ (accessed on November 12 2013)

⁴² New challenges in non-obstetricians area "Experiences of Sukoyaka-Oyako-Denshi-Techo and "Net Yurikago"; Health Sciences, Vol.54, No.3, 2012

⁴³ <https://health.med.kagawa-u.ac.jp/sukusuku/index.html> (accessed on November 12 2013)

⁴⁴ <http://www.kms.ac.jp/~syounika/nicu/oyako/index.html> (accessed on November 12 2013)

Table 2.9 The Function of the Website “Oyako Kenko Techo: Sucusuku” Based on Hospitals the Users Usually Visit

Hospitals the Users Usually Visit (Family Doctors)	The Function of the Website “Oyako Kenko Techo: Sucusuku”
Kagawa University Hospital	The results of clinical examinations and other information are reflected on the website. If the users write into the website, health care providers can see the contents.
Hospitals utilizing online electric medical records (EMR) provided by Kagawa University Hospital Or Hospitals’ EMR linked with the website “Oyako Kenko Techo Sucusuku”	The results of clinical examinations and other information are reflected on the website. If the users write into the website, health care providers can see the contents.
Hospitals or health care providers registered on the website “Oyako Kenko Techo :Sucusuku”	If the users write into the website, health care providers can see the contents.
Hospitals do not use the website “Oyako Kenko Techo Sucusuku”	The data the users wrote into the website is not shared, and is for personal records.

Source: Interview and trial by study team

In addition to the contents included in the existing MCH Handbook, the website has a function to automatically monitor the growth of the child (e.g. growth curve is plotted by entering the height and weight of the child, and the degree of obesity can also be monitored) Furthermore, contents such as recipes for weaning food introduced by the hospital nutrition department, childcare advice corresponding to each development stage, health resource information of Kagawa Prefecture, a diary recording how and what the parents felt during childcare, and interactive consultation with the health provider when parents face trouble are examples of additional functions provided on this website.

When a child is admitted to the neonatal intensive care unit, the family usually becomes separated from their child for months. Thus, parents and grandparents who cannot visit the hospital frequently can be updated with the condition of the child by accessing the website where the ID and password are shared privately. It is said that by sharing such information, this website has an advantage of shortening the distance between the mother and other family members. There is also a study which mentioned that the website had an effect of relieving the anxiety and loneliness of the mother by letting her type her feelings into the website and sharing them with her family members and health providers.⁴⁵

(3) Digital version of Mother and Child Health Handbook, “Yukari”⁴⁶ by Tokyo National College of Technology

“Yukari” is an android application based on the MCH Handbook issued by the Ministry of Health, Welfare, and Labor in Japan. On the 30th of September, 2013 Yukari was revealed. Yukari enables the user to record all the necessary contents which are included in the MCH Handbook such as medical records of the mother during pregnancy, development of the child, a growth monitoring chart, and an immunization record.

⁴⁵ Kensuke Ookubo, “Childcare utilizing website ‘Oyako Kenko Techo Sucusuku’ on internet”, Japanese Society of Psychosomatic Pediatrics, 2010

⁴⁶ <http://enyukari.sakura.ne.jp/top/about.php> (accessed on November 12 2013)

In addition, it has a feature which is usually not included in the paper version of the MCH Handbook, such as a calendar/scheduler (e.g. by typing your delivery date, the application shows your child's immunization schedule and notifies you when the date is nearby), a photo album, a diary (e.g. sharing your photos and movies with others and enjoying child caring), and a consultation space (e.g. posting questions and receiving answers on an electronic bulletin board).

Also, receiving opinions from professional health providers by cooperating with professional organizations is considered to be included in the future. Such data is saved and shared at cloud storage services (Google Drive). The contents of the MCH Handbook are shared among family members by allowing access only to authenticated devices. For example, information which the mother typed can be browsed by the father's Smartphone and vice versa. The father can realize in a timely manner how his child is doing, which is said to have an effect of raising awareness for the father's participation in child caring. If staff of a local government is entitled to browse its data, although limited to only certain data such as the immunization record of a child, it is expected to provide useful information to prevent and allow early detection of child abuse cases (neglect, abandonment etc) in the future.

(4) "Ninpu-Techo"⁴⁷ by HakuHodo DY Media Partners Inc. and NTT DOCOMO Inc.

HakuHodo DY Media Partners (hereinafter, HakuHodo DY) and NTT DOCOMO Inc. (hereinafter, DOCOMO) have released the "Ninpu-Techo" (maternity handbook) mobile application for Android and iOS to reduce the anxiety of pregnant women from December 11, 2013. According to HakuHodo DY, providing mobile applications that are interconnected to maternity hospitals or clinics has no precedent in Japan.

"Ninpu-Techo" limits users to obstetricians and pregnant women, and usage scenes to the duration of the pregnancy. It aims to improve the self-learning and self-control of pregnant women, and communications between obstetricians and pregnant women. HOKENDOJINSYA INC. (a healthcare publishing company) and Kizuna Mail Project (NPO) provide the educational contents. NTT Medical Center Tokyo (a hospital) provides a venue and personnel for trials⁴⁸. There are only 8 alliance partners (hospitals and clinics) at the moment (as at January of 2014), but HAKUHODO DY and DOCOMO will try to expand alliance partners to 500 in 3 years.

Table 2.10 Outlines of Ninpu-Techo

Functions/Uses	User (Pregnant Women)		Alliance Partners (Hospitals or Clinics)	
Provisioning	Application for Android or iOS Smartphone (handsets)		Web-based administrative function	
Price of Plans	Free for charge	200 JPY (2 USD) per month for premium services	Basic Plan (Free) Service contract is required.	Premium Plan (Ask for rate) Service contract is required.
Registration of due date	Essential (must be registered)			
Registration of alliance hospital and clinics	If user is outpatient of alliance hospitals or clinics, this registration is essential. Otherwise, it is optional.		Alliance partners shall be shown to users as choices (menus)	
Registration of the name of users	Registration of the name of user is essential after registration of alliance hospitals or clinics. Otherwise, it is optional.		Alliance partners are able to confirm registered users to their own hospitals or clinics.	

⁴⁷ https://www.nttdocomo.co.jp/info/news_release/2013/12/10_00.html

⁴⁸ <http://itpro.nikkeibp.co.jp/article/NEWS/20131022/512902/>

Functions/Uses	User (Pregnant Women)		Alliance Partners (Hospitals or Clinics)	
Data backup services	Registration to enjoy online backup services for recorded data by users. After registration of alliance hospitals and clinics, this is essential. Otherwise, it is optional.		/	
Automatic calculation of week of pregnancy	Available			
Showing growth of the fetus (Today's Baby)	Provide only correspond to current weeks of pregnancy. Advisories about "growth of the fetus" delivered every day.	Provide past records and current weeks of pregnancy Advisories about "growth of the fetus" delivery every day.		
Frequently Asked Questions and Answers supervised by experts, based on questions from pregnant women for the last 20 years.	Only corresponds to current weeks of pregnancy.	Provide all contents with search function.		
Recipes recommended by managerial dieticians	Only recommended contents based on current weeks of pregnancy.	Provide all contents with search function.		
Valuable information (1-2 times per month)	Recommended goods or services for pregnant women correspond to current weeks of pregnancy. (Advertisements from business partners)			
Recording physical conditions	Able to record physical conditions with memos for medical check-ups.	Able to record physical conditions and display them by graph. Also input memos for medical check-ups.	Alliance partners are able to check records and memos of registered users via web-based administrative function.	
ToDo list	Available. If register alliance hospitals or clinics, weekly ToDo list will be delivered from hospitals or clinics.		The contents of ToDo list are pre-set.	The contents of ToDo list are able to customize. Able to monitor level of understandings or implementation status of registered users.
Questionnaire from hospitals or clinics	Some questionnaires may come from registered hospitals or clinics.		Not available.	Able to compile questionnaire to outpatients and monitor answers.
Schedules of medical check-ups	Not available.	Available. Dates of medical-checkups are able to be registered to calendar with reminder.	Able to confirm the date of medical checkups registered by registered users.	
Web page for hospitals or clinics	Able to see registered hospitals or clinics.		1 page with text only.	4 pages with pictures and texts.
Information from hospitals or clinics (Timely information such as events or non-consultation day, etc.)	Provided from registered hospitals or clinics. Otherwise, not available.		Limited functions available.	Available.

Functions/Uses	User (Pregnant Women)	Alliance Partners (Hospitals or Clinics)	
Others	Users are able to delete records permanently at any time. Online backup service supports migration of handsets (same operating systems only).	Explanatory meeting for hospitals or clinics will not be provided.	Explanatory meeting for hospitals or clinics will be provided.

Contents providers	Outlines
Kizuna Mail Project ⁴⁹	A Nonprofit Organization. It has some experience working with local governments in Tokyo, delivering e-mails (magazine) to parents to support parental care (similar to text4baby in U.S.) ^{50,51} .
HOKENDOJINSHA Inc. ⁵²	A healthcare publishing company. It provides mobile version of “Excerpts from a Family Medical Dictionary” and hospitals/clinics support services (proxy response for out of consultation hours or call center services for community health).

Source: Press releases form NTT DOCOMO and Hakuodo DY.

According to Hakuodo DY⁵³, this system is used as follows: alliance partners (hospitals and clinics) print out the data that registered pregnant women (outpatients) have recorded from the mobile application, to get supplementary information (physical or mental conditions etc.) before face-to-face medical check-ups. It will be take more time to enjoy the interactive features of this system fully, since information security issues (personal information protection, computers of hospitals or clinics are prohibited to connect to the Internet etc.) and the burden for health professionals (device operation for input or browsing) shall be solved.

Hakuodo DY has started overseas business expansions since 2013. They demonstrated this system to some private hospitals and governmental agencies in Asian countries, and they are discussing future collaborations. “Ninpu-Techo” is developed on the premise of multi-language and the design of the user interface allows instinctive operations.

(5) “Mama Note” by the Standardization Committee of Computerized MCH Handbook

The Japan Association of Obstetricians and Gynecologists (JAOG) announced they will establish “the standardization committee of computerized MCH Handbook” to promote computerization and standardization of the MCH Handbook, to promote it in Japan and overseas⁵⁴. They mentioned these activities are with the blessing of the Cabinet Secretariat, Maternal and Child Health Division of the Ministry of Health, Labor and Welfare, and the Information Applications Promotion Office of the Ministry of Internal Affairs and Communications⁵⁵.

At the press conference⁵⁶, they explained the details of establishing this committee. The Cabinet Secretariat said to them, “All information of outpatients has been computerized in Iwate prefecture and it did not stop even under the Great East Japan Earthquake on March 11, 2011. So let us expand such a “disaster resistant” system to all of Japan”, and this concept was agreed with some other organizations and the private sector.

⁴⁹ <http://www.kizunamail.com>

⁵⁰ http://www.city.bunkyo.lg.jp/sosiki_busyo_kosodate_merumaga.html

⁵¹ <http://www.kizunamail.com/news/2177.html>

⁵² <http://www.hokendohjin.co.jp>

⁵³ Interview via e-mails by Study Team(January, 2014)

⁵⁴ http://www.jaog.or.jp/news/document/info_20140124.pdf

⁵⁵ http://www.asahi.com/and_M/interest/bcnnews/BCN201401280006.html

⁵⁶ <http://japan.zdnet.com/cloud/analysis/35043009/>

Also the committee is worried about the lack of interoperability among current “computerized MCH Handbooks” in the market, since there are no standards or rules for information exchanging. So, before populating the computerized MCH Handbook, it is required to set the rules/standards for computerized MCH Handbooks.

The committee consists of 4 organizations (The Japan Association of Obstetricians and Gynecologists (JAOG), The Japan Dietetic Association (JDA), the Mothers' and Children's Health and Welfare Association, the Medical Information System Development Center (MEDIS-DC)) and 11 private companies (Intel, Microsoft Japan, Mitla, Tanita, NTT DOCOMO, KDDI, etc.). They will work for the standardization of weight, height, and temperature to manage children, infectious diseases and vaccinations, auditory tests, development etc. to promote the computerization of the MCH Handbook. And those standards will be implemented to “Mama Note” as a reference implementation⁵⁷ to promote a set of standards through trials by following stakeholders.

Table 2.11 Outline of Computerized MCH Handbook Trial

Stakeholder	Role	Notes
Microsoft Japan	<ul style="list-style-type: none"> ● Provide cloud services as platform for trials ● Provide development support of “Mama Note” to Mitla and distribute it via the Windows Store (official distribution channel) ● Provide technical assistance for cloud services and application development, etc. 	<ul style="list-style-type: none"> ● Public sector department regards health care as one of the priority sectors, and they will announce this trial worldwide ● “Mama Note” will work on Windows 8.1 only.
Intel	<ul style="list-style-type: none"> ● Provide Windows tablet computers for trial at Kameda Medical Center. ● Provide development support of “Mama Note” to Mitla. 	<ul style="list-style-type: none"> ● Corporate business promotion department regards this trial as good practice from Japan, and will announce worldwide.
Mitla	<ul style="list-style-type: none"> ● Development of “Mama Note” for trial. 	<ul style="list-style-type: none"> ● Developed “ihatov” of Iwate prefecture. ● Develop and sell perinatal EMR systems (conducting marketing trials in Thailand in 2014)
Kameda Medical Center	<ul style="list-style-type: none"> ● Provide the venue for trial ● Provide medical feedback and monitor outpatients to trial 	<ul style="list-style-type: none"> ● A large-scale private hospital located in Chiba prefecture, they have introduced EMR since 1995. ● Accepting foreign outpatients ● They have track record of standardizations (e.g. ISO 9001 certification)

Source: Press releases from stakeholders

Moreover, the chairperson of the committee is concerned with “the project of ICT enabled telemedicine for the supervision of pregnant women and nursing mothers and diabetes in Thailand: 2013-2016⁵⁸ (Grassroots technical cooperation project)” with Mitla, one of the stakeholders in the above trial⁵⁹.

⁵⁷ Reference implementation: A software example of a specification, intended to help others implement their own version of the specification or find problems during the creation of a specification.

⁵⁸ <http://www.jica.go.jp/partner/kusanone/tokubetsu/index.html>

⁵⁹ http://www.kms.ac.jp/~hospinfo/Medinfo/hi_forum/index.html

2.3.3 Challenges of a Computerized MCH Handbook

As an example of the eHealth application of the MCH Handbook, cases introducing and utilizing a digital MCH Handbook have been gradually increasing in Japan, although it is not so common yet. It is necessary to clarify the merits and the additional values of a digital MCH Handbook which cannot be provided by the paper version of the MCH Handbook, and which compensates the features of the existing MCH Handbook, in order to expect further dissemination of the digital MCH Handbook. For example, the paper version of the MCH Handbook has a limitation of space for recording, while the digital MCH Handbook has an advantage of more recording space and the possibility of updating a variety of information in a timely and regular manner. Furthermore, the digital MCH Handbook can be utilized as a database of personal health information which covers one's entire life cycle, such as pregnancy, childhood, school age, adulthood to the elderly.

In developing countries, the MCH Handbook is printed within a limited budget mainly by the Ministry of Health and the sustainability of printing costs is a challenge in many countries. Therefore, by utilizing devices with high diffusion rates such as mobile phones, it might be possible to expect that the digital MCH Handbook will become one of the methods to supplement the existing MCH Handbook.

At present, the digital MCH Handbook has been introduced in a situation where sufficient communication infrastructure is organized, consisting of people owning devices such as personal computers or smart phones, who have no difficulty in operating and maintaining them, and where enthusiastic health facilities and local governments exist in introducing eHealth. Since a digital MCH Handbook usually contains private information, there are also concerns about the safety of information management. Therefore, even in the local government where the digital MCH Handbook is introduced, the printed version of the MCH Handbook is also used.

Although the MCH Handbook has been introduced in many countries, countries whose national policy promotes the introduction of the digital MCH Handbook do not exist yet. If the digital MCH Handbook is planned to be introduced, it is important to clarify whether the digital MCH Handbook can be a method to supplement the fiscal challenges of the paper version of the MCH Handbook, and to consider the development of the IT environment and the MCH Handbook utilization in each country.

3. Palestine

3.1 Maternal and Child Health Situation in Palestine

3.1.1 Country Profile

The population of Palestine in 2010 is, according to the United Nations Relief and Works Agency for Palestine Refugees (UNRWA), above 2.5 million in the West Bank and above 1.6 million in the Gaza Strip. The proportion of registered refugees in the West Bank and the Gaza Strip is more than 30% and 70%, respectively. The unemployment rate was 18.3% in the West Bank and 32.2% in the Gaza Strip in 2012. These figures show that Palestine has had a serious refugee problem. The literacy rate (15 years and above) in Palestine is high for both sexes and this rate is more than 90% in both the West Bank and the Gaza Strip (Table 3.1). When eHealth tools are developed in Palestine, literacy barriers, which are a common obstacle for developing the eHealth tools, will not be an issue.

Table 3.1 General situation of Palestine

	West Bank	Gaza Strip
Population (Registered refugees)	2,514,845 (848,447)	1,604,238(1,167,360)
Unemployment rate	18.3 %	32.2 %
Literacy rate	92.7	94.3 %

Source : Palestinian Central Bureau of Statistics (PCBS), State of Palestine, 2013

3.1.2 MCH Situation in Palestine

According to WHO⁶⁰, although the Maternal Mortality Ratio (MMR) was 28 per 100,000 live births in 2011, which is higher than other Gulf countries, it has improved since 2009 (from 38/100,000 live births). In 2012, the Infant Mortality Rate (IMR) and under-five mortality rate were 19.2 per 1,000 live births and 22.6 per 1,000 live births, respectively. The percentage of births attended by skilled health personnel was 100% during 2008 and 2011. That the proportion of births in health facilities is high can be inferred from the high percentage of births attended by skilled health personnel.

Among the main causes of maternal deaths in the West Bank, direct obstetric deaths account for 66.7% and indirect obstetric deaths account for 33.3%⁶¹. The causes of direct obstetric deaths are pulmonary embolism, hemorrhage, puerperal sepsis, pregnancy induced hypertension (PIH), amniotic fluid embolism, and that of the indirect obstetric deaths are heart diseases and Swine Influenza (H1N1)⁶². On the other hand, in the Gaza Strip, the causes of maternal deaths are hemorrhage during delivery and postnatal period, infections, eclampsia, anemia and obstructed labor⁶³. Among these causes, diseases which can be prevented by emergency obstetric care are included, which needs measures, such as the quality improvement of emergency obstetric care^{64,65}. In accordance with the UNFPA report, the causes of maternal deaths are not reported properly because the method of categorizing the causes is not standardized in Palestine. Thus, the majority of maternal deaths are registered as cardiac arrest instead of the real causes⁶⁶. In a research paper

⁶⁰WHO, WHO Regional Office for Eastern Mediterranean, Regional Health Observatory

⁶¹UNFPA, *Report on maternal mortality in Palestine*, n.d

⁶²UNFPA, *Report on maternal mortality in Palestine*, n.d.

⁶³WHO, *Initial health assessment report Gaza Strip*, 2012.

⁶⁴Al Adili N et al. Maternal mortality among Palestinian women in the West Bank, 2006

⁶⁵Imam AM et al. Maternal near miss in four governmental hospitals in the West Bank, occupied Palestinian territory, in 2010: a retrospective, facility-based survey, 2012.

⁶⁶UNFPA, *Report on maternal mortality in Palestine*, n.d

about maternal health in the West Bank, the researchers recognize that the improper categorization of the indirect obstetric deaths is an issue. They also mentioned that the criteria for diagnosis of maternal deaths are necessary in order to reduce the MMR⁶⁷.

The Total Fertility Rate (TFR) was 4.2 in 2011, which is one of the maternal and child health problems. According to WHO⁶⁸, contraceptive prevalence for married women was 50% in 2010⁶⁹. The main contraceptive method among Palestinians is an oral pill (the West Bank: 47.4%, the Gaza Strip: 48.8%) and an intrauterine device (IUD) (the West Bank: 31%, the Gaza Strip: 18.9%). While the common contraceptive methods are mainly used by women, the percentage of men using condoms is low⁷⁰.

As for the vaccinations carried out in Palestine, the percentage of one year old infants immunized against infections (BCG, DPT, HBV and measles) is more than 97%⁷¹, which means that high immunization coverage has been maintained. However, WHO's report (2013) shows that 27.8% of pregnant women have mild to moderate anemia, and 57% of infants have anemia⁷². It seems that the conflict with Israel and a prolonged economic depression affect nutrition status.

3.1.3 Challenges and Measures in Maternal and Child Health

In Palestine, although the IMR, the under five mortality rate and the MMR are not extremely high, these figures are higher than other Gulf countries and the situations in maternal and child health are issues, which should be rapidly improved. The direct and indirect causes of these issues are considered to arise from prolonged conflicts. Thus, these issues are difficult to solve by efforts and measures only in the health sector. According to the Palestinian National Health Strategy 2011-2013, the Ministry of Health (MoH) stated that the under five mortality rate and the IMR have not been improved very much since the 1990s. Although child malnutrition, limited accessibility to health facilities in emergency situations, high fertility rate and low contraceptive prevalence are also mentioned in the strategy as maternal and child health problems, a specific maternal and child health policy is not described⁷³.

As for antenatal care (ANC), the coverage was 100% in 2011, which seems to show there are not any problems of ANC⁷⁴. However, in accordance with interview results of the Association of Gynecologists, although pregnant women plan to give birth at either government or private health facilities, most of them tend to take ANC at private clinics. This inconsistency of health facilities causes difficulties in sharing patient records about ANC, delivery and postnatal care between health facilities as well as difficulties for the continuum of care from a pregnancy period to a postnatal period. An interviewee of the Association of Gynecologists mentioned that the reason why most pregnant women chose private clinics for taking ANC was because government health facilities and UNRWA hospitals were always busy and pregnant women could not obtain adequate health care services⁷⁵. Additionally, the interviewee described pregnant women who had suffered complications with previous pregnancies or deliveries tended to choose private clinics, in spite of the fees, for medical consultation. Many private clinics inform patients of equipment, such as ultrasonography machines and health care services through newspapers, which contributes to the popularity of private clinics. In addition to these situations, some pregnant women go to more than two health facilities to ask for second opinions.

⁶⁷Al Adili N et al. Maternal mortality among Palestinian women in the West Bank, 2006.

⁶⁸WHO, WHO Regional Office for Eastern Mediterranean, Regional Health Observatory, 2013

⁶⁹WHO, WHO Regional Office for Eastern Mediterranean, Regional Health Observatory, 2013

⁷⁰MoH, Health status in Palestine annual report, 2009.

⁷¹WHO, WHO Regional Office for Eastern Mediterranean, Regional Health Observatory, 2013

⁷²WHO, Health conditions in the occupied Palestinian territory, including east Jerusalem, and in the occupied Syrian Golan, 2013.

⁷³MoH, Palestinian national health strategy 2011-2013, 2010

⁷⁴WHO, WHO Regional Office for Eastern Mediterranean, Regional Health Observatory

⁷⁵ Results of the interview with the Association of Gynecologists; August 25, 2013

Although the postnatal care coverage in Palestine improved from 26.3% in 2000 to 34.1% in 2004, the coverage has been very low compared to the ANC coverage⁷⁶. The low coverage was mentioned as one of the maternal and child health issues by an interviewee of UNFPA⁷⁷. According to the Women's Health and Development Directorate (WHDD)⁷⁸, promoting postnatal care is a necessary intervention for improving maternal and child health situations. The interviewee stated that maternal health after delivery could be improved if they obtained mobile phone messages as reminders for postnatal care services during the first six weeks after delivery.

As for the reasons for low postnatal care coverage, while the WHDD's interviewee pointed out that women did not pay attention to their own health condition, from the Association of Gynecologists' interview, women considered postnatal care unnecessary and they did not take postnatal care because they tended to ask their mothers or their mother-in-law if they had any problems with their health.

Access to health facilities is limited because of the existence of checkpoints and Apartheid Walls, and a lack of transportation, which has caused late referrals. The improvement of the late referral situation should be rapidly solved, and the MoH recently has taken measures to build health facilities in each of the three areas⁷⁹.

3.2 Mother and Child Handbook (MCH Handbook) Situation

After the JICA Technical Cooperation Project "Improving Reproductive Health with a Special Focus on Maternal and Child Health Phase II" was completed in 2012, the National Coordination Committee for the Mother and Child Health Handbook (NCC MCHHB), under the jurisdiction of the General Directorate of PHC and Public Health, the MoH has been expected to administer the utilization of the MCHHB, and manage the distribution of the MCHHB. The challenges are how the NCC MCHHB should be administered, and how it is related to the continuous management of the MCHHB. Children, who were born in 2008 when the distribution of the MCHHB started, will come to be primary school students in 2014. The General Directorate of PHC and Public Health, the MoH, described that the MCHHB, therefore, was planned to be included in identity confirmation for entrance into a primary school from 2014⁸⁰. This plan can be considered as the MoH trying to expand the use of the MCHHB, and effectively utilize the handbook as national policy.

3.2.1 Distribution and Use of the MCH Handbook Situation

At the present stage, public health facilities and four NGOs (PMRS, PRCS, HWC, PFPPA) distribute the MCH Handbook when mothers are confirmed as pregnant. Table 3.2 shows that the national coverage of the MCH Handbook, and the timing of receipt and utilization of the MCHHB in Palestine. Although the MCH Handbook should be given to pregnant women when their pregnancy is confirmed, the majority of mothers obtain the MCH Handbook at health facilities when their children take immunization against infectious diseases.

With regard to the utilization of the MCH Handbook, 28% of mothers read all of it and 64% read a part of it, which means that more than 90% of mothers use the handbook as not only a "medical record" but also a "health education tool about pregnancy, delivery, and childcare" (Table 3.2).

⁷⁶PCBS

⁷⁷Results of the interview with UNFPA, 21 August 2013.

⁷⁸Results of the interview with WHDD, 20 August 2013.

⁷⁹Report on Maternal Mortality in Palestine, UNFPA

⁸⁰Results of the interview with General Directorate of PHC and Public Health, MoH, 18 August 2013.

Table 3.2 National Coverage of the MCH Handbook in Palestine

	West Bank	Gaza Strip
Coverage of the MCHHB	89%	63%
Timing of receipt of the MCHHB	During pregnancy : 46%	During pregnancy : 87%
	After delivery : 50%	After delivery : 11%

Source: Overview of the MCHHB in Palestine (2010)

Women in the 15-49 age group who have received the MCH Handbook	
Read all of it	28%
Read a part of it	64%

Source: Overview of the MCHHB in Palestine (2010)

According to UNFPA's interview results, the reason why most women received the MCH Handbook after birth is because in private health facilities the use of the handbook was not expanded, and the function of the MCH Handbook as a monitoring tool was not used⁸¹.

3.2.2 Challenges and Measures of the MCH Handbook

Table 3.3 shows the challenges of the continuous utilization of the MCH Handbook found through this research project.

Table 3.3 Challenges, current situation and measures of MCH Handbook (Summary)

Challenges	Current Situation	Measures
Maintaining the function of the NCC MCHHB	<ul style="list-style-type: none"> ● NCC MCHHB under the jurisdiction of the General Directorate of PHC and Public Health, the MoH role is to administer the use of the MCHHB and manage the distribution of the MCHHB ● Although in 2013 the meeting of NCC has still not been held, the meeting is planned to be held when the MCHHB is revised⁸². 	<ul style="list-style-type: none"> ● Confirming whether NCC MCHHB is held ● Involving medical doctors working in private health facilities in the NCC MCHHB members ● Strengthening communication among the NCC MCHHB members, and Providing follow-up for the meeting and information ● Transmission of information regarding the activity condition with NCC MCHHB to the exterior
Securing the budget for printing the MCHHB	<ul style="list-style-type: none"> ● Securing the budget for printing 200,000 MCH Handbooks, and having already printed 100,000 handbooks (the budget is based on a single fiscal year principle, so the financial problem is not solved.)⁸³ The delay of printing and distribution of the MCHHB (in a health facility 	<ul style="list-style-type: none"> ● Obtaining the fund (ex. advertisements are printed in the MCHHB.) ● Reporting distribution status, and improving the inventory control and distribution status ● Reconsidering the budget for

⁸¹Results of interview with UNFPA, 21 August 2013.

⁸²Results of interview with Community Health Department, MoH, 19 August 2013.

⁸³Results of interview with Community Health Department, MoH, 19 August 2013.

Challenges	Current Situation	Measures
	the MCHHB was out of stock for three months ⁸⁴ .)	printing matter in the MoH
Legislation	<ul style="list-style-type: none"> ● Although the Palestinian National Manual for the MCHHB was developed in 2010, it was not legislated⁸⁵. 	<ul style="list-style-type: none"> ● Promoting the legislation (the utilization of the MCHHB in health facilities is an obligation.) ● Improving the recognition of the MCHHB in society
Involving private health facilities	<ul style="list-style-type: none"> ● According to the interview results, the MoH has not adequately encouraged medical doctors working in private health facilities to use the MCHHB. While the MoH often has meetings with the Private Clinics and obstetrics and gynecologists Society, some medical doctors have still not utilized the MCHHB⁸⁶. ● The leader of the PHC has an opinion which is to add a page to the MCHHB for medical records in private health facilities to encourage the medical doctors to use it⁸⁷. However, medical doctors in private health facilities showed a negative reaction to the opinion and stated that the MoH should have involved private medical doctors in the first development of the MCHHB⁸⁸. ● An obstetrician and gynecologist has already officially participated in the MCHHB membership⁸⁹. ● Private health facilities must renew a license for running their facilities every year. Some organizations (MoH⁹⁰, UNICEF⁹¹, NGO(PMRS⁹², PFPPA⁹³), Private Clinics⁹⁴) suggested the utilization of the MCHHB should be a one of the requirements to meet when private health facilities renew the license. ● The interviewee of the Association of Gynecologists mentioned that the use 	<ul style="list-style-type: none"> ● Promoting communication among medical doctors ● Obligating private health facilities to use the MCHHB as a requirement for the license renewal ● Disclosing information on the management and development of the MCHHB ● Providing health education to health personnel ● Providing health education to citizens of Palestine

⁸⁴Results of interview with Nursing Department, MoH, 25 August 2013.

⁸⁵Results of interview with Community Health Department, MoH, 19 August 2013.

⁸⁶Results of interview with Nursing Department, MoH, 25 August 2013.

⁸⁷Results of interview with Nursing Department, MoH, 25 August 2013.

⁸⁸Results of interview with Gynecologists Society, 25 August 2013.

⁸⁹Results of interview with Community Health Department, MoH, 19 August 2013.

⁹⁰Results of interview with General Directorate of PHC and Public Health, MoH, 18 August 2013.

⁹¹Results of interview with UNICEF, 20 August 2013.

⁹²Results of interview with PMRS, 18 August 2013.

⁹³Results of interview with PFPPA, 21 August 2013.

⁹⁴Results of interview with Private Clinic, 20 August 2013.

Challenges	Current Situation	Measures
	of the MCHHB should be encouraged through interactive communication ⁹⁵ .	
Filling in the MCHHB properly	<ul style="list-style-type: none"> ● Nurses take both pre-service and in-service training in how to fill in the MCHH, and they understand the advantages of it. However, the utilization of the MCHHB as well as immunization card causes duplication of medical records and the increase of the burden to nurses⁹⁶ ● The burden of transcribing between medical records should be reduce⁹⁷. ● If mothers bring the MCHHB to health facilities, health providers fill in the handbook⁹⁸. ● There are issues of the utilization of the MCHHB in government hospitals. In the government hospitals, filling in the MCHB is not properly performed due to the large number of deliveries. Monitoring and assessment of the utilization of the MCHHB is necessary⁹⁹ 	<ul style="list-style-type: none"> ● Combining medical records by introducing electronic medical records and reducing the work loads ● Decreasing the burden of transcribing between medical records ● Sharing medical records between health facilities ● Monitoring the utilization of the MCHHB ● Providing health education to citizens of Palestine ● Providing health education to health personnel

Source: Study Team

3.3 IT Situation in Palestine

3.3.1 Telecommunication Infrastructure

(1) Fixed-line telecommunications in Palestine

Only the PalTel is providing fixed line telecommunication services in Palestine, and its penetration rate is shown in the following Table 3.4. The number of subscribers is approximately 10% of the population.

Table 3.4 Penetration of fixed-line telecommunication services

Item	Number
Subscribers	401,855
Subscribers of internet connection services	203,271
Not covered area (ratio to area)	Less than 1%
Internet covered area (ratio to population)	95%

Source: Interview from PalTel

(2) Mobile telecommunications in Palestine

At present, high speed mobile data communication services (3G or later) are not available in Palestine due to the Israeli authorities prohibiting them. There is no prospect of when that

⁹⁵Results of interview with Gynecologists Society, 25 August 2013.

⁹⁶Results of interview with MoH, Nursing Department, MoH, 25 August 2013.

⁹⁷Results of the direct observation, August 2013.

⁹⁸Results of interview with Gynecologists Society, 25 August 2013.

⁹⁹Results of interview with WHDD, 20 August 2013.

regulation will be terminated. So people might be forced to use wireless-LAN offered at retail premises or personal spaces to enjoy high speed data communications via Smartphone etc. High speed data communications might be available by using Israeli mobile operators in some areas¹⁰⁰, but it is unreasonable to expect official use by the Palestinian Authorities.

According to mobile operators (Jawwal and Wattanya), non-voice communications (such as SMS) are made highly available for subscribers due to the high penetration rate of handsets and the literacy rate. Especially, handsets are very popular in urban areas (almost 100% of the penetration rate) and significant differences between male and female are not observed.

(3) Telecommunication Infrastructure in UNRWA

UNRWA has built a dedicated microwave telecommunication network infrastructure to connect their clinics in Palestine. They ordered a private company in the West Bank of Palestine to build the antennas and implement the network equipment. But that company cannot install any equipment in Israeli territories, so their microwave network is only for Palestine.

Also, fixed-line telecommunications infrastructure provided by PalTel is used as a back-up network. That commercial telecommunication network provides good coverage in Palestine, but a lack of stability for EMR use, according to UNRWA.

UNRWA hired fixed-line telecommunication series by PalTel to connect the worldwide Internet, through Israeli territories.

3.3.2 The Private Sector

A lot of private IT development firms might be operating in Palestine. They can correspond in English and Arabic as their languages, so they receive work opportunities from not only Palestine, but also other countries. Also, advertising agencies are operating, and there are some cases of providing yellow-page services to Smartphone / Tablet devices.

Mobile operators in Palestine have their datacenters and development/contents partners, so these can be utilized for system development, implementation and deployment.

USAID has plans to provide IT support and training to clinics (including obstetricians) that want to connect computerized National Health Information Networks, through partnerships with local private IT firms.

3.4 eHealth in Palestine

The cases of eHealth in Palestine are typified by the computerized National Health Information Systems, through the assistance of USAID and EMR-HER by UNRWA. It seems that these systems correspond to Stage 3-4 (in Table 2.2) and Health Information Systems functions except PHR in Table 2.1. In both cases, the minimum unit of information management is the individual outpatient, and fixing specification (requirements) by customization with limited hospitals or clinics at first, then expanding to other hospitals or clinics.

In the case of computerized National Health Information Systems, it aims at early launching by introducing full-featured package software and initial installation limited to 4 large-scale hospitals.

¹⁰⁰According to PHC Center at Bir Zeit, Bedouins who lived near separation barriers might enjoy 3G data communication services by using SIM cards of Israeli mobile operators.

UNRWA has developed EMR-EHR uniquely to fit their own requirements, and they have deployed it to their 3 clinics in Palestine. After that, UNRWA aims to deploy it to their 40 clinics in the West Banks of Palestine by 2015. In this case, UNRWA limits users of their EMR-HER to the parties immediately concerned (internal health professionals and refugees) to put a “brake” on the requirement to enlarge systems, and the cost of development and maintenance.

In other cases, HWC (Health Work Committees) is trying to improve efficiency by consolidating statistical health information from their clinics.

3.4.1 Computerization of Medical Records

The MoH compiled an Institutional Development Plan (IDP) that includes prioritized 18 modules by March 2009 with assistance from USAID. The development of Health Information Systems was mentioned as module 2 in the IDP¹⁰¹. The “Palestinian Health Sector Reform and Development Project”^{102, 103} is ongoing, to realize the establishment of National Health Information Systems with computerization (module 2 and other components mentioned in IDP).

The “Avesiva”, which is a software package (client-server) from Turkey, has been introduced to hospitals by the project as a computerization platform for medical records (by Chemonics, Inc.¹⁰⁴). Required customizations have been ordered through alliance partners in Palestine to the original vendor in Turkey. At the time of the survey, this system is installed and piloted in 4 large-scale hospitals (Ramalla Hospital (PMC), Hebron’s Alia Hospital, Rafida Hospital (Nablus), Darwish Nazzal Hospital (Qalquilia)).

According to the public relations of the project on April 4, 2013¹⁰⁵, more than 80% of users of this system answered that efficiency of daily operations, performance, accountability and reporting have been improved compared to before. And the management of hospital answered outpatients, faculties, tracking of procurement of commodities and trend analysis and plans have also been improved.

At the beginning of the project, the purchase of extra software licenses was required to install the system to other hospitals or clinics. But July 20, 2013, USAID announced it will provide open licenses (1.76 million USD)¹⁰⁶, so more hospitals or clinics will be able to interconnect to the computerized National Health Information System. Also the Palestinian Authorities secured 640 thousand USD in the FY2013 budget for the operational cost of this system.

At the time of the survey, the implementation of systems has been behind schedule. USAID prioritized efforts to expand connections to this system to hospitals or clinics in the Palestine. The counterpart of the Palestinian side of this project is the Directorate of Computer and Network, MoH (at Nablus)

Aside from this, NORAD might have a plan to provide computers to half of PHCs (2-4 computers per PHC, in proportion to their scale) to interconnect them with each other¹⁰⁷.

¹⁰¹ USAID/WEST BANK & GAZA HEALTH SECTOR REFORM AND DEVELOPMENT FLAGSHIP PROJECT: MID-TERM EVALUATION (December, 2010)

¹⁰² <http://www.usaid.gov/west-bank-and-gaza/global-health>

¹⁰³ <http://www.flagshipproject.org/>

¹⁰⁴ <http://www.chemonics.com>

¹⁰⁵ http://www.flagshipproject.org/index.php?option=com_content&view=category&layout=blog&id=12&Itemid=95

¹⁰⁶ http://www.flagshipproject.org/index.php?option=com_content&view=category&layout=blog&id=12&Itemid=95

¹⁰⁷ Results of interview with PHC and Public Health

3.4.2 EMR in UNRWA

UNRWA has deployed an EMR that covers NCD (Non Communicable Diseases) and MCH (Mother and Child Health) to improve the quality and efficiency of health services¹⁰⁸. UNRWA's EMR is web-based and it has been in operation since February 2013, developed and maintained by their internal engineers located in Amman in Jordan. This system is unique; the operational platform is the cloud system in Italy (UN based), connecting each clinic via VPN on their microwave network in the West Bank of Palestine etc.

This system has provided not only management of all medical records or automation of regular reports, but also analysis of long-term based treatment outcomes and health conditions of NCD patients. Before installing this system, limited analysis was undertaken on few NCD patients, due to time-consuming tasks like reviewing paper-based medical records.

This system was deployed to 3 clinics in the West Bank of Palestine at the time of the survey, but UNRWA planned to deploy this system to 40 clinics by the end of 2015. According to UNRWA, the MCH module of this system is considered a harmonization with the parameters of the MCH Handbook. In the future, as needs arises, interconnection with the above-mentioned National Health Information Systems will be available, by improvement of this system.

3.4.3 Computerization of Medical Records in Health Work Committees (HWC)

HWC is an NGO, which was established to improve the health care issues of Palestinians under occupation, and provides health care to people regardless of gender, religion and political conviction.

A computerized health information system has been required to manage a lot of medical records of outpatients at clinics under HWC. The health information system has operated at 16 clinics and IT personnel are deployed to most clinics. All records of outpatients are encoded at the reception of the clinics, and a simple ordering system is also operated. Currently, medical records are transferred at reception to computerized forms, from handwritten records by doctors or nurses. Essentially, medical records should be encoded to the system by doctors or nurses at the point of treatments but this is not yet realized that due to the lack of computer skills of doctors and nurses.

In this system, medical records are encoded to Excel files at clinics, and sent to HWC headquarters to import to database and be analyzed by the system administrator.

3.5 IT Utilization in the Field of MCH

Some departments of the MoH are utilizing IT to improve operational efficiency and for promotional activities to people in the scope of their work.

Among international organizations, only USAID handles large-scale eHealth projects. Other organizations provide funding support to departments of the MoH for educational and promotional activities.

3.5.1 Women's Health Development Directorate (WHDD), MoH

WHDD is in charge of health development of women in the MoH. They have the experience to send 10 kinds of messages to promote breast-feeding via SMS to randomly selected subscribers of Jawwal (one of local mobile operators), supported by UNICEF and Jawwal. They are exploring similar trials about family planning issues, but sending SMS to promote breast-feeding was terminated with end of the budget.

¹⁰⁸UNRWA Health Department Annual Report 2012 (May 2013), p14

3.5.2 Health Education Department (HED), MoH

HED is in-charge of general health education in the MoH. They have a lot of experience in compiling health educational materials with UNFPA, WHO, UNICEF, other international organizations and NGOs. They plan to show these health educational materials to the public via the Internet.

At the time of the spread of bird flu, HED delivered emergency information via SMS and had hotline and inquiry counters in place. According to those experiences, HED takes a cautious stance to sending SMS to pregnant women due to the continuous cost of sending SMS and the operational costs of inquiry counters or call centers.

3.5.3 Nutrition Department (ND), MoH

The ND is in-charge of improvement of the conditions of nutrition. They have developed a unique community nutrition information surveillance system and have operated it on their intranet. They have experience in providing computers and communication devices and training to 200 faculties, to collect data related to nutrition. They use items in the MCH Handbook as parameters when they collect information on nutrition. They explore this to implement some activities to improve the nutrition of pregnant women, but lack a budget for this.

They have some experience working with the private sector, such as displaying nutritional advice on some products (milk, flour etc.) and the invoices of public services (telephone bills etc).

They prepared licenses of secondary use for educational materials that were produced with WHO, UNICEF, UNRWA, JICA and other organizations, and maintained the database of short text sentences to display/print on products, invoices, or bills etc.

3.5.4 UNICEF

UNICEF tried to build computerized National Health Information systems ahead of USAID, but they were not realized due to technical issues.

UNICEF supported the above-mentioned activities that display/print short sentences on products or bills of public services by some of departments of the MoH.

UNICEF also has experience in setting up a breast-feeding hotline (toll-free) at the prefectural level, and providing training to health workers as agents/respondents.

3.5.5 UNFPA

UNFPA has some experience in health educational materials with audiovisuals to promote family planning (standalone style, such as DVD, Video CD, etc)

3.5.6 USAID

USAID provides assistance to establish computerized National Health Information Systems as mentioned. Also they plan some pilot projects to provide computers and IT training to clinics (including obstetricians) through partnerships with the local private sector.

3.5.7 NORAD

NORAD might have a plan to provide computers to half of PHCs in Palestine, as suggested by some interviewees.

3.5.8 UNRWA

UNRWA planned the delivery of SMS for MCH in the Palestine with SoukTel, but it has not been realized due to a lack of initial funds and preparation of human resources in UNRWA at that time.

Besides this, UNRWA provides follow-up communications to those who missed vaccinations by SMS instead of Voice calls¹⁰⁹. This method is accepted by outpatients and saves a lot of labor for follow-up. UNRWA plans to use SMS for not only follow-up or reminding of vaccination, but also for MCH, if it works well. They are also trying reservation of medical checkups by SMS in the Gaza Strip.

As with other options, UNRWA plans to utilize SMS not only for communication with outpatients, but also for internal communication to promote team medical care.

3.5.9 SoukTel

SoukTel is a social entrepreneur; they have experience in distributing messages for nutrition improvement via SMS in Fiji, Vanuatu and New Caledonia. In Palestine, they provide JobMatch (job matching via SMS), AidLink (assistance material monitoring) and assistance demand survey in the Gaza Strip with UN related agencies¹¹⁰.

They have developed their original SMS delivery systems; it is available for MCH message delivery in Palestine..

3.6 Corresponding Issues of MCH / MCH Handbook by IT

3.6.1 Issues of MCH / MCH Handbook and Expected IT Utilization

As prospected, countermeasures to improve MCH conditions are: 1) promote appropriate ANC; 2) consolidate emergency transport systems for pregnancy and delivery; 3) improve EmONC; and 4) promote PNC and medical checkups for babies. These countermeasures are broken down into activities in Table 3.5.

According to Table 3.5, the MCH Handbook has a very important role in the countermeasures. Thus, utilization of the MCH Handbook shall be promoted to secure sustainability in Palestine.

Table 3.5 Issues of MCH: Countermeasures, Activities and Expecting Outcomes

Countermeasures	Activities	Expected Outcomes
1) Promote appropriate ANCs and management of results	<ul style="list-style-type: none"> ● Promotional Activities ● Utilization of MCH Handbook ● Reminding of medical checkups 	<ul style="list-style-type: none"> ● During pregnancy, attend medical checkups without fail by understanding timing of ANCs ● Attend required medical checkups without fail by checking MCH Handbook (Educational functions). And record results

¹⁰⁹ According to interview from UNRWA, NGOs (collaborators in U.S.) send SMS via Gateway to individuals who missed vaccinations based on submitted lists from UNRWA.

¹¹⁰ <http://souktel.org/>

Countermeasures	Activities	Expected Outcomes
		of ANC's in MCH Handbook to decrease risks for the delivery even when ANC's and birth assistance provided in different locations
2) Consolidate emergency transport systems for pregnancy and delivery	<ul style="list-style-type: none"> ● Installation of new medical institutions ● Introduce systems to enable transportation of patients by appropriate timing (interconnections of primary Healthcare institutions, ambulances and referral hospitals etc.) ● Utilization of MCH Handbook 	<ul style="list-style-type: none"> ● Installation of new medical institutions in remote areas and supporting systems improves emergency transportation of patients at appropriate timing ● Recorded results of ANC's in MCH Handbook provides details in emergency situation at any medical institutions
3) Improve EmONC	<ul style="list-style-type: none"> ● Improve medical institutions (equipment for EmONC, etc.) ● Capacity development of doctors and midwives. 	<ul style="list-style-type: none"> ● Required medical treatment or care is provided with higher quality.
4) Promote PNC and medical checkups for babies	<ul style="list-style-type: none"> ● Promotional Activities ● Utilization of MCH Handbook ● Reminding of medical checkups 	<ul style="list-style-type: none"> ● During pregnancy or after delivery, attend medical checkups without fail by understanding timing of medical checkups for babies and PNCs ● Attend required medical checkups without fail by checking MCH Handbook (Educational functions). And manage medical information of ANC, Delivery, PNC and babies in MCH Handbook

Source: Study Team

Issues of the MCH Handbook shall be solved to promote more sustainable utilization of the MCH Handbook. IT utilization plans to tackle those issues as shown in Table 3.6 (except improve EmONC)

Table 3.6 Prospected IT utilization plans to issues of MCH Handbook

Subject	Contents	IT utilization
Integration of medical records by computerization (include computerization of MCH Handbook)	<ul style="list-style-type: none"> ● Integration of overlapped documents ● Sharing medical information among institutions ● Reducing posting of medical records in operations 	<ul style="list-style-type: none"> ● Computerization of medical records ● Positioning MCH Handbook as a part of integrated computerized Health Information Systems
Enhancement of communications among related entities	<ul style="list-style-type: none"> ● Enhancing communications among NCC MCHHB members ● Enhancing communications among practitioners (include public and private sectors) ● Disclosure of information of activities of NCC MCHHB and dialogues of the private sector (industry organization) 	<ul style="list-style-type: none"> ● Utilization of SNS (Facebook) ● Utilization of web sites of MoH or the private sector (industry organization)

Subject	Contents	IT utilization
Enhancement of promotion	<ul style="list-style-type: none"> • Provide information about pregnancy, delivery, and childcare. • Promotion of MCH Handbook. 	<ul style="list-style-type: none"> • Utilization of SNS (Facebook) • Information delivery via SMS
Improvement of distribution of MCH Handbooks	<ul style="list-style-type: none"> • Keeping proper inventory by rapid delivery reporting and totaling. • Increase delivery points. 	<ul style="list-style-type: none"> • Reporting and totaling via SMS • Promoting delivery points
Assistance for legislation	<ul style="list-style-type: none"> • Assisting legislation by recognition of MCH Handbook among practitioners and people. 	<ul style="list-style-type: none"> • (Enhancement of promotion and communications among related entities will help this item indirectly.)
Securing printing cost	<ul style="list-style-type: none"> • Obtaining external funds by advertisement in MCH Handbook • Reviewing all printing cost in MoH to manage printing cost of MCH Handbook. 	<ul style="list-style-type: none"> • Computerization of MCH Handbook (Computerization of medical records and assistance for legislation will help this item indirectly) • Utilization of SNS (Facebook) and Information delivery via SMS

The following are summarized IT utilization plans.

(1) Integrated Operations of Networked Computerized Medical Records Include HIS

One of important functions of the current MCH Handbook is sharing medical records among practitioners. But at the same time, some issues are pointed out; damage, loss or the Handbook being left at home, and difficulties of decoding handwriting decoding etc.

Associated with these issues, it is expected that computerization will reduce the burden of documentation at hospitals or clinics. For example, practitioners of small PHC located in Bir Zeit are required to fill following documents at the time of each vaccination:

- Vaccination records entry column of MCH Handbook (outpatient -owned)
- Vaccination card (outpatient -owned)
- Personal medical record (clinic-owned)
- Logbook of clinic
- Ledger of vaccinations (used for inventory management of vaccines)
- Monthly vaccination report based on ledger of vaccinations in clinic (submit to MoH)

Regarding these issues, improvement of the following issues is expected by communalizing integrated networked EMR-EHR (hereinafter, integrated health information network systems) at primary healthcare facilities:

- Reduce the burden of handwriting documents.
- Share medical records among medical institutions.
- Improve readability of medical records.
- Additionally, statistical analysis of medical records will be available.

However, the following conditions should be achieved to enjoy the merits of integrated health information network systems:

- Public and Private medical instructions shall participate as much as possible.
- Items of medical records that are recorded or read shall be covered.
- Provide appropriate prior explanations and training to participants.

- Outpatients shall agree that medical records are computerized and shared among medical institutions (and/or government agencies).
- Penetration of computers and stable high-speed Internet connections among medical institutions.

Following issues shall be considered to work MCH Handbook as a part of integrated health information network systems.

- Standardized data set of computerized MCH Handbook shall be set
- All EMRs in integrated health information network systems shall be harmonized with standardized data set of computerized MCH Handbook
- The computerized MCH Handbook will function as “customer’s receipt (copy) of medical services” of legal medical records that are maintained by hospitals, clinics or health care professionals. It is recommended electronic information exchanging when governmental agencies except MoH require access to individual medical records (e.g. vaccination records).
- It is expected that computerized MCH Handbook shall be available to various computers and handsets. It is recommended that the MoH allow the development of computerized MCH Handbooks by the private sector under approval and license

The MoH showed a cautious approach to the computerized MCH Handbook, since there are limited track records (large-scale official installations) in Japan, and penetration levels of computers or Internet connections in medical institutions and people in Palestine is low.

In the case of information exchange between public agencies, both sides shall adopt computerized information exchange. This is one of the reasons that printing media shall store some of the medical records (Vaccination card or/and MCH Handbook) even after communalizing integrated health information network systems among health institutions.

(2) Enhancement of Communications among Related entities

It is confirmed that both the MoH and the private sector (medical associations) agree to hold dialogues to promote the utilization of the MCH Handbook¹¹¹. It is expected that this opportunity be used not only for promoting mutual understanding and utilization of the MCH Handbook, but also for discussing the revision of the MCH Handbook, and to introduce EMR to MCH field and computerize the MCH Handbook.

In addition to face-to-face meetings, community features of SNS (Group features) should be used for promoting regular communications among related entities.

(3) Enhancement of Promotion

Many interviewees expected that SMS be used for reminders or follow-ups to outpatients, since the features of SMS allow sending messages to individual handsets at once or separately.

Follow-ups and reminders to outpatients are relatively vegetative works but also troublesome tasks, so IT is expected to save labor. Some demands are observed in the survey; ANC/PNC reminders (WHDD, Ramallah Medical Complex, UNRWA, Association of obstetrics), reservation of medical checkups (Nursing Department, UNRWA), NCD follow-ups of mother and children (PMRS). UNRWA has tried to use SMS for reservation of medical checkups, guidance of ANC/PNC (including controlling unnecessary hospital visits) and follow-ups of vaccinations in part of their clinics, and are observing their effectiveness.

¹¹¹ PFPPA (one of NGOs) has already started dialogues with private health professionals.

As advanced demands, improvement of MCH Handbook utilization by delivering information to mothers and children to promote understanding of the contents of the MCH Handbook (PMRS), improve the recognition of pregnant women (HWC), and providing information to husbands and family members (PFPPA) are enumerated.

At the same time, the Health Education Department (MoH), Nutrition Department (MoH), WHDD (MoH) and UNICEF mentioned the issue of “continuing cost” to send SMS.

Therefore, it is important to increase the brand value of the MCH Handbook by using various marketing methods and media (printing materials, TV, radio, newspapers etc).

(4) Improvement of Distribution of MCH Handbook

Currently, the MoH limits delivery points of the MCH Handbook to public medical institutions. But according to the field survey, it is mentioned that private medical institutions should be involved from the early stages of pregnancy.

Almost half of the MCH Handbooks are distributed to mothers after delivery, even in the West Bank, so it is important to improve the consistency of care by the involvement of private medical institutions, which are expected to attach half of the notifications of pregnancies to the MCH Handbook (distribution or/and encode medical records).

Originally, MCH Handbooks shall be given just after pregnancy confirmation. Distribution points shall be promoted clearly in public relations and appropriate stocks shall be kept at distribution points.

(5) Assistance for legislation

The MoH (Directorate of Computer Network and Nursing Department), NGO (PMRS) and UNICEF showed that making usage of the MCH Handbook compulsory in medical license renewal (by law) is one of the methods to promote utilization of the MCH Handbook. Private medical associations (Association of gynecologist and Association of pediatricians) have positive perspectives about the functions of the MCH Handbook and they want to use it satisfactorily, but are against such a unilateral decision¹¹².

IT will not assist directly, but contribute indirectly to legislation, through the enhancement of communications among related entities, promotions of the MCH Handbook etc.

On the other hand, standardization of the computerized MCH Handbook shall be indispensable for the popularization of the MCH Handbook.

(6) Securing Printing Cost

IT is not able to contribute to a secure printing budget for the MCH Handbook at this moment. Realistically, it is expected that reviewing all printing costs in the MoH, to manage the printing cost of the MCH Handbook, or obtaining external funds by inserting advertisements in the MCH Handbook.

After most of medical institutions adopt EMR-EHR (computerization of medical records) and penetrate the computerized MCH Handbook to people, the demands of printed MCH Handbooks will be decreased.

¹¹² It is able to consider establishing some benefits-plans with MCH Handbook.

3.7 Business Propositions

Following business propositions should be implemented as a series of activities as shown in Figure 3.1.

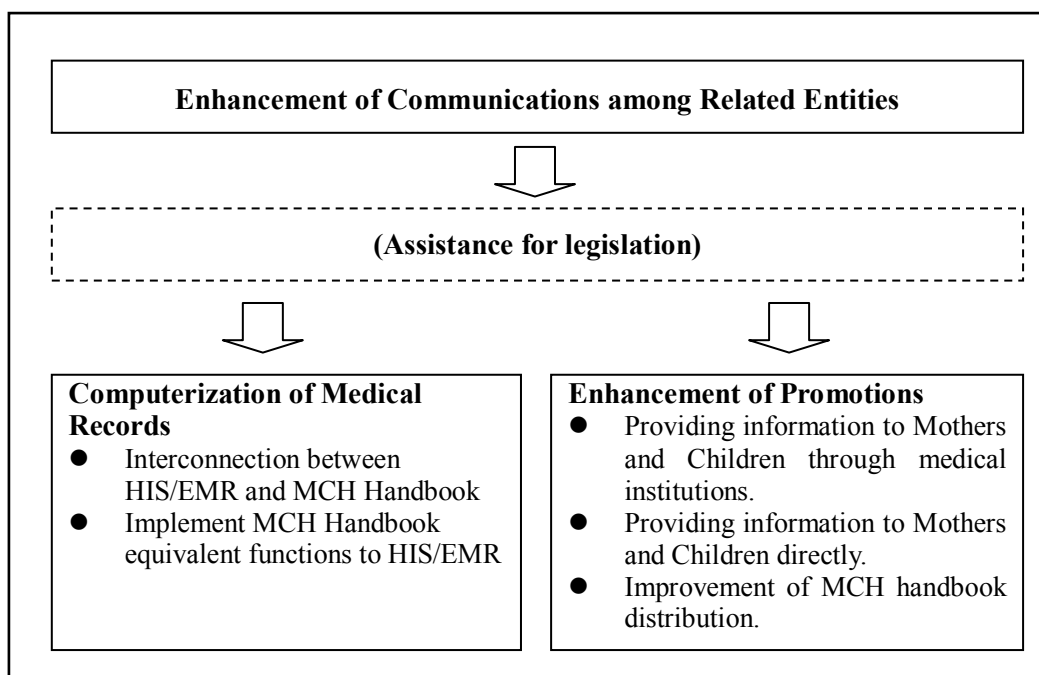


Figure 3.1 Correlation Chart of Activities

3.7.1 Computerization of MCH Handbook

(1) Computerization of Medical Records

As mentioned above, the computerization of medical records is proceeding in Palestine by the Palestine Authority and UNRWA. In both cases, stable operation is prioritized. Next, specifications or requirements of systems are fixed by customization with limited hospitals or clinics, and then expanded to other hospitals or clinics.

Before further spreading of computerization to other medical institutions including the private sector, the following issues should be resolved:

- MoH and private sector (health professionals) agree with institutionalization of utilization (essentially) of MCH Handbook
- MoH and private sector promote collaboration to popularize existing MCH Handbook across the country
- MoH and private sector work to implement a function that is harmonized with MCH Handbook in computerized National HIS
- MoH establishes standards for computerized MCH Handbook
- MoH and private sector work to implement PHR functions in accordance with standards for computerized MCH Handbook in computerized National HIS

(2) Feasibility

Even if all medical institutions are interconnected with computerized National HIS, the demands of a printed MCH Handbook might be continued at people's request.

But, legal bases and availability (at all medical institutions) of the MCH Handbook is not only a base of value, but also it is a strong base to interconnect with computerized National HIS.

NCC MCHHB centralize "requests from medical related entities" (public and private) as standards for the computerized MCH Handbook through NCC MCHHB, to reduce the cost of the current situation survey (necessary to develop functions in computerized National HIS). And to show those standards to USAID (and/or UNRWA).

It is not assured that package software (Avesiva and UNRWA EMR) is able to correspond to requests, and large-scale modification to systems in production tends to invite serious trouble. So some options are prepared in Table 3.7.

Table 3.7 Options for computerization of MCH Handbook

Options	Feasibilities
1. Harmonize all the items/parameters between computerized National HIS and MCH Handbook	It requires customization of computerized National HIS (only items).
2. Implement functions to transfer medical records from computerized National HIS to MCH Handbook	It requires implementation of some screen designs at least. Printing functions (printing items/parameters directly to MCH Handbook, just like bankbook posting operation) will be very difficult.
3. Implement functions of PHR.	It will require other feasibility study.

Option 1 and 2 are the processes of computerization of the printed MCH Handbook to incorporate with computerized National HIS.

Option 3 shall be checked to ensure that computerized National HIS supports (or will support) PHR functions at first. If it is supported, user interface for people can be considered.

In that case, User authentication system will be developed uniquely in computerized National HIS or diverted to Personal identification numbers managed by the Department of Interior (and/or refugee identification number in UNRWA). And "web based" or "web API based" will be preferentially selected to build user interfaces.

In case of "web based", the provider of computerized National HIS prepares web pages for people, and people use web browsers on their devices (computers, handsets etc.) to see it. Usability will depend on the capacity of web browsers on each device.

In case of "web API (Application Programming Interface) based", the provider of computerized National HIS prepares an authentication mechanism and medical records compliant with standards (standards for computerized MCH Handbook) and opens them to IT developers as "API"¹¹³. IT developers develop "applications" that are compatible with API specifications for various devices or platforms¹¹⁴.

This style is becoming the mainstream of mobile applications development since it offers good usability.

¹¹³ For examples, Google Maps API, Twitter API, Yahoo! Weather information API, etc. Some of Medical network open their APIs also.

¹¹⁴ Shimane medical information network (Mame-Net) in Shimane Prefecture in Japan opens of specification of EMR-EHR APIs to IT developers.

Table 3.8 Options of User Interface for Computerized MCH Handbook

Method	Merits	Issues
Web based	<ul style="list-style-type: none"> ● Users use only web browsers ● Information providers can control all of the data 	<ul style="list-style-type: none"> ● Information providers should prepare a lot of web pages to correspond to a lot of devices ● Usability depends on web browsers on each device
Web API based	<ul style="list-style-type: none"> ● Applications with higher usability will be developed. ● It can divert web-based ● Burdens of information provider will be less than web based 	<ul style="list-style-type: none"> ● Application developers must be invited actively ● Terms of licenses of information providers shall be checked in advance (correspond to API or not)

To realize “web API based”, inviting software developers in the private sector is essential, to correspond to various devices (New-Old, platforms, languages etc.) and to keep up with innovations. So, standard specifications of the computerized MCH Handbook with legal bases will be essential. It is also essential to maintain excellent communication with the private sector on a daily basis (a case of USAID¹¹⁵) to scout them for ideas through events, such as application development contests etc. (e.g. Startup Weekend¹¹⁶, a contest for medical applications in Japan¹¹⁷)

(3) Cost Estimation

A Requirement Definition (define requirements to IT systems without contradiction; such as specification records, display/screen designs etc.) is formed at first. Especially, standards for the computerized MCH Handbook should be defined with the coordination of the MoH, private practitioners and USAID (and/or UNRWA). Further, monitors (pregnant women, mothers/children and doctors/midwives) should be prepared for trials to test reference implementation of the computerized MCH Handbook.

Thus, cost shall be estimated after the Requirement Definition, which should be done following the “Enhancement of communication among related entities” activity.

3.7.2 Enhancement of Communications among Related Entities

(1) Utilization of SNS

The MoH hosts a Facebook group to enhance communications among related entities. The following factors in Table 3.9 are considered to use Facebook (all items show positive perspectives).

Table 3.9 Consideration factors to use Facebook

Item	Conditions	Situation
Visibility	Facebook is well known.	Millions of active Facebook accounts in Palestine. Facebook is well known among public agencies and the private sector.

¹¹⁵ <http://www.usaid.gov/results-data/success-stories/opening-doors-employment-possibilities-palestinian-youth>

¹¹⁶ <http://souktel.org/news/newsletter/470-june-2013.html>

¹¹⁷ <http://www.atmarkit.co.jp/ait/articles/1309/13/news155.html>

Organizational utilization	Public agencies or Small-Medium enterprises utilize Facebook as one of their advertising media.	Public agencies and private enterprises utilize Facebook in their production.
Commercial utilization	Utilizing Facebook is recognized as one of the business activities.	Advertising agencies and software development firms will be able to provide advice or support to use Facebook effectively.

Corresponding to “openness of information”, “group functions” should be used properly. “Secret group” and “Closed group” are good for communication with alliance partners. “Public group” and “Public pages” are good for enhancing promotion to people (described later).

Table 3.10 Features of Facebook Groups and Prospected Users

Groups	Features	Usages
Secret group	<ul style="list-style-type: none"> ● Not visible to regular users. ● Invitation and authentication by host are required to join group. ● Posting and browsing past postings after joining group. 	<ul style="list-style-type: none"> ● Dialogues, reminders of meetings and confirming minutes of meetings among NCC MCHHB members
Closed group	<ul style="list-style-type: none"> ● Visible to regular users (by search function) ● Application by users (or invitation from host) and authentication by host are required to join group. ● Posting and browsing past postings after joining group. 	<ul style="list-style-type: none"> ● Dialogues or discussions with public/private practitioners or health professionals ● Discussion for computerization of MCH Handbook with USAID or UNRWA ● As a directory of supportive members
Public Group	<ul style="list-style-type: none"> ● Visible to regular users. ● Facebook users join group anytime. ● Posting after joining group, but regular users browse past posting without any authentications. 	<ul style="list-style-type: none"> ● Promotion to Facebook users ● Enhancement of promotion of MCH Handbook
Facebook pages	<ul style="list-style-type: none"> ● Visible to Non-Facebook user. ● Any Facebook users can post 	<ul style="list-style-type: none"> ● Promotion to people, also non-Facebook uses ● Enhancement of promotion of MCH Handbook.

Source: How to use Facebook group/pages

Users should be Facebook registered-users to join any “Groups”. Members of groups can be browsed by owners (hosts) of groups, so the MoH is able to have a directory of cooperative health professionals and practitioners.

Organizational use of Facebook requires special attention and preparations, which are different from personal use. Experiences and knowledge of local advertizing agencies, IT developers and JICA will be very helpful.

(2) Cost Estimation

Special cost is not required except for internet connection fees. Some remuneration will be prepared to ask advisories or obtain counseling from external instructors about the usage of Facebook pages/groups.

3.7.3 Enhancement of Promotions to the People

(1) Preparation of Contents

“MCH standard messages” should be set to include following contents and others. External contents should be customized to adopt the conditions of Palestine with discussions among related entities:

- How to obtain MCH Handbook
- Educational contents of MCH Handbook (timeline based)
- Improvement of nutrition of pregnant women, mothers and babies (available at Nutrition Department of MoH)
- Information of General health for mothers and breast feeding (available at Education department of MoH or Woman's Health and Develop Directorate of MoH)
- Knowledge and Experiences from private health professionals or practitioners
- Appropriate timing and frequency of ANC and PNC
- “The Handy Messages” compiled by previous JICA projects¹¹⁸
- External contents (e.g. MAMA (Mobile Alliance for Maternal Action) messages)¹¹⁹

During preparation of “MCH standard messages”, the following considerations should be taken into account:

- A sentence should be up to 70 characters, if those messages were promised via SMS. (Nutrition department might have some experiences)
- Not only text formats, but also Movies and Voices/Mosaics (Education department of MoH and Woman's Health and Develop Directorate of MoH might have a lot of contents)
- Line all contents in timeline based on pregnancy period or child growth
- Copyright management of contents should be promised on multi-purpose usage (SMS, printing materials, broadcasting, advertisement etc.)

These “standard MCH messages” should be understood by people, especially pregnant women, mothers and expected mothers. It is possible to ask for the supervision of external entities which are used to compile “messages” to people, such as local advertizing agencies.

(2) Selection of Media

The “standard MCH messages” will be used not only for SMS, but also for Facebook postings, and printed materials (Posters, Calendars, bills, and so on) etc.

Those services and materials should be announced or provided by health professionals or practitioners at the time of the notification of pregnancy to women, to save mass-promotional and inquiry-related costs.

¹¹⁸ The final report of “Improving Maternal and Child Health/Reproductive Health in Palestine (Phase 2)”; JICA technical cooperation project

¹¹⁹ <http://www.mobilemamaalliance.org/mobile-messages-download>

(3) Cost Estimation

The MoH might have a lot of experience to estimate the costs of printing materials. Otherwise, it might be a requirement for personnel expenses, the cost of data conversion of animations or movies, copyright management costs etc.

About sending SMS continuously, the MoH will negotiate with mobile operators (including the possibility of CSR) after making detailed message distribution plans.

3.7.4 Inviting the Private Sector (IT-related)

Providing applications or services that are not regulated as medical treatments (refer to “Regulations of mobile applications” in appendix) through private health professionals and practitioners should be permitted. Examples are as follows:

- Providing information (such as Health Tips, schedulers for vaccinations, etc.) based on MoH authorized information (a.k.a. standard MCH messages)
- Personal-based applications to record child growth with pictures with authorized information
- Providing appointment reminders to customers (outpatients) by health professionals or practitioners

Moreover, mobile operators in Palestine are providing several value-added services (horoscopes etc) via SMS, but not health care messages.

3.7.5 Improvement of MCH Handbook Distribution

At least, distribution points of the MCH Handbook are promoted clearly in public relations and distributors have been increased to enhance the convenience of people. At the same time, the MoH should grasp accurate distribution numbers of the MCH Handbook to keep proper stocks at each distribution point and to estimate proper numbers of copies to prepare.

This improvement might be enabled through the implementation of systems that analyze daily distribution numbers of the MCH Handbook reported from each distribution point via SMS. This is not a comprehensive solution, but a simple solution to selected issues.

3.7.6 Secure Printing Budget

Various perspectives are shown from departments of the MoH or other organizations about inserting advertisements into the MCH Handbook to reduce the cost of printing. At the moment, cautious approaches should be respected. But the possibility of inserting advertisements should be kept as one of choices for cost reduction.

Table 3.11 Perspectives about Inserting Advertisements into MCH Handbook

Perspectives	Departments and Organizations
Able to discuss in NCC MCHHB	PHC (MoH)
Have some experiences of inserting or utilizing advertisements	Nutrition Department (MoH), HWC
Possible with proper regulations or rules	Community Health Department (MoH), UNFPA, UNRWA, HWC, Association of Gynecologists

Perspectives	Departments and Organizations
Feel difficulties to find sponsors who offer advertisements	UNICEF
Cautious feeling	Health Education Department (MoH)
Not agree	Ramallah Medical Complex

Source: Interview results

4. Cambodia

4.1 Maternal and Child Health Situation

4.1.1 Country Profile

The Kingdom of Cambodia (“Cambodia” hereafter) is located in the Indochina Peninsula and bordered by Vietnam, Thailand and Laos. The total population of Cambodia is about 14,140,000, of which Khmers make up 90 %. According to WHO¹²⁰, 20.1% of the population resides in urban areas and the literacy rate in 2008 is 70.9% for women, and 85.5% for men.

Due to the civil war which began in from 1970, human resources for health sharply decreased in Cambodia. Both health and social services suffered much damage during this period. After the signing of the Paris Peace Agreement in 1991, the reconstruction of the country has made progress. With political stability, brought by the Hun Sen Government, the economic growth rate also has improved. Despite this progress, Cambodia is still included among the Least Developed Countries.

4.1.2 Maternal and Child Health Situation

According to WHO¹²¹, the Maternal Mortality Rate (MMR) in Cambodia was 461 per 100,000 live births in 2008 while the data from the Cambodian Ministry of Health shows this to be 206 in 2010.¹²² Based on the data from the Cambodian Ministry of Health, the Millennium Development Goal for this indicator has been achieved; however, it is still high compared to its neighboring countries even though there has been some improvement. According to the Comprehensive Midwifery Review¹²³ that was supported by UNFPA in 2006, the low quality of midwifery services were highlighted including inadequate antenatal checkup, an underdeveloped system to refer and transfer pregnant women who need emergency obstetric care, insufficient number of midwives and limitations in their training. These are considered as some of the contributory factors for the high MMR.

The under-five mortality rate was 54 per 1,000 live births and the infant mortality rate was 45 per 1,000 live births in 2010¹²⁴; Cambodia has met the MDG targets for both these indicators. The reasons for these achievements include the national immunization program, promotion of breastfeeding, improvement in access to basic health services and reduction in poverty. Despite improvements of these indicators, neonatal deaths consist of 54% of infant mortality in 2010, and the neonatal mortality rate has a bigger gap between urban areas and rural areas than the infant mortality rate and the under-five mortality rate.^{125,126} Meanwhile, immunization coverage for infants in 2010 was 94.5% for BCG, 91.8% for DTP3, 91.8% for Hepatitis B III and 91.9% for POL3. The coverage is therefore relatively high as it is more than 90% for each of these immunizations.

In terms of nutrition status, 19.1 % of women in the reproductive age group are considered as underweight, which means less than 18.5 in Body Mass Index, 7.3 % of women were average and 0.4% had severe anemia¹²⁷. According to WHO (2005), the percentage of premature newborns

¹²⁰ WHO Western Pacific Region Health Databank, 2011 and WHO World Health Statistics 2013

¹²¹ *Ibid.*

¹²² Cambodia Demographic and Health Survey 2010

¹²³ Report of Comprehensive Midwifery Review, Ministry of Health, 2006

¹²⁴ Cambodia Demographic and Health Survey 2010

¹²⁵ *Ibid.*

¹²⁶ JICA, Data collection survey on health sector country report Kingdom of Cambodia., 2012

¹²⁷ Cambodia Demographic and Health Survey, 2010

was 8%, while the World Bank (2009) mentions 29% of newborns weighted less than 2,500 grams at birth¹²⁸.

4.1.3 Challenges in Maternal and Child Health

As mentioned above, the challenges in maternal and child health in Cambodia include issues such as the following:

- Low quality of overall maternal and child health services
- Further improvement is necessary for reducing neonatal mortality which makes up 54% of infant mortality and which has high regional disparity

For the purposes of improving maternal and child health services, Cambodia has set a high priority on enhancing the capacity and quantity of midwives, who are the main health service providers, in order to develop human resources for health¹²⁹. Improvement of maternal and child health services, such as basic emergency obstetric care, comprehensive obstetric care, and delivery assisted by skilled birth attendants is expected to reduce neonatal deaths^{130,131,132}.

In addition, it is acknowledged that the high neonatal mortality rate in rural areas of Cambodia is due to poor accessibility of maternal and child health services by women living in rural areas.¹³³ The Ministry of Health (MoH) has defined the policy agenda to encourage community activity so as to enhance the utilization of maternal and child health services where the accessibility of health facilities remains a challenge¹³⁴.

Results of the survey on challenges in maternal and child health are summarized as follows.

4.1.4 Situation of Midwives

The training of midwives is considered as one of the issues of highest priority in the development of human resources for health by the MoH, Cambodia.¹³⁵

In Cambodia, there are two categories of midwife; the Secondary Midwife and the Primary Midwife, who receive 3 years and 1 year of basic training respectively. The training course for Primary Midwives is currently abolished. There are arguments that Primary Midwives do not have sufficient competency as a midwife. However, where there is a shortage of human resources for health, it is necessary to expect the Primary Midwife to assist normal delivery and provide basic emergency obstetric care as well. This task sharing is clarified within the “Fast Track Initiative Road Map”¹³⁶ which describes the strategy to achieve the reduction of MMR and Neonatal Mortality Rate (NMR) in Cambodia. The Roadmap also mentions the necessity to provide training courses (“bridge course”), to fill the gap of competency between the Primary Midwife and the Secondary Midwife, although such a plan is still under consideration according to the Directorate General of Health, MoH.¹³⁷

¹²⁸ Health Nutrition and Population Statistics, World Bank, 2013

¹²⁹ Ministry of Health, *Health strategic plan 2008-2015*, 2008.

¹³⁰ Khan AA, Zahidie A&Rabbani F (2013) Interventions to reduce neonatal mortality from neonatal tetanus in low and middle income countries--a systematic review. *BMC Public Health*, 13:322.

¹³¹ Acuin CA. et al, Maternal, neonatal, and child health in southeast Asia: towards greater regional collaboration.

¹³² Fenn B. et al. Inequities in neonatal survival interventions: evidence from national surveys.

¹³³ Cambodia Demographic and Health Survey 2010

¹³⁴ Ministry of Health, *Health strategic plan 2008-2015*.

¹³⁵ Ministry of Health, *Health strategic plan 2008-2015*.

¹³⁶ Ministry of Health, *Fast track initiative road map f or reducing maternal and newborn mortality 2010 to 2015*, 2010.

¹³⁷ Results of interview with Directorate general of Health, MoH: 2 September 2013

It is said that health facilities should provide maternal and child health services 24 hours a day, however, only 61% of the hospitals and 7% of the health centers are providing such a service¹³⁸. The Roadmap also mentions that at least one Secondary Midwife should be allocated to each health center. Nevertheless, approximately 60% of the health centers are allocated with a Primary Midwife only in 2009.¹³⁹ Midwives without adequate experience are usually dispatched alone to health centers in rural area without having an opportunity to work together with an experienced midwife, and having contact with doctors working in the health facilities¹⁴⁰.

In addition, it was clarified during the survey that communication with referral hospitals is also a challenge, over and above the issue of lack of human resources such as competent midwives. For example, timely referrals are hindered because there are no official communication devices at the facility, and private mobile phones of health providers are utilized for referrals, for which the health provider must pay the communication fee. On the other hand, the National Maternal and Child Health Center (NMCHC) has mentioned that timely referral cases have increased as a result of the activity of supervising management for referral cases at each level.¹⁴¹

In Cambodia, training for midwives is conducted based on Safe Motherhood Clinical Management Protocols¹⁴² which include referral guidelines as well. In the case of maternal death, the Provincial Health Department must report each case to the MoH and the MoH is expected to take the necessary actions¹⁴³. Incentives are paid for each referral case (10 USD per referral¹⁴⁴), while midwives are warned by the MoH based on the regulations in case there is a maternal death.¹⁴⁵

After the economic integration of ASEAN planned in 2015, mutual authentication of medical licenses will be implemented within the region. Therefore, it is important to establish a system of continuous education which includes the introduction of licensing and the renewal of licensing in Cambodia.¹⁴⁶ For example, in order to renew a license, enrollment in an accredited training course and passing an examination certified by the MoH should be required.

4.1.5 In-service Training for Midwives and Challenges

As summarized in Table 4.1, there are two types of training course for midwives in Cambodia. While pre-service training is conducted at Regional Training Centers, in-service training is conducted at the NMCHC. There is a clear demarcation of the role between the RTC and the NMCHC. Therefore, the RTC does not conduct any in-service training at present.

¹³⁸Ministry of Health, *Fast track initiative road map for reducing maternal and newborn mortality 2010 to 2015*, 2010

¹³⁹ Ibid.

¹⁴⁰http://www.urccambodia.org/site/contents.php?p=8&k=mnh_spotlight&lang=en

Midwifery in service training meetings: In Cambodia, midwives working at health centers often have poor contact with midwives and doctors at the major hospitals. In parallel to staff at such facilities, the provincial health department and the district health department have staff working to improve maternal health services. One way to bring these key staff together for joint discussions of current problem cases and provide new knowledge are quarterly midwifery meetings (MCAT: midwifery coordination alliance team meeting).

¹⁴¹Results of interview with National Maternal and Child Center (NMCHC), 2 September 2013.

¹⁴²Ministry of Health, *Safe motherhood clinical management protocols health centers*, 2010.

¹⁴³Results of interview with Department of Human Resource, MoH, 3 September 2013.

¹⁴⁴Results of interview with URC, 5 September 2013.

¹⁴⁵Results of interview with Kampong Cham Provincial Hospital, 29 August 2013.

¹⁴⁶Results of interview with JICA Project for Strengthening Human Resources Development System of Co-medicals in Cambodia, 4 September

Table 4.1 Training Institutions and Types of Training

Training Institutions	Types of Training
Regional Training Center(RTC)	Pre-service Training (Basic Education)
National Maternal and Child Health Center(NMCHC)	In-service Training (Continuous Education)

Source: Study Team

During the survey, the MoH commented that if the RTC can conduct in-service training in the future, targets of in-service training can be expanded. In order to achieve such a system, coordination among the RTC, NMCHC, Department of Human Resource Development, MoH, Province, and hospitals is essential on the basis of a sustainable budget and agreement regarding the target region.

According to the Department of Human Resource Development, MoH, there is no difference between the training for midwives in the urban and rural areas. Primary Midwives allocated to health centers are considered as the main target of the training. However, Secondary Midwives also lack adequate skills and knowledge, thus they need to upgrade their quality of health services, such as normal delivery and antenatal checkups.

Participants in the training receive both per diem and transportation allowances. Transportation allowance is provided based on the common fund pooled by the development partners. According to interviews with the experts of JICA Project for Strengthening Human Resources Development System of Co-medicals in Cambodia, per diem and transportation allowances are likely to be considered as a strong incentive for midwives to participate in training.¹⁴⁷

As a challenge of in-service training for midwives in Cambodia, it was mentioned by experts of JICA Project for Improving Maternal and Newborn Care through Midwifery Capacity Development that this situation; midwives frequently leaving their workplaces when they participate in training even though the training is conducted at each regional referral hospital, is not favorable. On the other hand, if they are too busy to participate in the training, they will lose the opportunity of gaining updated knowledge.¹⁴⁸ In addition, the survey team found through an interview with Directorate General of Health, MoH¹⁴⁹, that some training made the training period shorter, and the number of participants and target regions were decreased due to a shortage of budget.¹⁵⁰

Although various development partners are conducting in-service training in Cambodia, it is not provided through a standardized method. Therefore, the MoH is planning to standardize the in-service training with the support of JICA Project for Improving Maternal and Newborn Care through Midwifery Capacity Development, by developing a draft of the training implementation manual, and by conducting the training of the midwifery trainer. These achievements are expected to be reflected in the National Guidelines.

¹⁴⁷ Results of interview with JICA Project for Strengthening Human Resources Development System of Co-medicals, 4 September 2013.

¹⁴⁸ Results of interview with Directorate General of Health, MoH, 2 September 2013.

¹⁴⁹ Results of interview with Directorate General of Health, MoH, 2 September 2013.

¹⁵⁰ Results of interview with Directorate General of Health, MoH, 2 September 2013.

4.1.6 Midwife Coordinator/Midwife Alliance Team Training (MCAT)

MCAT is training to strengthen the cooperation between MCH officers and skilled birth attendants at referral hospitals. The training is expected to improve the technical support for midwives working at health centers¹⁵¹. The NMCHC and JICA Project¹⁵² cooperated in developing the curriculum for Midwife Coordinator/Midwife Alliance Team Training (MCAT) on the basis of the curriculum for Midwife Coordinator TOT (MCT) and Midwife Alliance Team (MAT).¹⁵³

In 2009, MCAT was conducted for administrative staff within the Operational District of the 17 Provinces which have hospitals offering Complementary Package of Activity (CPA) 3, and 86 skilled birth attendants who are working at hospitals.¹⁵⁴

Currently, MCAT has been acknowledged, even in the websites of other development partners, as an opportunity to provide joint discussions of current problem cases, and as an opportunity to obtain new knowledge.¹⁵⁵

According to interviews with the NMCHC, details of MCAT were mentioned as follows.

- MCAT is held monthly or quarterly, and medical doctors at the referral hospital provide technical lectures during the periodical meeting. Per diem and transportation allowances are paid to midwives invited from each health center. It is considered that MCAT can be maintained because the development partners financially support the training. However, the sustainability of the MCAT is doubtful due to the lack of a government budget. Case conferences are held using a method which includes a panel discussion between health centers which have sent the referral cases, and hospitals which have received the referral cases (the scenario is developed in advance). Skills and competence to facilitate the conference and focus on the main points of the discussion are highly necessary. For example, as one of the main points of discussion, the judgment on how and why they decided to conduct a caesarean section for a prolonged labor case was selected.
- Case studies in the MCAT have been gathered from normal work at health facilities. If some cases have a pattern between symptoms and medical interventions, participants of training can learn knowledge and skills for dealing with these cases through the cases studies, and the knowledge and skills can be accumulated into a protocol. However, each case requires different midwifery care, so it is difficult to expect that midwives will encounter a similar case scenario to those mentioned in the protocol.¹⁵⁶ Therefore, the MCAT is functioning as a successful system providing in-service training to health staff in order to enhance skills and gain experience, and as an important opportunity to bring midwives who are working at different levels of health facilities together.

4.1.7 Pre-service Training for Midwife and Challenges

The curriculum for basic training for developing human resources for health, such as Primary Midwives, Secondary Midwives and Bachelor of Science Midwives, is under consideration to be

¹⁵¹MoH (NMCHC) & JICA, Orientation workshop for health managers on MCH, 2010.

¹⁵²Results of interview with JICA Project for Improving Maternal and Newborn Care through Midwifery Capacity Development, 2 September 2013.

¹⁵³http://libopac.jica.go.jp/images/report/11987781_01.pdf

¹⁵⁴Ibid.

¹⁵⁵http://www.urccambodia.org/site/contents.php?p=8&k=mnh_spotlight&lang=en

Midwifery in service training meetings: In Cambodia, midwives working at health centers often have poor contact with midwives and doctors at the major hospitals. In parallel to staff at such facilities, the provincial health department and the district health department have staff working to improve maternal health services. One way to bring these key staff together for joint discussions of current problem cases and provide new knowledge are quarterly midwifery meetings (MCAT: midwifery coordination alliance team meeting).

¹⁵⁶Results of interview with National Maternal and Child Center (NMCHC), 2 September 2013.

revised according to the Department of Human Resource Development, MoH¹⁵⁷. This is because in many cases, contents of the current curriculum do not reflect the real situations of midwives working at health facilities in Cambodia. The revised curriculum and the training courses which are based on the new protocols are expected to take into full consideration the opinions of midwives working at health facilities.¹⁵⁸

(1) Utilization of Health Facilities

In rural areas, the coverage rate of ANC and PNC, and the health facility delivery rate are low compared to urban areas¹⁵⁹. The factors which affect the utilization of health facilities among women in rural areas for Maternal Health Services, could be economic reasons, or/and physical and psychological problems^{160,161,162,163}. The MoH has taken some countermeasures in the Health Strategic Plan 2008-2015¹⁶⁴ to address the issues mentioned above, to improve the utilization of health facilities.

In interviews at the state hospital¹⁶⁵, several reasons for the prevalence of home deliveries in rural areas were pointed out, such as traditional culture, anxiety about the skills of the midwife, and poverty. The hospital has been providing some training to the midwives, TBA and VHSG in their target area to facilitate the use of maternal health services. In addition, there were some ideas by the hospital to promote facility use by pregnant women, such as enhancement of health education and counseling to improve the communication between midwife and pregnant women, and a desire to offer humanization of childbirth, to provide a higher quality of care.

Facilitation of the use of health facilities by pregnant women is effective in reducing maternal and neonatal mortality. In the prior study, it was possible to reduce neonatal mortality by providing skilled childbirth care, basic and comprehensive emergency obstetric care¹⁶⁶, and administration of tetanus vaccine, promoting regular attendance of ANC, provision of clean childbirth, and the provision of folic acid and iron supplements¹⁶⁷.

For the purpose of reducing maternal mortality, provision of family planning, skilled childbirth and emergency obstetric care are considered as most effective¹⁶⁸. The ANC at the appropriate time leads the opportunity to find the risks of pregnancy and to receive professional care during delivery¹⁶⁹. Furthermore, it is possible to reduce 16-33% of maternal mortality if there is an environment which can provide skilled childbirth, essential medical supplies, drugs and equipment, and an appropriate referral system¹⁷⁰.

¹⁵⁷Results of interview with Department of Human resource Development, MoH, 3 September 2013.

¹⁵⁸Results of interview with Department of Human resource Development, MoH, 3 September 2013.

¹⁵⁹National Institute of Statistics et al. Demographic and Health Survey 2010, 2011.

¹⁶⁰National Institute of Statistics et al. Demographic and Health Survey 2010, 2011.

¹⁶¹Matsuoka et al (2010) Perceived barriers to utilization of maternal health services in rural Cambodia

¹⁶²Por et al (2010) Using targeted vouchers and health equity funds to improve access to skilled birth attendants for poor women: a case study in three rural health districts in Cambodia,

¹⁶³Ministry of Health, Fast track initiative road map f or reducing maternal and newborn mortality 2010 to 2015, 2010.

¹⁶⁴Ministry of Health, Health strategic plan 2008-2015.

¹⁶⁵ Results of interview with state hospital , 29 August 2013.

¹⁶⁶Tura G, Fantahun M & Worku A (2013) The effect of health facility delivery on neonatal mortality: systematic review and meta-analysis. BMC Pregnancy and Childbirth, 13:18.

¹⁶⁷Khan AA, Zahidie A&Rabbani F (2013) Interventions to reduce neonatal mortality from neonatal tetanus in low and middle income countries--a systematic review. BMC Public Health, 13:322

¹⁶⁸Bullough C, Meda N, Makowiecka K, Ronsmans C, Achadi EL, & Hussein L. (2005) Current strategies for the reduction of maternal mortality. BJOG, 112 (9): 1180-1188.

¹⁶⁹Bullough C, Meda N, Makowiecka K, Ronsmans C, Achadi EL, & Hussein L. (2005) Current strategies for the reduction of maternal mortality. BJOG, 112 (9): 1180-1188.

¹⁷⁰Graham WJ, Bell JS & Bullough CHW (2001) Can skilled attendance at delivery reduce maternal mortality in developing countries? Studies Health Serv Organ Policy, 17: 97-130.

One of the reasons for the reduction in the maternal mortality rate in Cambodia was an increased number of health centers which can provide 24 hour maternal and child health care services¹⁷¹. This evidence shows the importance of improvement of maternal health services in both quality and quantity, to reduce maternal mortality. In addition, community level health workers can reduce neonatal mortality through home-visits of pregnant women during pregnancy and after delivery, since half or fewer than 5 child deaths occurred within the first month of child life¹⁷², and 83% occurred in first year of child life¹⁷³.

(2) Community Activities

The MoH has developed a community participation mechanism to facilitate the activities of community members in the existing health system. This is written in “Community participation policy for health¹⁷⁴”. According to this policy, there is one VHSG per village in Cambodia and each VHSG has one leader, with each VHSG member responsible for 10-50 households.

In interviews at the MoH, Department of Human Resource Development¹⁷⁵, it was offered that the MCH coordinators in State MoH are taking responsibility for VHSG work. However, the opinion from UNFPA was slightly different. The opinion from UNFPA was that VHSG is under the control of health centers, and therefore, the National or Operational District does not understand the situation and number of VHSG correctly.

The roles of VHSG are: 1) reporting the information such as number of pregnancies, deliveries, and deaths in a community; 2) collecting the information about health related issues in a community; and 3) distribution of medicine and supplements to communities¹⁷⁶. Table 4.2 shows VHSG membership, condition of the leader and members, and the scope of work of VHSG.

In interviews at the MoH, Directorate General of Health¹⁷⁷, the health center holds a meeting with VHSG every month, and health education, services provided at health center, immunization and contraceptive related information have been chosen as topics of the meetings. However, whether this system is functioning well or not is different at each health center. It seems to depend on the presence or absence of development partners (there are paid VHSG members and unpaid VHSG members in different health centers). Different conditions like the presence of development partners could affect VHSG activities in each area. The situation of VHSG and the contents of their activities at 2 different health centers (Kmouch in Phnon Penh, Kampong Trach in Svay Rieng) are shown in Table 4.3.

¹⁷¹Fujita et al. (2013) Addressing the human resources crisis: a case study of Cambodia’s efforts to reduce maternal mortality (1980-2012). *BMJ OPEN* 2013;3

¹⁷²Source: Demographic and health survey (DHS), 2010

¹⁷³Community-based intervention packages for reducing maternal and neonatal morbidity and mortality and improving neonatal outcomes (Review)

¹⁷⁴Ministry of Health, *Community participation policy for health*, 2008.

¹⁷⁵Results of interview with Department of Human Resource, MoH, 3 September 2013.

¹⁷⁶Ministry of Health, *Community participation policy for health*, 2008.

¹⁷⁷Results of interview with Directorate General of Health, MoH. 2 September 2013.

Table 4.2 VHSG: Membership, Criteria, and Scope of work

Topic	Contents
VHSG Membership	<ul style="list-style-type: none"> ● One elected VHSG Leader ● VHSG Members: one VHSG member responsible for 10-50 households, as defined by the Operational District(OD) Director and the needs of the community ● Examples of VHSG Members: Traditional Birth Attendants (TBA), Mother Support Groups, Community Home Based Care Teams(CHBT), Village Malaria Workers(VMW) etc.
Responsibility	<ul style="list-style-type: none"> ● VHSG Leader and members are formally recognized by the local health authorities ● The HC is responsible for submitting a list of all active VHSG Leaders and members in their catchment area to the OD. The OD is responsible for organizing identification (ID) cards to submit to the PHD. The PHD Director is responsible for signing the ID cards.
The Criteria for Selection of VHSG Leader	<ul style="list-style-type: none"> ● Must be elected by community members ● Should be literate
The Criteria for Selection of VHSG Leader/Members	<ul style="list-style-type: none"> ● Must live in the village where they are elected/selected ● Should have good communication skills and be motivated to work for the benefit of their community ● Should be between 20 and 55 years old
Main roles of the VHSG Leader	<ul style="list-style-type: none"> ● Ensure the regular flow of information between the community and the HC ● Coordinate the VSHG to implement the Scope of Work for the VHSG in their village
Roles and Responsibilities of the VHSG Leader	<ul style="list-style-type: none"> ● Providing feedback from the community to the HC, and keeping the VHSG and the community informed about HC activities ● Coordinating training activities for the VHSG to support HV activities in the community ● Providing information about HV services and fees to the community ● Reporting consumer satisfaction and dissatisfaction to the HCCM regarding the quality of health care in HCs, access to HCs, user fee rates etc. ● Facilitating outreach activities with the VHSG Members, the HC and the community ● Promoting client rights and good governance
The Scope of Work of the VHSG	<p>[Health Information System]</p> <ul style="list-style-type: none"> ● Assist the HV with disease surveillance/monitoring and case reporting to the VHSG Leader during Monthly Village Health Meetings (including “Zero Reporting”) ● Report disease outbreaks to the HV in a timely manner ● Keep a register of all children below five years of age in the village, recording each child’s name, sex, date of birth, and parents’ names ● Assist the HV in collecting vital registration statistics including notification of pregnancies, births and deaths

Topic	Contents
	<ul style="list-style-type: none"> ● Literate VHSG Members should be trained and encouraged to complete verbal autopsies for deaths that occur in the village using a simple checklist provided ● Collect information through appropriate tools on health and health-related problems in the community, inform and report to the HC in a timely manner <p>[Provision and follow up of information and essential services]</p> <ul style="list-style-type: none"> ● Facilitate the identification of the poor for fee exemption and Health Equity Fund coverage ● Provide health education, promote improved health practices, and distribute health IEC materials. Health topics to be covered include: Key Family Practices, family planning, antenatal care, clean delivery, post natal care, breastfeeding, complementary feeding, safe water, hygiene and sanitation, malaria and dengue control, HIV/AIDS/STIs, tuberculosis, immunizations, non-communicable and chronic diseases, mental health, tobacco and alcohol, and gender-based and family violence ● Mobilize families and assist HC staff during outreach activities and health campaigns ● Assist in the mobilization of resources for sustainability of Health Centers ● Assist families with early identification of the danger signs for severe/serious illnesses ● Promote and strengthen the HC referral system and assist in logistics such as transportation <p>[Provision and follow up of essential diagnosis and treatment services]</p> <ul style="list-style-type: none"> ● Promote correct home care for illnesses following the C-IMCI training curriculum for Community Health Volunteers; ● Provide Community Based First Aid and rehabilitation ● Identify and refer children with acute malnutrition; follow up on children with acute malnutrition under community based management and provide health education on feeding malnourished children ● Provide Home Based Care ● Assist HC to detect chronic diseases ● Provide DOTS for TB patients when requested by the HC ● Provide ORS including Zinc for diarrhea in children <p>[Provision of essential commodities]</p> <ul style="list-style-type: none"> ● Distribute micronutrient supplement (Vitamin A, Iron, Folic Acid, etc.) ● Distribute mebendazol ● Distribute oral-re-hydration treatment with zinc ● Distribute condoms and family planning supplies ● Distribute long lasting insecticide treated mosquito bed nets and hammock nets ● Distribute abate ● Distribute food supplement (i.e. sprinkles) and Ready to Use Supplementary Foods (RUSF).

Table 4.3 VHSG Activity Situation at Kmouch and Kampong Trach Health Center

Topic	Kmouch Health Center	Kampong Trach Health Center
Member	2-3 VMSG members are allocated per village. Total 20 VMSGs are distributed within the catchment area.	2 VMSGs are allocated at each village.
Activity	<ul style="list-style-type: none"> • VHSG is highly trusted by villagers, therefore, some difficult/complicated information that Medical doctors cannot tell villagers directly, can be told through VHSG • Possible to provide education to pregnant women • Using whiteboards and leaflets provided by MoH and Development Partners • Conducting Monthly Meeting • The motivation of the VHSG is very high • VHSG is taking role of emergency contact such as to call for ambulance in case of accident, and supports patients and disabilities to be sent to health facilities • VHSG is transferring the information from government and collecting the information when natural disaster or endemic of serious sickness occurs • There is a system when chicken die in a village, VHSG will report immediately (suspicion of avian influenza). MoH sends investigator after they receive the information from VHSG 	<ul style="list-style-type: none"> • Providing Health Education or Prevention activities to villagers with the Nurses from health centers as one of the leaders for outreach activities (there are many posters and brochures which target farmers). • 2-3 TBAs who received maternal and child health training provide health education about maternal and child health. As for deliveries, TBAs are not allowed to assist and deliveries have to be referred to health centers. (actually, there are a few deliveries which TBAs assist.)
Approach from Health Center	<ul style="list-style-type: none"> • Teaching the use of health education materials in the health center • There is experience conducting First Aid Training with NGO in the past 	
IT utilization	<ul style="list-style-type: none"> • All VHSG members have mobile phone (the mobile phones was provided by the NGO who are targeting TB control. Currently, call charge is paid by individuals but it is used very frequently. 	<ul style="list-style-type: none"> • The contact is made from hospital to health center by using mobile phone. • The contact from health center to VHSG is also done by mobile phone to the VHSG members who have their own mobile phone. For the VHSG members who do not have their own mobile phone, the message will be delivered by villagers orally.

Source: Study Team

4.2 IT Situation in Cambodia

4.2.1 Telecommunications Infrastructure

The penetration rate of mobile phones in Cambodia has surged from 27.49% in 2012¹⁷⁸ to 77% in 2013¹⁷⁹. It seems 25% of estimated subscribers own smart phones in 2013¹⁸⁰. Also 3G telecommunications infrastructure has been implemented in both urban and rural areas¹⁸¹.

¹⁷⁸<http://www.forest-interactive.com/mobile-penetration-rate/>

¹⁷⁹<http://www.forest-interactive.com/mobile-penetration-rate-2013-2/>

Mobile phones are widely used in the field of MCH, such as for referrals between health centers and hospitals, or communications among related entities, but it used at personal expenses in most cases.

According to the Media Index Report (UNICEF, 2012: Draft):

- Penetration rate of mobile phones in rural areas is approximately 55%
- Cost of devices (phones) and call charges are issues for penetration
- Voice communications are the dominant use at both of urban and rural areas
- Non-voice communications (SMS or data communications) are not frequently used due to lack of standardized Khmer language support on devices
- Coverage area to area is 90% and to population is 95%
- 3G data communications infrastructure is being implemented rapidly, so it is used as one of main lines to connect to the Internet in rural areas, instead of fixed lines

The supply of electric power is improving in urban areas, but solar power generators are used in some referral hospitals in rural areas due to the lack of stability of power supply and the cost of electricity¹⁸².

4.2.2 Special Issues of Power Supply in Cambodia

According to “Cambodia Feasibility Study for Power Control Systems Project (March, 2013)¹⁸³”, “insufficient services and functions of hospitals in rural areas” that comes from the situation of unstable and expensive power supply, is one of the developing issues in Cambodia. So, the introduction of solar power systems to CPA2 hospitals is proposed as one of the solutions to overcome such a situation.

Also according to the report;

“Since many of the electrical power facilities were destroyed due to the civil war that continued in Cambodia until the early 1990s, several small-scale power plants using diesel generators were built by Independent Power Producers (IPP) to help meet the demand for power that rose suddenly during the post-war reconstruction period. However, with the domestic power demand subsequently rising more than 20% per year, the current supply of electricity does not adequately meet this demand. Additionally, a lack of water in dams during the dry season causes power generation capacity to drop at hydroelectric power facilities, further creating a shortage problem in the electrical power supply. In the future, the amount of power that can be supplied will increase upon the completion of new power plants etc., and full coverage for demand is planned by around 2020.

Meanwhile, a power transmission and distribution grid is also being developed in Phnom Penh and running through urban areas and along major roads. However, the electrification rate in rural areas is still only 25-30%. Although the Cambodian government continues to work on bringing electricity to rural areas, the frequency of power outages at rural hospitals visited during the survey was higher compared to hospitals in Phnom Penh. Also, the electricity charges are high in areas being supplied by IPPs, with electricity charges being three times those in Phnom Penh in some cases. Therefore, until the power grid is completed in 2030, it is possible that rural areas may not be able to receive adequate power supply due to an unstable supply and high electricity charges.”

¹⁸⁰ <http://www.forest-interactive.com/mobile-users-2013/>

¹⁸¹ According to URC, more than 500kbps bandwidth of internet connection speed will be expected by 3G.

¹⁸² According to interviews from Romeas Haek District Referral Hospital & Kampong Trach Health Center

¹⁸³ http://www.mofa.go.jp/mofaj/gaiko/oda/seisaku/kanmin/chusho_h24/pdfs/en_a27.pdf

4.3 eHealth in Cambodia

The cases in Cambodia are typified by the computerization and enhancement of the National Health Management Information System (NHMIS) through the assistance of USAID. At the time of the field study, computerized NHMIS has realized information collection functions from health centers (as the minimum information management unit) via the web. It is planned that making individual outpatients as the minimum information management unit will enhance NHMIS. But interconnection with HIV and Tuberculosis related systems and enhancement of MCH functions are further issues.

4.3.1 Computerization of NHMIS

HISSP (Health Information System Strategic Plan) 2008-2015, the first strategy of health information systems was set by the assistance of WHO/HMN (Health Metrics Network¹⁸⁴). In the HISSP 2008-2015, "4.1 The development, use, and maintenance of ICT systems for health data management and communications" is noted in "4. To increase data sharing, management, analysis, dissemination and use" as one of items of "Data Management, Dissemination and Use"¹⁸⁵.

NHMIS of Cambodia¹⁸⁶ was computerized by a local firm in 2006-2009 as a database of Microsoft Access. Since 2010, computerized NHMIS has migrated to web based (maintaining data structures) and enhanced continuously through the assistance of USAID under the program of "Better Health Services (BHS)". Hereinafter, NHMIS is for "computerized NHMIS".

Operating data collection modules in NHMIS are as follows:

- Health information (HC1 and HO2) reported from public medical institutions
- Health information reported from NGOs
- Health information reported from private medical institutions
- Surveyed data of notification of maternal deaths
- Population data (national census in 2008 and population of ODs)

Currently, NHMIS collects information based on HC1 and HO2 monthly reports from 990 health centers, 55 referral hospitals, 24 district hospitals, 8 national hospitals and 2 NGO operated clinics. 77 OD, 89 hospitals and 70 health centers (Battambang province) are able to input data (reports) directly to NHMIS via the web. Other medical institutions submit monthly reports to superagencies (ODs or PDCs) in paper form, and superagencies input this data to NHMIS via the web (but according to UNFPA, paper-based reports have remained in medical institutions even when they correspond to web-based report).

Development, operations, maintenance and training for users have been conducted by 2 NGOs (URC and RACHA¹⁸⁷) under the project of BHS funded by USAID. According to URC, the MoH has introduced computers to almost half of health centers, so computers will be installed to almost all health centers in the near future.

According to USAID, the BHS program will be terminated by 2013, but the succeeding program will support NHMIS for at least 5 years from 2014. It is planned to implement "PMRS (Patient Management and Registration System)" to NHMIS, and this will be tested in 2 hospitals.

¹⁸⁴ <http://www.who.int/healthmetrics/partners/en/>

¹⁸⁵ Department of Planning and Health Information of MoH Cambodia, "Health Information Systems Strategic Plan 2008-2015" (August, 2008)

¹⁸⁶ http://www.hiscambodia.org/public/aboutthis_en.php?m=2

¹⁸⁷ Reproductive and Child Health Alliance. (<http://www.racha.org.kh/>)

According to PHID (Planning and Health Information Department) in-charge of NHMIS in the MoH, collecting information from more medical institutions (NGO and private) is an immediate issue for accuracy improvement of NHMIS.

At present, medical institutions should prepare computers with internet connections and user accounts (with passwords) issued by the PHID of the MoH to connect and to use NHMIS.

4.4 IT Utilization in the Field of MCH

At the time of the field survey, UNICEF and UNFPA considered IT utilization, USAID and URC attached directly to IT systems and elemental technologies, and InSTEDD proposed applications. On the whole, IT utilization for pregnant women or mothers-and-children (promotions) is very limited.

4.4.1 UNICEF

UNICEF is exploring the possibilities of eHealth/mHealth with NGOs. UNICEF is considering using SMS as one of the access methods at community level, and so is negotiating with mobile operators under the support of MPTC (the Ministry of Posts and Telecommunications of Cambodia). But as it stands, it is difficult to provide health information directly to women (mothers) in English due to the lack of standardized Khmer language support in mobile devices.

UNICEF assists with the improvement of educational contents (competency based) for midwives, but not for adopting IT utilization, such as distance learning etc.

UNICEF compiled the “Media Index Report (2012: Draft)” that surveyed the utilization and influence rate of traditional media (e.g. TV, radio, newspapers etc.) and new media (e.g. internet services, mobile phones etc) among Cambodian people. According to the report, people who live in rural areas recognize health centers as one of the most reliable information sources for health, but the frequency of health information is less than 2 times in a month. Also, non-voice communications (SMS, etc.) are not popular and even TV or newspapers are not effective information delivery channels in rural areas of Cambodia.

4.4.2 UNFPA

UNFPA does not conduct any eHealth/mHealth projects in a single attempt. According to interviews (as personal perspectives of interviewee), the lack of standardized Khmer language support on IT devices and the low penetration rate of internet connections are the main obstacles.

UNFPA will conduct a feasibility study with the BBC World Service in 2013-2014 to assess plans to deliver information to young generations to change their behavior via several media such as SMS, SNS, TV, and radio etc. This plan requires that some interactions will be required to improve their awareness and to change their behavior, considering the current situation that younger generations have low attention to family planning. However, younger generations will be receptive to the use of SMS or SNS, and delivering messages directly to individuals will therefore be effective.

Regarding the idea shown by the Study Team, to support pregnant women in rural areas by providing health information to health centers and VHGS, UNFPA advised that connecting “cares” and data collection to decrease neonatal mortality rate might be key factors.

4.4.3 WHO

WHO plans to support the establishment of eHealth Strategies for Cambodia from 2014-2015. But at the time of the survey, WHO does not offer any approach to cover the whole of the national health information systems in Cambodia. Also, it is said, the MoH carefully reflects on such approaches (more large scale eHealth projects).

WHO mentioned that existing NHMIS should involve private medical institutions and NGO operated clinics more.

WHO assists the implementation of CVRS (Civil Registration Vital Statistics), since WHO recognizes the study of population dynamics is important, such as the improvement of accuracy of sources of death based on ICD-10. Moreover, WHO supports the Logistic Management Information System for Medicine, but WHO is worried about the capacity of the Cambodian government to maintain and to improve these systems.

WHO will continue assistance with eHealth in Cambodia, mainly in capacity development of government agencies and the project design phases. So supporters or donors to fund and implement these projects are needed.

4.4.4 USAID

USAID offers support to build, operate and penetrate computerized NHMIS through NGOs under the BHS program.

Moreover, USAID supports the SPICE project¹⁸⁸, which aims to facilitate social and business innovation using communications technology, and improves communications in the Khmer via mobile devices. For example, holding Bar Camp (developers/entrepreneurs conference) in Cambodia, or the introduction of Khmer language supported mobile applications etc.

On November 4, 2013, it was announced that Google had produced Khmer language phones by integrating the translations provided by the NGO Open Institute supported by the SPICE project¹⁸⁹.

As just described, USAID funds the computerization of the NHMIS and capacity building of the private sector (include NGOs) to overcome the lack of Khmer language support on IT devices.

4.4.5 URC (University Research Co., LLC)

URC is a research company located in Wisconsin, U.S.A., which owns NGOs. They have conducted international activities since the Primary Healthcare Operations Research Project of 1981. They have established NGOs in Cambodia, and have been entrusted with the development, operations, maintenance and training of users of computerized NHMIS from USAID. URC is in charge of OD and Hospitals and RACHA (another NGO) is in charge of health centers.

URC is developing PMRS (Patient Management and Registration System) modules, and developing CRVS (Civil Registration and Vital Statistics system) with the Ministry of the Interior. Moreover, the website of the CMC (Cambodian Midwives Council)¹⁹⁰ is also developed by URC.

¹⁸⁸<http://www.open.org.kh/en/spice>

¹⁸⁹

<http://www.open.org.kh/en/press-release-google-produces-khmer-language-phones-integrating-translations-provided-ngo-open-0>

¹⁹⁰<http://www.cmidwivesc.org/?lg=en>

URC has conducted a pilot project of the MCH Handbook in Pursat province¹⁹¹ in recent years. Medical records in the MCH Handbook have been utilized as evidence of MCH services provided.

URC proposes a “Clinical Hotline” that would provide mobile phones to referral hospitals (a mobile phone for the chief midwife on duty) to accept referral contact from health centers. The “Clinical Hotline” mostly receives phone calls asking for referrals, so it is able to operate with very few costs. Charges for the originating calls should be paid from existing allowances for accepting referrals (10 USD per referral).

4.4.6 InSTEDD innovation lab

InSTEDD is a social entrepreneur¹⁹² located in California of U.S.A. They have established their “Innovation Lab” in Cambodia and Argentina to develop IT solutions in limited resource conditions (languages, telecommunication infrastructure, user literacy, medical environment, etc.). They think their solutions based on limited resource conditions will be utilized in a lot of developing countries¹⁹³.

At the time of the survey, they showed “Magic Wheel¹⁹⁴”, one of the applications of the “Reporting Wheel¹⁹⁵” encoding tool. “Magic Wheel” will be used for reporting the numbers of each disease (e.g. cholera, dengue, malaria etc.) via SMS or IVR, by using basic mobile phones at health centers. ODs are able to see summaries and reports that are automatically generated at the server side, based on reports from health centers. This is a very simple and practical solution, and very good for issues of emergency.

Their fund raising method is to develop the initial system by analyzing demands at first, then apply for venture capital that provide funds for innovative ideas (e.g. TED Prize, Google Ventures, the Rockefeller Foundation etc.) to obtain seed funds. They demonstrate their solutions by using seed funds, and apply to government agencies or other venture capital organizations. (a common method for IT venture firms)

Currently, reporting systems through Magic Wheel are recruited by only 1 OD as a pilot base.

4.5 Corresponding to Issues of MCH by IT Utilization

4.5.1 Issues of MCH and Expected IT utilizations

Table 4.4 shows issues, situations and proposed countermeasures of MCH in Cambodia.

Table 4.4 Issues, Situations and Countermeasures of MCH

Issues	Situation	Proposed Countermeasures
Low quality of MCH services	<ul style="list-style-type: none"> ● Shortage of midwives in quality and quantity ● Shortage of Secondary midwives (services by secondary midwives are provided by 61% of hospitals and 7% of health centers only) ● 60% of health centers equip only 	<ul style="list-style-type: none"> ● Improve secondary midwives in quality and quantity (include enhancement of educational systems) ● Enhance education and training to primary midwives ● Map capability evaluations

¹⁹¹ According to interview to URC, this pilot project is conducted in Pursat province, not in Battambang province.

¹⁹² Social entrepreneurship is the process of pursuing innovative solutions to social problems.

¹⁹³ <http://instedd.org/technologies/>

¹⁹⁴ <http://ndt.instedd.org/2010/05/it-without-software.html>

¹⁹⁵ <http://instedd.org/technologies/reporting-wheel/>

Issues	Situation	Proposed Countermeasures
	primary midwife ● “Bridge courses” from primary midwife to secondary midwife are still under consideration	and training records of midwives with their locations to optimize deployment and referral destinations ● Establish licensing and renewal systems for midwives
Training of midwives	● NMCHC provides in-service training to midwives ● Required training is for birth assistance and quality enhancement of ANCs ● Referral hospitals in rural areas provide face-to-face ensemble training ● Several donors provide in-service training (MoH wants to aggregate) ● MCAT is known as one of the best practices among other developing partners	● Interconnect pre-service and in-service training ● Aggregate existing in-service training ● Promote MCAT ● Improve educational materials
Education of midwives	● RTC provides pre-service training ● MoH is revising curriculum ● Working with professional organizations to fill gaps between educational content and practical needs is considered	● Interconnect pre-service and in-service training ● Improve educational materials
Utilization of health facilities (promotion of utilization of MCH services to reduce neonatal mortality rate in rural areas)	● ANCs, hospital deliveries and PNCs are inactive in rural areas ● Deliveries at home are dominant in rural areas (due to cultural backgrounds, worrying about capacity of midwives, poverty etc.) ● Capacity building of midwives and training for TBA are required ● VHSGs promote utilization of health facilities in each community, but not standardized ● VHSGs report to health centers ● Health education, repletion of counseling, enhancement of communications between midwives and pregnant women and humanization of deliveries (including improvement of health facilities) are required. ● The most popular health information source in rural areas is health centers.	● Enhance health centers in rural areas as health information hubs ● Deploy midwives to health centers ● Improve facilities of health centers ● Promote utilization of health centers ● Improve activities of VHSG

Source: Study Team

In the above-mentioned proposed countermeasures, IT utilization might be expected to lead to greater utilization of distance learning (including corresponding to licensing and renewal systems), and enhancement of health centers as health information hubs (promotion of utilization of health facilities), and greater utilization of geographic information systems.

Table 4.5 Countermeasures to MCH issues and IT utilizations (outline)

Proposed countermeasures	Contents and Objectives	IT Utilizations
Improve educational contents to secondary midwives	<ul style="list-style-type: none"> ● Improve educational materials ● Interconnect pre-service and in-service training 	<ul style="list-style-type: none"> ● Distance learning (a part of education)
Improve in-service training for midwives	<ul style="list-style-type: none"> ● Promote MCAT ● Aggregate existing in-service training 	<ul style="list-style-type: none"> ● Distance learning (a part of education)
Improve “bridge program” from primary midwives to secondary midwives	<ul style="list-style-type: none"> ● Improve educational materials ● Utilize capability evaluations and training records of midwives 	<ul style="list-style-type: none"> ● Distance learning (a part of education)
Optimize deployment of midwives	<ul style="list-style-type: none"> ● Map capability evaluations and training records of midwives with their locations ● Optimize deployment of midwives and arrange desirable referral destinations 	<ul style="list-style-type: none"> ● Geographical Information systems
Establish licensing and renewal systems for midwives	<ul style="list-style-type: none"> ● Establish licensing systems ● Establish licensing renewal systems 	<ul style="list-style-type: none"> ● Distance learning (prepare educational materials for licensing and renewal systems)
Enhance health centers in rural areas to health information hubs	<ul style="list-style-type: none"> ● Enhance information handling functions of health centers to promote utilization of health facilities ● Enlightenment of mothers and children in rural areas 	<ul style="list-style-type: none"> ● Enhance health centers to health information hubs (promote utilization of health facilities)

Source: Study Team

4.5.2 Proposed IT Utilizations

(1) Distance learning

Distance learning can be used for pre-service education to secondary midwives, in-service training to midwives, “bridge-program” from primary midwife to secondary midwife, and corresponding licensing renewal systems etc. In recent years, educational materials are made on computers as electronic data (data files), so those materials can be used for distance learning with few modifications (also for aggregation of in-service training by donors or developing partners).

There are various methodologies in distance learning, but it is hard to measure “which is the best for education for midwives”. Also motivation for learning should be aroused, since distance learning requires self-responsibility.

Table 4.6 Typical Distance Learning Styles

Methodologies	Features
Blended learning	Educational materials or instructions provided online are partially used in education.
Flipped classroom	Flip lectures and homework in blended learning.

Methodologies	Features
	It is regarded that lectures (explanations) are preparation and homework (applied questions) are learned in the classroom with interactions (effective to learners with awareness of the issues). ¹⁹⁶

Source: Study Team

UNICEF supports improvement of in-service training for midwives by making them competency-based trainings (CBT) as described previously. CBT is one of the methodologies that are mainly used in vocational education¹⁹⁷; set occupational standards consist of attainment criteria for each required skill and knowledge area in certain jobs, and skills are found to develop by checking personal capabilities against occupational standards. IT might be utilized to manage personal portfolios (personal training records management) and to show items to learn by checking personal portfolios against occupational standards.

(2) Enhancement of Health Centers to Information Hubs

IT is useful to connect health centers (in charge of providing health information to people) and administrative organizations (OD, PID, etc.). Deployment computers and internet connections to health centers are beginning to use computerized NHMIS from health centers. That infrastructure (computers and internet) are not planned except those which NHMIS use, but it should be used for other purposes interactively.

It is said that one of the important factors for reducing maternal deaths in Cambodia is setting health centers that provide health services 24 hours a day. Also MCH services provided by midwives need to improve to reduce maternal deaths.

Therefore, health centers are enhanced by providing computers and internet connections (and power supply such as a solar power system as appropriate) to be a “health information hub”, to provide appropriate health information to midwives and local residents

(3) Geographic Information Systems (GIS)

Monitoring of communicable diseases and infectious diseases are known as typical applications of GIS¹⁹⁸. But here, locations of hospitals and health centers, capability evaluations and training records of midwives and deployment of midwives are integrated on GIS to enhance other plans of IT utilization.

Collaterally, GIS might contribute to set adequate deployment of medical institutions or health professionals and to optimize referral destinations in each province.¹⁹⁹

4.6 Business Propositions

4.6.1 Introduction of Distance Learning

Midwives are prompted to learn on LMS (Learning Management Systems) with educational materials (consisting of animations and/or movies to help understanding) that are authorized by

¹⁹⁶ Japanese Cognitive Science Society, 29th meeting in 2012; p10-20

¹⁹⁷ Technical cooperation project by JICA: Technical and Vocational Education and Training Support Project in Ghana (<http://www.jica.go.jp/project/ghana/0604633>)

¹⁹⁸ <http://www.healthmap.org/en/>

¹⁹⁹ Studied at Division of International Health (Public Health), Graduate School of Medical and Dental Sciences, Niigata University

the MoH. Also, e-mails or SNS are provided as lines of communication to alleviate shortages of human resources (of instructors or teachers) and to reduce the burden on them.

Moreover, interactive communication and information (animations, movies and texts) delivering functions via the Internet should be utilized to enhance interconnections between midwives (not only at each health center, but also between health centers and referral hospitals). It is possible that good practices of MCAT or online MCAT can be delivered via the internet.

In the near future, it is expected that the sustainability of distance learning will be secured by setting the required credits for license renewal of midwives²⁰⁰, and the possibility of opening up business opportunities to the private sector (in/out of Cambodia) to make or provide educational materials. Also, distance learning should be introduced to RTC as one of the learning methods. Teachers and learners will be able to utilize distance learning for in-service training by getting used to distance learning from the pre-service educational period.

It is regarded that EmONC and/or family planning as high demand training subjects to boost the effectiveness of face-to-face skill practices, by utilizing distance learning for preparations. For examples:

- Corresponding to massive bleeding after delivery
- Corresponding to eclampsia
- Corresponding to protracted delivery (difficult delivery)
- Resuscitation of newborn infant
- Family planning

Trial and error is often required to develop educational contents for distance learning or to implement distance learning.

But LMS is also good for management of personal portfolios and items to learn, by checking personal portfolios against occupational standards after educational contents (curriculum) have adopted CBT.

Furthermore, it is observed in Japan that distance learning will be a part of formal education in high school (set schedule by 2015), e-learning will be utilized for renewal of national licenses (set schedule by June of 2014), and computerization of schoolbooks with a screening system (set schedule by 2016). Technologies and knowledge of IT-enabled education (distance learning or e-learning) will be widely available after IT-enabled education is set in formal educational systems in Japan²⁰¹.

4.6.2 Enlightenment of Mothers and Children in Rural Areas to Promote Utilization of Health Facilities

Although proper skills of midwives, medicines and medical equipment completed in health centers shall be implemented, it is expected that neonatal mortality and maternal mortality will be reduced by promoting ANCs, PNCs, delivery at medical institutions and family planning that come from the utilization of health facilities by women in rural areas.

Therefore, health centers are enhanced by providing computers and internet connections (and power supply such as solar power system as appropriate) to be a “health information hub” to provide proper health information to midwives and women in rural areas²⁰². In this case,

²⁰⁰ Not in medical field, but a similar case example in Japan; distance learning as a part of credits for renewal of teaching certificates provided by the Japan Open University

²⁰¹ “A Proposal of integrated action plans to spreading IT use by systematic reforms”, IT Strategy Headquarters, Prime Ministers of Japan and His Cabinet; December 20, 2013

²⁰² According to Media Index Report (UNICEF: 2012: Draft), people in rural areas regard health centers as most reliable source of healthcare information.

information consisting primarily of animations and movies should be delivered to women and VHGS to help their understanding.

It is possible to incorporate home-visiting activities by midwives with EMR and network-enabled tablet computers (just like "Wireless Access for Health" in the Philippines²⁰³) in the case of conducting a pilot project to limited areas.

Regarding providing health information to women and VHGS in rural areas via SMS or IVR, it might be very difficult to implement due to the lack of popularity of non-voice services and personal expenses issues (the charge of mobile phones is shouldered by individuals). After standardization of Khmer language input/output support on IT devices, it will be possible technically.

²⁰³<http://lifestyle.inquirer.net/99509/mobile-midwife-taps-technology-to-improve-health-care>

5. The Philippines

5.1 Maternal and Child Health Situation

5.1.1 Country Profile

The Republic of the Philippines (hereafter “the Philippines”) is located in Southeast Asia. It is an archipelagic country composed of 7107 islands. These islands are divided into three main islands; Luzon, Visayas and Mindanao. The population of the Philippines was 94,013,200 in 2010²⁰⁴, and 48.9% of the population have lived in urban areas. The total Fertility Rate (TFR) is 3.30 in 2008, which means there is a natural increase of population. The literacy rate for women is higher than that for men (88.7% for women and 84.2% for men).

(1) National Health Policy

The Department of Health (DoH) has established “2011-2016 National Objectives for Health” in 2011. The National Objectives set the health program goals, strategies, performance indicators and targets to achieve Universal Health Care (UHC) by 2016. The National Objectives provide guidance to all stakeholders in order to attain three strategic goals for the health sector; to ensure protection against financial risk, to ensure access to high quality health facilities, and to ensure the achievement of the health related Millennium Development Goals, especially a decrease in the Infant Mortality Rate, the Maternal Mortality Ratio and the incidence of infectious diseases, such as TB, HIV/AIDS and Malaria.

(2) Health Administration

The DoH devolved responsibility for administration and management of health services to local governments through the Local Government Code (LGC) (Republic Act 7160) issued in 1991. The LGC has allowed provincial governments to manage provincial health facilities and district health facilities, and municipal offices to manage Rural Health Units (RHU) and Barangay Health Stations²⁰⁵. As a result, local governments have had a technical and financial burden imposed, such as the supply of quality health services, the development of a referral system, organizing health information, development of human resources, and the procurement of medicines²⁰⁶.

The following are the roles of the DoH after decentralization²⁰⁷.

- (1) To establish health policies and health programs
- (2) To strengthen the capacity of development partners through technical support
- (3) To leverage performance for high priority health programs
- (4) To develop and enforce regulatory policies and standards
- (5) To provide specific programs that affect large areas of population
- (6) To provide specialized and tertiary level care

(3) Local Governments

The local governments are divided into 17 regions, which include 78 provinces administered by provincial authorities, 138 cities and 1,496 municipalities controlled by mayors, and 42,025 barangays or villages administered by barangay chairpersons²⁰⁸.

²⁰⁴ WHO Western Pacific Region Health Databank, 2011 and WHO World Health Statistics 2013

²⁰⁵ local health systems inter-local health zones, a new approach to reform, n.d.

²⁰⁶ local health systems inter-local health zones, a new approach to reform, n.d.

²⁰⁷ the Philippines health system review, 2011

²⁰⁸ the Philippines health system review, 2011.

Provincial Government

Provincial governments have the authority to provide health care services at provincial and district hospitals, called secondary health facilities, and they organize the supply of health services at Rural Health Units (RHUs) and Barangay Health Stations (BHSs) in their provinces²⁰⁹.

City and Municipal Governments

City and municipal governments take charge of the provision of maternal and child health services, nutrition services and primary care including direct health care services. In the 1950s, Rural Health Units (RHU) were established in each municipality to improve access to health services²¹⁰. City and municipal governments manage public health facilities, such as RHUs and BHSs²¹¹.

(4) Field Health Service Information System (FHSIS)²¹²

The DoH has established the Field Health Service Information System (FHSIS²¹³) to gather information for monitoring health programs. The FHSIS, under the jurisdiction of Executive Order 352²¹⁴, is in place as a measure to gather health information for statistics by the National Statistics Coordination Board (NSCB).

The FHSIS is a system based on health facilities, and it aims to gather a variety of health information from BHSs and RHUs, as well as to support the decision making of the governments. Private health facilities and clinics run by NGOs providing similar health services as BHSs and RHUs are not targets of the FHSIS. The contents, objectives and importance of the system are described in Table 5.1 in accordance with the literature²¹⁵.

Table 5.1 Contents, Objectives and Importance of the FHSIS (Summary)

Contents	<ul style="list-style-type: none"> ● Information network system managed by the DoH ● System which copes with needs of staff at the DoH and Local Government Units (LGUs) which administer and control public health facilities in their target regions ● System for monitoring supply of health services throughout the whole country
Objectives	<ul style="list-style-type: none"> ● To provide data on supply of health services and program achievement indicators at barangay, municipality/city, district, provincial, regional and national levels ● To provide data which can be used for monitoring and evaluating programs ● To provide standardized, facility level database which can be used for in-depth studies ● To reduce the burden of recording and reporting at the service delivery levels and health providers at the levels afford the time for health service provision and outreach
Importance	<ul style="list-style-type: none"> ● Helping local governments to decide public health priorities ● Base for monitoring and evaluating health program implementation ● Base for planning, budgeting, logistics and making a decision at all levels ● Source to detect abnormal occurrence of a disease ● Source to monitor health situation at community levels ● Useful information for midwives to follow up with patients

²⁰⁹the Philippines health system review, 2011.

²¹⁰the Philippines health system review, 2011.

²¹¹local health systems inter-local health zones, a new approach to reform, n.d.

²¹²http://nec.doh.gov.ph/index.php?option=com_content&view=article&id=59&Itemid=78

²¹³DoH, MNCHN strategy manual of operations, 2011.

²¹⁴ <http://www.nscb.gov.ph/ru5/statlaws/eo352.html>

²¹⁵DOH, Electronic field health service information system Manual of operations, 2011.

	<ul style="list-style-type: none"> ● Helping RHM(Rural Health Midwife) and PHN(Public Health Nurse) create a report about their daily activities
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Source: DoH, Electronic field health service information system Manual of operations, 2011

The FHSIS was established by the DoH in 1987, and then it expanded throughout the Philippines from 1989 to 1990. In 1996 the DoH modified the FHSIS to adjust the situation after the Local Government Code (LGC) was issued, and revised it to strengthen its function in 2001. An evaluation, performed in 2004, revealed that some problems had been left after the system was modified. For example, data was incorrect and incomplete, and the timing of reporting was late. It found that strengthening the support system of the FHSIS, such as support by policy, establishing guidelines of the FHSIS, training skilled data entry workers, and appropriate allocation of budget was necessary.

After 2005, the DoH has revised the FHSIS in obedience with advice from an advisory committee composed of a manager of the National Center for Disease Prevention and Control, and officers at RHUs and LGUs. Additionally, the DoH conducted a survey on the needs of the health information system and revised indicators, and then FHSIS (2008 version) was completed. From January 2011, the FHSIS (2008 version) was partly computerized, and called Electronic FHSIS (EFHSIS), by the National Epidemiology Center under the jurisdiction of the DoH.

5.1.2 MCH Policy

The DoH issued “Implementing Health Reforms for Rapid Reduction of Maternal and Neonatal Mortality” (Administrative Order 2008-0029) because the delay in reduction of the Maternal Mortality Ratio (MMR) and the Neonatal Mortality Rate (NMR) led to difficulty in achievement of the MDGs²¹⁶. The DoH announced MNCHN Strategy Manual of Operations in order to guide LGUs.

MNCHN Core Package of Services, described in the MNCHN Strategy Manual of Operations, guides the provision of effective health services for the reduction of maternal and neonatal mortality and improvement of the health situation. The MNCHN Core Package of Services is provided at each life stage; pre-pregnancy, pregnancy, delivery, post-partum and newborn as below.

Table 5.2 MNCHN Core Package of Services²¹⁷

Life Stage	The Contents of MNCHN Core Package
Pre-Pregnancy	Provision of iron/folate tablets, health education in family planning and healthy life, provision of contraceptive methods, prevention and management of infectious diseases and other diseases
Pregnancy	Recommendations on taking antenatal care (ANC) during early pregnancy period and taking ANC at least four times during pregnancy Purpose: <ul style="list-style-type: none"> • To detect and control danger signs and complications of pregnancy • To provide iron/folate tablets for three months • To provide tetanus vaccines (twice) • To counsel healthy life and breast feeding • To prevent and manage infectious diseases • To provide oral care
Delivery	Assisting delivery at health facilities by skilled birth attendants Possible health care services at health facilities are below.

²¹⁶DoH, MNCHN strategy Manual of Operations 2011, 2011.

²¹⁷DoH, MNCHN strategy Manual of Operations 2011, 2011.

Life Stage	The Contents of MNCHN Core Package
	Using partogram, proper management of complications of pregnancy and abnormalities of infants, access to Basic Emergency Obstetric and Newborn Care (BEmONC) and Comprehensive Emergency Obstetric and Newborn Care (CEmONC)
Post-partum	Postnatal care services are provided to mothers and their children within the first 72 hours and the seventh day after delivery date. The postnatal care services include observing bleeding and signs of infection, provision of supplement Vitamin A and contraceptive methods and explanation of breastfeeding.
Newborn Care (the first week)	During the first ninety minutes, health care providers wipe newborns and promote skin to skin contact, do cord clamping and help with breastfeeding.
Child Care	Provision of immunization and micronutrients (Vitamin A and Iron), helping exclusive breastfeeding and continuous breastfeeding with weaning foods until two years, Integrated Management of Childhood Illness (IMCI), Prevention of injuries, and provision of oral care and chemically treated mosquito nets

Source: MNCHN strategy Manual of Operations 2011, 2011

5.1.3 General Situation on MCH

As for maternal and child health indicators, the under five mortality rate and Infant Mortality Rate (IMR) have smoothly decreased for the past 15 years. In 2012, the IMR is 24 per 1000 live births and the under five mortality rate is 30 per 1000 live births. It is probable that the MDG to “reduce by two-thirds, between 1990 and 2015” will be achieved by 2015. (In 1990, the IMR was 41 per 1,000 live births, and the under five mortality rate was 59 per 1,000 live births).²¹⁸

While the Maternal Mortality Ratio (MMR) has recently decreased, it is hardly probable that the MDG 5; “the MMR reduce to 52 per 100,000 live births by 2015²¹⁹ (170 per 100,000 live births in 1990, 99 per 100,000 live births in 2010²²⁰”. Although Antenatal Care (ANC) coverage (at least one visit) was high (91.1% in 2008), the overall coverage (more than four visits) was low (77.8% in 2008)²²¹. In that year, both rates of deliveries at health facilities and births attended by skilled health personnel were low (44.2% and 62.2% respectively²²²). According to the DoH, in 2009 the causes of maternal deaths were complications related to pregnancy and deliveries (41%), pregnancy-induced hypertension (PIH) (32.1%), postpartum hemorrhage (PPH) (17.9%), abortion (8.9%) and antenatal hemorrhage (APH) (0.2%)²²³. Most of the deaths could be prevented if these births were attended by skilled health personnel.

As for infant and child immunization, in 2010 the immunization coverage against BCG, DPT3, Hepatitis B3 and POL are 88%, 86%, 70% and 86%, respectively²²⁴. The infant and child immunization coverage is around 80% and the immunization program has room for improvement.

Regarding nutrition, 42.5% of pregnant women in 2008 are anemic and the percentage of low birth weight infants is 19.6%²²⁵. Additionally, 26.2% of children aged less than five years have a problem of low weight. The percentage of exclusive breastfeeding until six months has decreased and it is about 34%.

²¹⁸WHO, Global health observatory data repository, 2013.

²¹⁹MDG achievement fund, The MDG-F in the Philippines country evaluation report full revised version, 2013.

²²⁰WHO, Global health observatory data repository, 2013.

²²¹WHO, Global health observatory data repository, 2013.

²²²National statistics office, National demographic and health survey 2008, 2009.

²²³DoH, Maternal deaths by main cause, 2011.

²²⁴WHO, Global health observatory data repository, 2013.

²²⁵National statistics office, National Demographic and Health Survey 2008, 2009.

5.2 Situation and Challenges of MCH

As mentioned above, the MNCHN Core Package of Services includes health care services in accordance with each life stage, and it is thought that the package is effective for the reduction of the MMR and the under five mortality rate, and for the improvement of the health situation. However, there are no health facilities which have provided all health care services²²⁶. According to the literature, maternal and child health services such as antenatal care, deliveries at health facilities and family planning are not appropriately provided for in rural areas.

5.2.1 Antenatal Care

The contents of antenatal care services (measuring blood pressure, urine examination, blood examination, provision of iron tablets and explanation of complications) are different between health facilities in urban and rural areas²²⁷. For example, while the percentage of measuring blood pressure is 95.9% in urban areas, that of measuring blood pressure in rural areas is 89.9%. In the same way, the percentages of provision of the services in urban areas are higher than those of provision of the services in rural areas (urine examination; 68.8% vs. 39.9%, blood examination; 60.7% vs. 32.7% and explanation of complications; 72.3% vs. 65.4% respectively.) As for the reasons why these differences occur, there is not only a lack of medical equipment but also lack of knowledge and skills of health care providers.

According to the Manual of Operations, a Community Health Team (CHT) is in charge of providing health information and basic health services (antenatal care services, family planning postnatal care services, and so forth) to people at Barangay level, which is the smallest administrative division in the Philippines.

A CHT is a group composed of a midwife and several health volunteers, such as Barangay Health Workers (BHW), Traditional Birth Attendants (TBA), Barangay Officials and representatives of NGOs, and a midwife leads a CHT²²⁸. In the current situation, a midwife leads four CHTs, which means that the number of midwives is not enough²²⁹.

An increase in the number of midwives and an improvement of their knowledge and skills are essential in order to improve the quality of maternal and child health services.

5.2.2 Deliveries at Health Facilities

The percentage of deliveries at health facilities is 59.2% in urban areas and 29.8% in rural areas²³⁰. In the rural areas, about 70% of women deliver at home and women who are poor and obtain no education tend to opt to give birth at home²³¹. As for birth attendants, the percentage of births attended by skilled health personnel in urban areas is higher than that of births attended by skilled health personnel in rural areas (77.5%, 47.7%, respectively)²³². In regions where the percentage of births attended by skilled health personnel is lower, the percentage of births attended by Hilot is higher. Two-thirds of the causes of maternal deaths tend to occur during deliveries and within

²²⁶DoH, MNCHN strategy Manual of Operations 2011, 2011.

²²⁷National statistics office, National Demographic and Health Survey 2008, 2009.

²²⁸<http://www.doh.gov.ph/sites/default/files/Aquino%20Health%20Agenda%20-%20Universal%20Health%20Care.pdf> (Administrative Order No.2010-0036)

²²⁹Byrne A. et al, Context- specific, evidence-based planning for scale-up of family planning services to increase progress to MDG 5: health systems research, 2012.

²³⁰National statistics office, National Demographic and Health Survey 2008, 2009.

²³¹National statistics office, National Demographic and Health Survey 2008, 2009.

²³²National statistics office, National Demographic and Health Survey 2008, 2009.

48 hours after deliveries²³³. Therefore, an increase in the percentage of births at health facilities is important to reduce the MMR.

5.2.3 Family Planning

In the Manual of Operations, the MNCHN Strategy is announced, and one of the results from the strategy is that “every pregnancy is wanted, planned and supported²³⁴.” In 2011, the Total Fertility Rate (TFR) is 3.3 and about 30% of women give birth to their next baby within two years²³⁵, which means that appropriate family planning is not undertaken.

According to the results of the survey of married women²³⁶, although 98.6% of them know modern contraceptive methods, only 34.0% of them use these methods. While the main reasons why married women from 15 to 29 years old do not use the methods are “health concerns” (26.5%) and “fear of side effects” (23.3%), those of married women from 30 to 49 years old are “health concerns” (19.6%) and “menopausal/had hysterectomy” (18.1%). The percentage of married women who informed about side effects or other methods that could be used was about 60%, and the public sector, such as RHUs and BHSs provide more information about family planning to these women²³⁷. In the public sector family planning services are provided without charge²³⁸.

After the Local Government Code (LGC) was issued in 1991, some problems have occurred due to a lack of budget and the lowering of the capacity of management. For instance, “contraceptive methods are not properly distributed”, “the proportion of midwives who take renewal training of family planning is low” and “the quality of family planning services provided is low.”²³⁹

Additionally, when family planning is implemented, the relationship between religion and family planning should be considered. In the Philippines, the official state religion is the Catholic faith, and it recognizes only a Natural Family Planning Method as a contraceptive method. Thus, there are regulations which restrict the use of contraceptive methods depending on the region²⁴⁰. Against this situation, the Responsible Parenthood and Reproductive Health Act of 2012 (Republic Act No.10354²⁴¹) was issued on December 21, 2012. Abortion is illegal, but wide options of contraceptive methods, family planning to adolescents, and practical training for health administrative staff are legally recognized.

5.3 Solutions for Maternal and Child Health Challenges

In accordance with the above mentioned maternal and child health situation and issues, it is necessary to improve the quality of health services provided by midwives, who are in charge of the provision of maternal and child health services in rural areas, and to increase the number of midwives. The DoH has already implemented diverse measures to solve these issues. For example, there is the MNCHN Service Delivery Network which promotes cooperation among health care providers or health facilities in rural areas, an Inter-Local Health System to share

²³³Campbell OMR & Graham W, Strategies for reducing maternal mortality: getting on with what works, 2006.

²³⁴DoH, MNCHN strategy manual of operations, 2011. p3.

²³⁵National statistics office, National Demographic and Health Survey 2008, 2009.

²³⁶National statistics office, National Demographic and Health Survey 2008, 2009.

²³⁷National statistics office, National Demographic and Health Survey 2008, 2009.

²³⁸National statistics office, National Demographic and Health Survey 2008, 2009.

²³⁹Byrne A. et al, Context- specific, evidence-based planning for scale-up of family planning services to increase progress to MDG 5: health systems research, 2012.

²⁴⁰Byrne A. et al, Context- specific, evidence-based planning for scale-up of family planning services to increase progress to MDG 5: health systems research, 2012.

²⁴¹ <http://www.gov.ph/2012/12/21/republic-act-no-10354/>

human resources and budget in each health district for the provision of quality health services, and the Rural Health Midwives Placement/Midwifery Scholarship Program of the Philippines²⁴².

Whether pregnant women visit health facilities to obtain the MNCHN Core Package of Services depends on knowledge about health care services of these women and their families, awareness of their health and entering insurance for poor families²⁴³. Therefore, it is necessary to strengthen the function and management of the FHSIS in order to comprehend the situation on the provision of health services and information about pregnancy and deliveries in each community. It is expected that pregnant women and their families obtain health education and health information in accordance with each pregnancy period or postpartum period.

The responsibility of the administration and management is devolved to the local governments because of the LGC, and subsequently the capacity of the administration and management of health services has decreased. As a result, essential medicines and equipment like contraceptive methods are not allocated to rural areas. Improving the supply system to health facilities is necessary in order to ensure the provision of maternal and child health services.

5.4 IT Situations in the Philippines

5.4.1 Telecommunications Infrastructure

(1) Fixed-line Telecommunications in the Philippines

PLDT (70% of market share), Globe (20% of market share) and Bayantel (10% of market share) are operating fixed-line telecommunication services in the Philippines. The penetration rate of fixed-line telecommunications is relatively low (6.78 million subscribers, the ratio of the population is 7.2%), since the national land consists of a lot of islands. So, subscribers to broadband internet services are limited to 1.79 million, the ratio of the population is 1.9%.

(2) Mobile Telecommunications in the Philippines

Mobile operators	Subscribers	Notes
Smart Communications	67.6 million	NTT communications and NTT DOCOMO are big shareholders of PLDT. PLDT is the parent company of Smart communications. ²⁴⁴
Globe Telecom	31.4 million	Globe Telecom is under Ayala conglomerates (local), head shareholder is a Singapore company.

The “service area scheme” has been introduced to international telecom companies and mobile operators since 1995. That scheme requires newcomers (international telecom companies and mobile operators) to build 400 thousand local loops at least, and 1 telephone line for rural areas per 40 telephone lines for urban areas²⁴⁵. Also, mobile operators are required to submit access contracts (to ensure interoperability with other mobile operators) to the authorities to obtain operating licenses.

Mobile broadband internet connections have been growing popular at urban areas, such as both the mobile operators providing LTE services (high-speed data communications) since September 2012.

²⁴² <http://www.doh.gov.ph/content/rural-health-midwives-placement-program-rhmpp-midwifery-scholarship-program-philippines-mspp.html>

²⁴³ DoH, MNCHN strategy manual of operations, 2011.

²⁴⁴ http://www.nttdocomo.co.jp/info/news_release/2011/05/13_00.html

²⁴⁵ <http://www.soumu.go.jp/g-ict/country/philippines/detail.html>

5.4.2 The Private Sector

The Philippines is the biggest English speaking area in Southeast Asia and has the 3rd largest English speaking population in the world. So, the Philippines is the first voice service deposit (call center or contact center), and the second BPO (Business Process Outsourcing) deposit in the world.

In the Philippines, the IT services industry is called “IT/BPM (Information Technology and Business Process Management) industry”, and consists of Call centers, BPO, Software development, IT outsourcing, Medical information management, engineering services, creative outsourcing, and game development etc. It has produced 760 thousand jobs and 13 billion sales (5% of GDP).

Industry groups are organized by each professional area. For example, HIMOAP²⁴⁶ (Healthcare Information Management Outsourcing Association in the Philippines) has been organized by companies which originally accepted Medical Transcriptions²⁴⁷ as outsourcing.

Japanese IT firms (mostly software development and engineering services) have been conducting off-shore development in the Philippines since the 1990s. 120 Japanese firms are operating in IT industrial parks authorized by PEZA (the Philippines Economic Zone Authority) as of July, 2013. And, the Philippines Chamber Commerce & Industry²⁴⁸ in Japan has a design & software department that consists of IT firms.

SIG-Japan of PSIA (the Philippines Software Industry Association)²⁴⁹ consists of local enterprises that are interested in the Japanese market, conduct dialogues with Japanese industry groups, or participate in trade fairs in Japan. The PSIA plays an active part in popularizing Japanese ITSS (IT Skill Standards) in the Philippines.

5.5 eHealth in the Philippines

5.5.1 Policies of eHealth

The National eHealth Strategic Framework, 2010-2016 was announced in the first National Health sector conference in March, 2011. The framework declared IT utilization for providing healthcare services, management of the health sector, and improvement of health educations. The framework consists of following 5 objectives:

- (1) Build a legal framework for e-Health implementation
- (2) Streamline processes of providing healthcare services and their management, and create new processes or methods to implement those services
- (3) Build integrated health information systems
- (4) Build institutionalized knowledge management systems for knowledge sharing and utilization, especially at local level
- (5) Provide better healthcare services to remote areas to support achieving the MDGs, and spread information to people and health professionals by utilizing ICT/IT

5.5.2 Unified Health Management Information System (UHMS)

The UHMS is aimed at integrating a lot of health information systems (data collection, reporting, providing information, etc) in the DoH.

²⁴⁶ <http://www.himoap.com/>

²⁴⁷ Mainly, converting voice-recorded reports as dictated by physicians or other healthcare professionals into text format.

²⁴⁸ <http://www.jccipi.com.ph/>

²⁴⁹ <http://www.psia.org.ph/>

Regarding IT utilization in the DoH, progress status of the Unified Health Management Information System (UHMIS)²⁵⁰ was announced at “ICT Project Updates from Government CIOs” session of NiCT Summit 2013 in Manila in July, 2013²⁵¹.

Table 5.3 shows outlines of each component of UHMIS. In those components, WOMB (Watching Over Mothers and Babies) in Clinic Information Systems is a related item of MCH.

EDPMS (Electronic Drug Price Monitoring System) and EFHSIS (Electronic Field Health Service Information System) have enabled to submission of reports by uploading data via websites of UHMIS.

Table 5.3 Components of UHMIS

Name of Components	Outlines	Progress Status	Legal Basis
Integrated Hospital Operations, Philhealth eClaims, and Management Information System	Integrated and comprehensive information system designed to manage the medical, clinical, administrative, services, and financial aspects of a hospital. It complies with the requirements of Philhealth eClaims System on online membership verification, claims processing and online submission, and online status verification.	Implemented at 42 hospitals and 51 hospitals within 2013	AO 44s (1999)
Clinic Information System	Integrated and comprehensive information system designed to manage the medical, clinical, and services aspects of a rural health unit, barangay health station, or clinic. It will also include the requirements of Philhealth.	Online & Offline : 1,250 RHU/HC, year-end	
Watching Over Mothers and Babies	A component of Clinic Information System; registers pregnant mothers and newborns/ babies, tracks and monitors their status; reminds services to be availed of; with tablet application.	Ongoing Development, pilot test in 6 municipalities	
Integrated Chronic Non-communicable Disease Registry	National registry of persons with chronic non-communicable diseases.	For nationwide implementation in July 2013	AO 2013-0005 AO 2011-0003
Online National Electronic Injury Surveillance System	National registry of injury related cases including fireworks where data are submitted on a daily basis.	Operational in at least sentinel hospitals	AO 2013-0005 AO 2007-0010
Violence Against Women and Children Registry	National registry of women and children who are victims of violence.	For nationwide implementation in June 2013	AO 2013-0005
Integrated Tuberculosis Information System	Harmonized system of the Philippine Electronic Tuberculosis Registry (Phil-ETR) and Electronic Tuberculosis Manager (e-TB Manager); Patient-based system of collecting cases on tuberculosis.	Ongoing Nationwide Implementation (Pilots - Regions 3, 6,10 & NCR)	EO 187s 2003

²⁵⁰ <http://nicts Summit.org/wp-content/uploads/Crispinita%20Valdez.pptx>

²⁵¹ <http://uhmis1.doh.gov.ph/UnifiedHMIS/>

Name of Components	Outlines	Progress Status	Legal Basis
Electronic FHSIS (EFHSIS)	National reporting of field health services program on Maternal Care (Prenatal, Post Partum, Family Planning), Child Care & Health (like Expanded Program on Immunization), Control of Diarrheal Diseases, Nutrition, Malaria, Schistosomiasis, Leprosy, Dental Health, Environmental Health, Notifiable Diseases, and others.	Operational nationwide (Online & Offline)	RA 3573 EO 352s 1996 AO 2011-0010
National Blood Bank Network System – Stock Availability Reporting System	National registry of available or stocks of blood	Ongoing nationwide implementation (Online)	RA 7719
DOH Integrated Licensing Information System	Supports the licensing/accreditation systems of the Bureau of Health Facilities and Services and the Bureau of Health Devices and Center for Device Regulation, Radiation Health, and Research, and harmonizes with the FDA Integrated Information System.	To replace existing system for hospital licensing ;Ongoing Development	
Health Facility Enhancement Program Tracking System	Reporting, monitoring, and tracking of improvements in health facilities (government hospitals, health centers and barangay health stations) to sufficiently provide for emergency and primary care services.	Operational in 17 regions (Online)	
Electronic Drug Price Monitoring System	National collection of drug prices and inventories from pharmaceutical companies and drug outlets.	Operational (Online & Offline)	RA 9502 RA 7581 AO 2011-0012
Adverse Drug Online Reporting System	National registration of adverse drug reactions from hospitals.	Ongoing nationwide implementation	Patient Safety Program
Monitoring the Violations of 100% Smoke-Free Philippines	Public reporting of infringements under the legal provisions for smoke-free environment including the options of reporting by SMS, online reporting through the Internet or through telephone hotline.	Operational (Online)	
Integrating Drug Test Operations and Management Information System	National and integrated system of accrediting drug testing laboratories and rehabilitation centers, drug testing operations, confirming drug test results, monitoring and evaluation of drug testing operations.	Operational: 1200 DTLs (Online & Offline)	RA 9165 AO 2008-0025
Web-based Public Assistance Information System	System that monitors the referral outcomes and Indecency Fund utilization of DOH Special, Specialty and Retained Hospitals to support the medical needs of selected indigents through the Public Assistance Unit of the Office of the Secretary.	Operational in most DOH hospitals (Online)	AO 2010-0026

Name of Components	Outlines	Progress Status	Legal Basis
National Online Stock Inventory Reporting System	National inventory system of all ESSENTIAL commodities purchased/received and distributed by the Materials and Management Division (MMD) of the DOH to the different Centers for Health Development (CHD), Retained Hospitals and other health facilities; purchased and dispensed/distributed by the CHDs and different health facilities (Other than MMD)	Ongoing Implementation (Online)	
National Yellow Prescription Pad System	Tracks and monitors issuance of yellow prescription pads issued by S2 licensed physicians; Online prescription of regulated drugs.	Ongoing Enhancement (Online)	
National Database on Health Human Resource Information System	National system of capturing data on doctors, nurses, midwives, dentists, nutritionists, pharmacists, occupational therapists, physical therapists, medical technologists, and other health providers.	Operational (Online)	
National Health Facility Registry	National registry of health facilities like licensed hospitals, private clinics, drug test laboratories and other health facilities licensed by the Bureau of Health Facilities and Services. It also includes rural health units and barangay health stations.	Operational, with on-going code validation	

Source: Health Information Systems in to Support to Kalusugan Pangkalahatan, at the CIO General Membership Meeting (June 26, 2013)

Notes for Legal bases: AO (Administrative Order), EO (Executive Order). RA (Republic Act)

5.5.3 Other eHealth Related Activities

(1) NTSP (National Telehealth Service Program)

The DoH and the University of the Philippines are in the final stages of public consultation on the Administrative Order on Telehealth which will establish national telehealth services in the country on July 3, 2013²⁵². The telehealth systems through the National Telehealth Services (NTS), will prioritize connecting hospital-based medical specialists and patients in remote and isolated areas in the country, where access to quality medical specialty care is low.

The Administrative Order on telehealth conforms to the provisions of the Data Privacy Act of 2012 to protect the privacy of patients.

(2) RxBox²⁵³

Using RxBox's capability for video consultation, clinical experts can inspect patients and can even assist rural doctors in how to manage or treat their patients. Furthermore, audio signals from

²⁵² <http://one.telehealth.ph/beta/2013/07/17/doh-to-institutionalize-telehealth-systems-in-ph/>

²⁵³ <http://one.telehealth.ph/beta/2011/07/27/pnoy-meets-rxbox/>

a patient's heart, lungs, and abdomen could also be transmitted to help experts diagnose the status of the patient from the health unit²⁵⁴.

The "RxBox" is a portable innovation funded by the DOST's Philippine Council on Health Research and Development (PCHRD) and developed by researchers at the Electrical and Electronics Engineering Institute, and the U.P. National Institute of Physics from the University of the Philippines in Diliman, and the National Telehealth Center. It contains medical devices for taking a patient's electrocardiogram or ECG, heart rate, blood, pulse rate and blood oxygenation. It was unveiled as one of the "7 promising innovations" at DOST's Expo Science in July of 2013.

On February 4, 2014, it was announced that TV White Space Technology (unused radio frequencies between broadcast TV channels) will be provided by the Department of Science and Technology Information and Communication Technology Office (DOST-ICTO) in far-flung areas where connectivity or internet connection is not available, starting with the municipalities of Talibon and Tubigon in Bohol, for the testing of RxBox²⁵⁵.



Source: Yahoo Southeast Asia Newsroom (RxBox)

(3) CHITS (Community Health Information Tracking System) ²⁵⁶

CHITS (Community Health Information Tracking system) is a free and open source software electronic health record system for local government health centers in the Philippines. "CHITS" was created by the University of the Philippines (Manila) through a grant from the International Development Research Centre of Canada since 2004.

There are some proprietary specifications (Philhealth ID for identification of patients, Institutional ID by the DoH for identification of medical institutions etc.) since CHITS is supposed to use in the Philippines. But medical records correspond to HL7 (one of the international standards) to secure interoperability.

CHITS is used for electronic medical records systems in the WAH (Wireless Access for Health) projects. In that project, CHITS has been modified by the project to improve interoperability with FHSIS and to support SMS sending, and to enable use with mobile devices.

5.6 IT Utilizations and Business Propositions in the Philippines

eHealth in the Philippines aims to integrate separately managed health information systems (data collection reporting, information providing etc.) under the name of UHMIS. It will avoid overlaps

²⁵⁴

<http://ph.news.yahoo.com/photos/7-of-the-promising-innovations-at-dost-s-expo-science-2013-1374897086-slideshow/rxbox-photo-1374891425748.html>

²⁵⁵

<http://www.gmanetwork.com/news/story/346994/scitech/technology/tv-white-space-tech-to-be-used-for-health-care-access-in-phl-provinces>

²⁵⁶ <http://chits.ph/>

of functions of health information systems through the effort of the DoH. Negotiations with the DoH will be required to build/implement IT systems to support any component listed in UHMIS.

In other hand, a pilot project for MCH (Wireless Access for Health project) has been conducted and also RxBox has been developed locally.

Track records (or installation records) and results are required to penetrate good practices or applications of new technologies nationwide. JICA can contribute to the expansion of technologies through the use of the technologies in JICA's projects.

6. Recommendations

6.1 Proposed IT Utilization for MCH in Developing Countries

Proposed IT utilizations for MCH based on document investigations and field surveys (Palestine and Cambodia) are summarized as follows. These IT utilizations are not feasible for all developing countries based on “limited” field surveys. Detailed assessments of current situations and demands should be conducted to introduce IT to MCH in individual developing countries

6.1.1 MCH Handbook and eHealth (Palestine)

IT utilizations to promote the MCH Handbook are proposed for Palestine. IT utilizations might assist the enhancement of communications among NCC MCHHB members, promotion of the MCH Handbook utilization in private medical institutions, improvement of medical records entry into the MCH Handbook in medical institutions, to solve issues of the MCH Handbook.

Regarding improvement of medical records entry into the MCH Handbook, the following measures are expected by interconnection between the computerized MCH Handbook and EMR-EHR:

- (1) EMR-EHR includes comprehensive parameters of the MCH Handbook
- (2) EMR-EHR equips functions (or screens) to transfer medical records or parameters to the MCH Handbook
- (3) EMR-EHR equips functions to output PHR (include parameters of the MCH Handbook)

It is expected that these measures are implemented partly or gradually, to promote sustainability and popularization of the MCH handbook.

6.1.2 MCH and eHealth (Cambodia)

IT utilizations to introduce distance learning for midwives and to enlighten mothers and children in rural areas to promote utilization of health facilities based on issues of MCH are proposed for Cambodia

(1) Introduce Distance Learning for Midwives

The introduction of distance learning to improve the quality and quantity of secondary midwives is proposed. Distance learning can be used for pre-service education to secondary midwives, in-service training to midwives, “bridge-program” from primary midwife to secondary midwife, and corresponding licensing renewal systems etc.

Midwives are prompted to learn on the LMS (Learning Management Systems) with educational materials (consisting of animations and/or movies to help understanding) authorized by the MoH. Also e-mails or SNS should be provided as lines of communication to alleviate shortages of human resources of instructors or teachers and to reduce the burden on them. Moreover, interactive communication and information (animations, movies and texts) delivering functions via the Internet should be utilized to enhance interconnections between midwives (not only at each health center, but also between health centers and referral hospitals). It is possible that the good practices of MCAT or online MCAT can be delivered via the Internet.

Besides development of educational materials for distance learning, the LMS is also good for the management of personal portfolios and items to learn, by checking personal portfolios against occupational standards after educational contents (curriculum) adopting CBT.

Improvement of the quality of education for midwives, the capability of midwives and a reduction in the shortage of secondary midwives are expected by this idea.

(2) Enlightenment of Mothers and Children in Rural Areas to Promote Utilization of Health Facilities

Lower utilization of health facilities are described as one of the reasons for the high level of maternal deaths in rural areas of Cambodia. Therefore, promoting the utilization of health services (health facilities) is proposed.

In this idea, health centers are enhanced by providing computers and internet connections (and power supply such as solar power system as appropriate) to be a “health information hub” to provide proper health information (consisting primarily of animations and movies to help understanding) to midwives, women and VHGS in rural areas.

It may be possible to incorporate home-visiting activities by midwives with EMR and network-enabled tablet computers (just like "Wireless Access for Health" in the Philippines²⁵⁷), in the case of conducting a pilot project to limited areas.

It is expected to reduce the neonatal mortality and maternal mortality by promoting ANC, PNC, delivery at medical institutions and family planning that come from the utilization of health facilities by women in rural areas by this idea.

²⁵⁷ <http://lifestyle.inquirer.net/99509/mobile-midwife-taps-technology-to-improve-health-care>

7. Appendix

7.1 Common IT Utilization

In recent years, business operational strategies have been shifted from individual operational efficiency improvements to restructuring of all operations to improve throughput of business outputs. In other words, they are trying to achieve business improvement by defining the flow of business as a process aggregated of sub-processes, and paying attention to the flow of information or goods between each sub-process. Information Technology (IT) is regarded as a method/tool to accelerate or to automate each sub-process and to streamline delivery and the sharing of information between each sub-process. But the role of improving efficiency and throughput of business operations by using provided or shared information is for humans (business operators).

7.1.1 Standardization of Information

It is considered that implementing IT systems through the combinations of multiple products as the mainstream method, rather than implementing IT systems by a product, since this has complex requirements. So it is becoming important to connect between each component (sub-system). Also, the requirements of utilizing and analyzing stored information are highly demanded.

The standardization of rules to handle information is important, to reduce the cost of connections between each sub-process, and to use stored information continuously; some rules are standardized as international standards, such as ISO. IT systems developers sometimes propose standardization (items and description rule) by referring to other good practices.

7.1.2 IT Systems and Implementation Costs

The ceiling cost of IT systems is determined by the comparison of the potential benefits that are converted to monetary values in ordinary business. In the case of public services, the budget shall limit the cost since public services do not produce direct monetary values or incomes.

In any case, a lower cost of IT systems shall be welcomed, if it allows users to enjoy the same benefits. For this reason, the “Package (Package software)” is highly demanded, since expecting lower cost and quicker deployment than from-scratch (made-to-order) development. The “Package (Package software)” is supplied to the general public to support specific operations or services, so the Package equips functions in accordance with the standards, laws and rules. The good tracking records (installation records) of the Packages are regarded as proof of performance.

It will be required that installation of infrastructures and training of operators/users will fulfill the condition to use the packages. Also, some customizations of the packages will be required to fit current work flow. The customizations shall be minimized as much as possible by changing operational rules or operational structures. Customizations always require surveys of the current situation, and some of full-scratch developments; those activities must increase the installation cost and maintenance cost.

If there are no packages to fit the requirements or operations, the from-scratch (made-to-order) developments of IT systems will be considered; it shall be in accordance with standards, laws or rules that cover business operations. At this time, the “original” standards or rules will be produced if there are no standards, laws or rules, so they will be obstacles to secure interoperability (sharing, migration of information) in the future.

7.1.3 Health care Field and IT

Health care and IT professionals should work together to develop/implement IT systems for health care. But generally, it is very difficult to propose improvements of operations from IT professionals to health care professionals, since the medical practices are “life-threatening” matters.

Moreover, information standardizations for computerization in the health care field is not popular yet. This is one of reasons difficulties in interconnecting EMRs with each other (e.g. Trial project of building seamless health information utilization systems; MHLW of Japan, March 2013²⁵⁸).

For example, the electronic health record systems for clinics are supplied on premises and for each department. There is little choice for the packages for regional medical information systems that are interconnectable (able to estimate concrete installation fees in advance). Also there are no packages to manage the health records at the national level, or to operate the computerized MCH Handbook.

Regarding the computerization of health information systems among surveyed countries; the Palestinian Authority introduces integrated package software (Avesiva) with customizations, UNWRA (UN Relief and Works Agency for Palestine Refugees in the Near East) develops from-scratch software with infrastructures, the Cambodian government expands existing database systems to make them Internet-ready. In all cases, the rule of stored information has been pre-defined (by package, inner requirements and existing databases) and agreed among limited stakeholders before system development or implementation.

7.2 IT Related Regulations and Constraints

7.2.1 Standards and Rules of Information

As already described, IT equipment or software (systems) are developed in accordance with a lot of common standards or rules; this also applies to health information systems.

The promotion committee of electronic health records systems under the Ministry of Health, Labor and Welfare of Japan mentioned three tasks to expand the use of electronic health records systems in May 2005²⁵⁹ as follows:

- Promotion and improvement of standard master dictionary of medical terminology and codes
- Interoperability between different systems and trouble-free data migration between old and new systems
- Incentives to promote standardization

In recent years, on-premises based electronic health records systems are becoming popular, but the information (records) is stored in a different manner in each system. Since information/data exchanges between each system is required, electronic data exchange rules such as MML (Medical Markup Language), HL7 (Health Layer 7), and data storage forms such as SS-MIX (Standardized Structured Medical Information Exchange) have been proposed. Some vendors of electronic health records systems conduct interconnection trials on a voluntary basis²⁶⁰. But actually, huge connection trials are required to connect existing different electronic health records systems with each other.

²⁵⁸ http://www.mhlw.go.jp/seisakunitsuite/bunya/kenkou_iryou/iryou/johoka/johokatsuyou/index.html

²⁵⁹ <http://www.mhlw.go.jp/shingi/2005/05/dl/s0517-4b.pdf>

²⁶⁰ <http://www.ihe-j.org/connectathon>

In the case of the MCH Handbooks in Japan, the Ministry of Health, Labor and Welfare provides standard forms for printing the MCH Handbook²⁶¹, but no standards for electronic data processing or information exchange. There are some electronic forms of MCH Handbook supplied, but they handle information or data in their own way and exchanging/migrating information with other systems is beyond their scope. For this reason, general users of the MCH Handbook (e.g. pregnant women or mothers) feel less secure of long-term usage of computerized MCH Handbooks, as they may move to other local government areas, have troubles with the replacement of devices (computers, Smartphone etc.), discontinuation of software or devices etc. Also, it will be difficult to utilize data to improve the quality of medical services or policies.

The Japan Association of Obstetricians and Gynecologists has announced the establishment of the standardization committee of the computerized MCH Handbook with other organizations and the private sector on January 24, 2014²⁶². The committee will make efforts to establish standard electronic forms of MCH Handbooks. It is expected that the private sector will be able to consider the development of (the package of) computerized MCH Handbooks after populating the standards for electronic processing that is proposed by health care professionals.

7.2.2 Personal Information Protection

Personal information is defined as “any information relating to an identified or identifiable individual (data subject)” in accordance with OECD Privacy Guidelines²⁶³ in this section. Personal information protection must be considered, since very sensitive information will be handled in the field of health. Among surveyed countries, comprehensive legislation of personal information protection (Republic Act 10173: Data Privacy Act of 2012) has been stated only in the Philippines²⁶⁴.

In recent years, personal information protection is regarded as the principal of first-person informed consent (opt-in principals). So agreement from identical persons is required to transfer any personal information to other entities.

Especially, transborder flows of personal information shall be considered when developing internet-based (cloud computing) IT systems. For example, the European Union (EU) stated restrictions in the “General Data Protection Regulation” as “In any event, transfers to third countries may only be carried out in full compliance with this Regulation”²⁶⁵. In the days ahead, some countries are expected to making laws of EU-like personal information protection to promote the outsourcing industry to accept Business Process Outsourcing from the EU.

7.2.3 Constraints of Equipment; Certification Systems and Connection to Commercial Service Networks

IT communication devices (especially wireless devices) often require clearance of the radio act or other related laws of interested countries to use in that country. And such devices shall be connected to service networks (generally, provided by private sectors) in order to use them.

Those certifications or constraints are able to be cleared by procuring equipment or devices from licensed distribution channels, especially from telecommunication operators (e.g. mobile operators).

²⁶¹ http://www.mhlw.go.jp/seisakunitsuite/bunya/kodomo/kodomo_kosodate/boshi-hoken/kenkou-04.html

²⁶² http://www.jaog.or.jp/news/document/info_20140124.pdf

²⁶³ OECD Recommendation of the Council concerning the Guidelines on the Protection of Privacy and Transborder Flows of Personal Data (September 23, 1980)

²⁶⁴ <http://www.gov.ph/2012/08/15/republic-act-no-10173/>

²⁶⁵ http://ec.europa.eu/justice/data-protection/document/review2012/com_2012_11_en.pdf

As well, the wireless LAN (Wi-Fi) is standardized internationally (IEEE 802.11 a/b/g/n...), so technical matters such as interoperability are possible.

[Supposition of the usage of high speed data communications among surveyed countries]

There are 3G or later communication methods by mobile networks and wireless-LAN (Wi-Fi) as the choice to enjoy high speed data communications. The adoption rate (subscribers versus population) of mobile phone 2G and 3G or later communication options among surveyed countries are as follows:

Table 7.1 Adoption Rate of Communication Network Generations

Network Generations	2G	3G or later
Cambodia	120.3%	11.0%
The Philippines	107.5%	8.3%
Palestine	(N/A)	(No 3G or later communication)

Source: InfoCom Research Inc. (March 19, 2013) ²⁶⁶

The numbers of subscribers of 3G or later are relatively low. It supposes a lot of users of smart phones or tablet computers are enjoying internet via wireless-LAN (Wi-Fi).

Generally, Users should purchase 3G (or later) enabled SIM cards or subscribe to Wi-Fi plans from telecommunication operators to enjoy high speed data communication on mobile devices anywhere, but users always should pay attention to communication traffic or pre-paid balances. Indeed, users can choose to go to some places to enjoy free Internet access to save cost.

In real life, 2G enabled SIM cards are inserted into smart phones or tablet computers to enable Voice and SMS, and then users go to some places to enjoy free or very cheap Internet access.

So, if considering the utilization of applications (Internet) for smart phones or tablet computers, response time and usable places should count into constraints. Voice or SMS will be a better choice in some cases in terms of certainty.

7.2.4 Constraints of Equipment; Input/Output of Languages

Telecommunication devices shall support (input/output) languages that are used in the countries. Among surveyed countries, English and Filipino (Tagalog) are used in the Philippines, Arabic and English are used in Palestine, and Khmer and English (French) are used in Cambodia. Most modern telecommunication devices support English and Arabic, also French and Filipino, but there is very limited support for Khmer.

The support for Khmer language is getting better recently, so the penetration of supported devices is the rest of challenge.

Table 7.2 Support for Khmer Language by Operating Systems

Platform	Support
Windows (Microsoft)	Vista (November, 2006) and 7 (October, 2009) or later, support Khmer language by installing language-packs.

²⁶⁶ http://www.icr.co.jp/newsletter/global_perspective/2013/Gpre201324.html

Platform	Support
Mac OS (Apple)	10.7 (July, 2011) or later, support Khmer language.
Android (Google)	Version 4.4 (October, 2013) or later, support Khmer language ²⁶⁷ . By that time, Samsung and LG offered customized support for Khmer language.
iOS (Apple)	Support Khmer language by installing third party software ²⁶⁸ .
Traditional mobile phones	Since 2005, a part of devices support Khmer language, but do not penetrate since lack of interoperability and difficulties of operations.

Source: Study Team

7.2.5 Consideration: Health Care Facilities

Some health care facilities will prohibit the use of telecommunication devices on their premises; considering the effects of radio waves on pregnant women or patients.

7.2.6 Regulation of (Mobile) Applications

Mobile applications are the software that executes on mobile platforms or executes on remote servers but fitting for mobile platforms (web-based). The following table shows general regulations of mobile applications by platform operators.

Table 7.3 General Restrictions for Mobile Applications

Platform	Distribution Channels	Screening or Regulations
iOS (Apple)	iTunes App Store is the official and only distribution channel.	Must clear screenings by Apple ²⁶⁹ and software developers must be registered with Apple in advance. After screening, still apple monitors applications.
Android (Google)	Google Play is the official distribution channel, but can distribute software via any website.	Screening is relatively loose. Also it can distribute software without screenings.

Source: Study Team

Since most of the mobile platforms (and applications) are by U.S. affiliated companies, development and distribution of mobile applications in the field of health care are affected by regulation policies of the authority of medical devices in the U.S. (the FDA - Food and Drug Authority)²⁷⁰. The FDA defines “Medical” mobile applications as follows and regards them as control subjects²⁷¹.

- Mobile applications that are used as an accessory to a regulated medical device
- Mobile applications that transform a mobile platform into a regulated medical device

²⁶⁷

<http://www.open.org.kh/en/press-release-google-produces-khmer-language-phones-integrating-translations-provided-ngo-open-0>

²⁶⁸ <http://apps.khmergadget.com/?app=khmer-keyboardtextpad-free>

²⁶⁹ <https://developer.apple.com/appstore/guidelines.html>

²⁷⁰ <http://park.itc.u-tokyo.ac.jp/mdrrc/info.html>

²⁷¹ Item 201(h) of FD & C Law in U.S.

But the following mobile applications are not included in “Medical devices”:

- Just the electronic version of medical textbooks or references
- Do not relate to specific diseases, and general tracking of health conditions such as diet records
- Automate general clerical work such as medical billings or reservations
- Mobile applications for general use, not for specific medical subjects such as magnifier applications
- Work as electronic health records only

7.3 Business models

Some potential business models take case examples, constraints and sustainability into consideration, and are showed in this section.

7.3.1 A model of Integrated Operations

(1) Outline

This model shows the integration of interconnected Electronic Medical Records (EMR-EHR) and the computerized MCH Handbook (as Personal Health Records: PHR).

Comprehensive EMR systems (in general hospitals and clinics) and perinatal EMR systems (in obstetricians and gynecologists) are interconnected via computer networks and gather data from those EMRs according to uniform rules to a repository. They then output medical records for MCH Handbooks and statistical anonymized information for policy making from this repository. The following system chart is divided into three areas in accordance with information flows and the status of stakeholders.

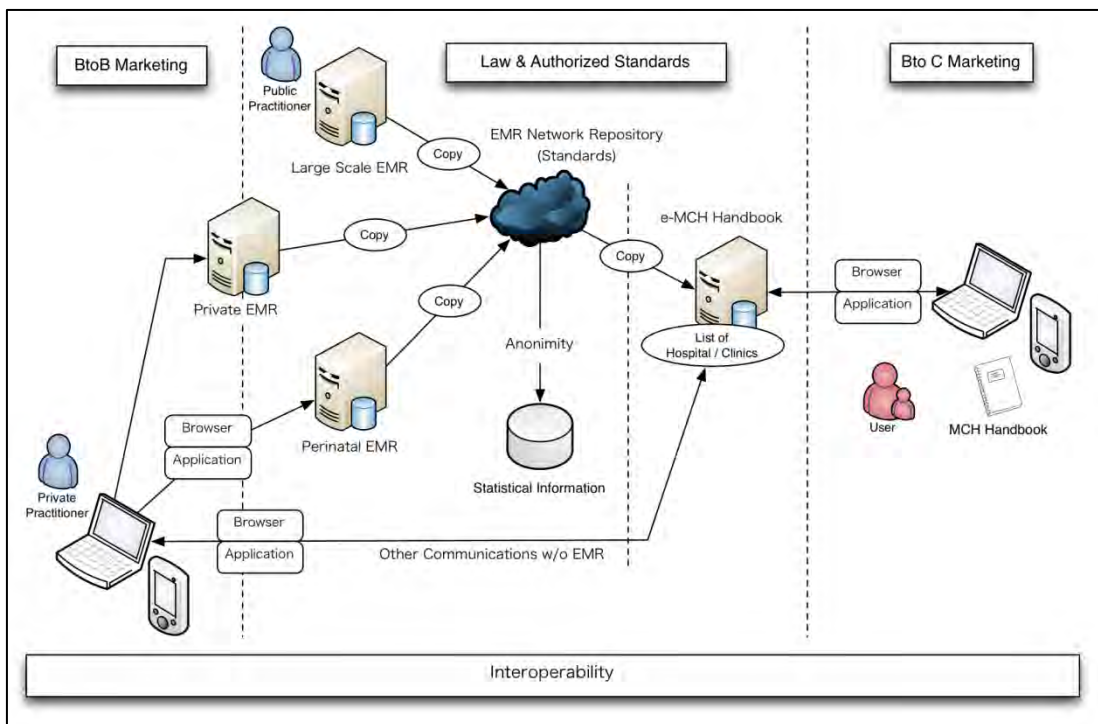


Figure 7.1 Chart of Integrated Operations Model

At the central part of above chart (Laws and Standards area), interoperability for data exchange, correspondence to laws such as personal information protection or pharmaceutical affairs, and long-term data maintenance are highly required. Thus, a standardized and centralized governance structure is required.

At both ends of the above chart (B to B / B to C marketing area), acceptance by “users” (private healthcare professionals and general consumers) is the dominant force to familiarize computerizations. It is expected that supplying a variety of products to the market to fit various individual environments (infrastructure, IT literacy, etc.), and those products be sophisticated under the mechanism of market competition.

Especially in the B to C area, it is required to facilitate the entry of the private sector into business to secure diversity and distribution channels with promotional activities. In such a case, it should be implemented with some proper regulations (standards and/or rules) to secure interoperability and/or screening, approval or certification systems to computerized MCH Handbooks. Those regulations will cut down on the burden of IT developers.

Those standards and screening rules shall become popular among IT developers through a variety of measures and policies, such as providing standards for information store/processing/exchange, developing environment, development guidelines and reference implementations, etc. Also, standards or rules shall be updated certainly in accordance with changing legal systems and/or medical issues.

The computerized MCH Handbook will function as a “customer’s receipt (copy) of medical services” of legal medical records as maintained by hospitals, clinics or health care professionals.

(2) References of Implementation Costs

The following are case examples to introduce large-scale IT systems:

A case example of installing regional interconnected perinatal EMR systems to 11 clinics

The package of perinatal EMR systems that are interconnectable with “ihatov (the name of regional perinatal health information network systems of Iwate prefecture)”, obstetric care units, general EMRs, and medical business accounting systems was installed to 11 of clinics according to the regional health systems recovery plan and health systems reconstruction plan of Iwate prefecture funded by supplemental budgets of JFY 2009.

Total costs consisted of perinatal EMR systems (approx. 7 hundred millions JPY / 7 millions USD), annual maintenance fee for perinatal EMR systems (approx. 36 millions JPY / 350 thousands USD for 3 years), installing network equipment (approx. 59 millions JPY / 590 thousands USD), and renovation fees for existing health information systems of local government units to connect to “ihatov” (36 million JPY / 360 thousands USD for 2 years)

A case example of packaging and export of Japanese public IT systems

“The Project for E-Customs and National Single Window for Customs Modernization in Vietnam” is a grant aid project that packaged Japanese NACCS (Nippon Automated Cargo Clearance System) and CIS (Customs Intelligence database System) and exported them to Vietnam. The direct cost has been estimated up to 26.6 hundred millions JPY (approx. 26 millions USD) by the 7-month preliminary survey that cost was 43 million JPY (approx. 420 thousands USD).

A case example of rapid and low-cost IT system deployment by business processes and common data criteria in advance

The recovery and reconstruction assistance policy database by METI (the Ministry of Economy, Trade and Industry) is a web-based system that provides the latest information of

assistance policies by the national government, local governments and other agencies since January 17, 2012. It took 2-3 months for development and approximately 59 million JPY (590 thousands USD) cost (except operational cost). It recruited several exercises for rapid development, such as predefined business processes, predefined data schemes of policy information by XML scheme, and employing cloud system for operational infrastructure to avoid hardware procurement.

A case example of system development cancellation by repeated significant requirement changes

The Business systems renewal project since 2006 by Japanese Patent Agency; since the project started from December 2006, there were 3 significant requirement changes to suit the convenience of the Patent Agency. The contractor (System Integrator) enhanced the implementation structure up to 450 members to put current workflows in writing by May of 2007, but it could not catch up. The implementation structure was enhanced to 1,100 members in 2008, but it could not recover from the delay. At last, the Patent Agency decided to cancel this project in 2012.

7.3.2 A Model of Specialized to Support Pregnant Women

As described previously, this model refers to the concept of “Ninpu-Techo (Handbook for pregnant women)”. This model sidesteps constraints that long-term maintenance of medical records and interoperability issues by limiting the period of use to pregnancy and limiting functions to the improvement of communications between pregnant women and family doctors (obstetricians). Medical records shall be managed by hospitals or clinics and the MCH Handbook is as per usual in this model.

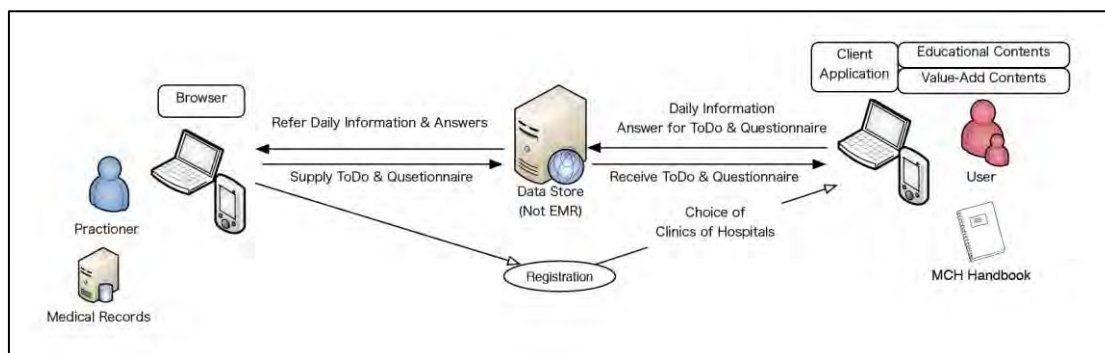


Figure 7.2 Chart of the Model of Specialized to Support Pregnant Women

This model can be installed in individual hospitals, clinics or doctors (obstetricians) to enhance the convenience of outpatients (pregnant women). Outpatients are required to own a smart phone or tablet computer and to install an application (Ninpu-Techo), but this application will work as a personal health educational tool even without high speed data connections, and can utilize advertisements to cut down on a cost burden for outpatients and doctors. Technically, system development will be small scale, easy to utilize for existing health educational contents, and will cause no critical damages (or changes) to existing medical systems.

A pilot-scale testing will be implemented with rental Smartphones or tablet computers to outpatients and health professionals, if hospitals or health professionals can maintain medical records by themselves.

An application for smart phones with defined specifications will cost around 0.5 million JPY (50 thousands USD) or more to develop²⁷². This cost does not include any license fees of existing health educational contents.

7.3.3 A Model of Sending Health Information via SMS

This model is often found in mHealth cases of developing countries. The mobile operators deliver SMS contents supervised by the Ministry (or Department) of Health, or doctors, to subscribers. The contents shall be under restriction (limitation of number of characters per one message), but messages can be sent or received without the internet and do not require IT literacy, or extra charges can be minimized. Also, system maintenance fees will not be so high, since it utilizes existing network systems or services. Most of the continuing expenses will be the tariff of sending SMS.

On the other hand, this model is just “providing short messages”, so effect measurement (e.g. effects to behavior changes of receivers) will be difficult just as mass-promotion activities. Also, continuous expenses will be proportional to the number of SMS sent, and heavily depends on the handsets (e.g. input/output languages) of subscribers. Moreover, there will be some countries or areas that are not familiar with SMS.

It will be required to deliver timely information, combine with other printed materials (e.g. health educational Handbooks) or local call centers that accept enquiries from users (outpatients or doctors), since those short messages are not always stored in subscribers’ handsets for a long time.

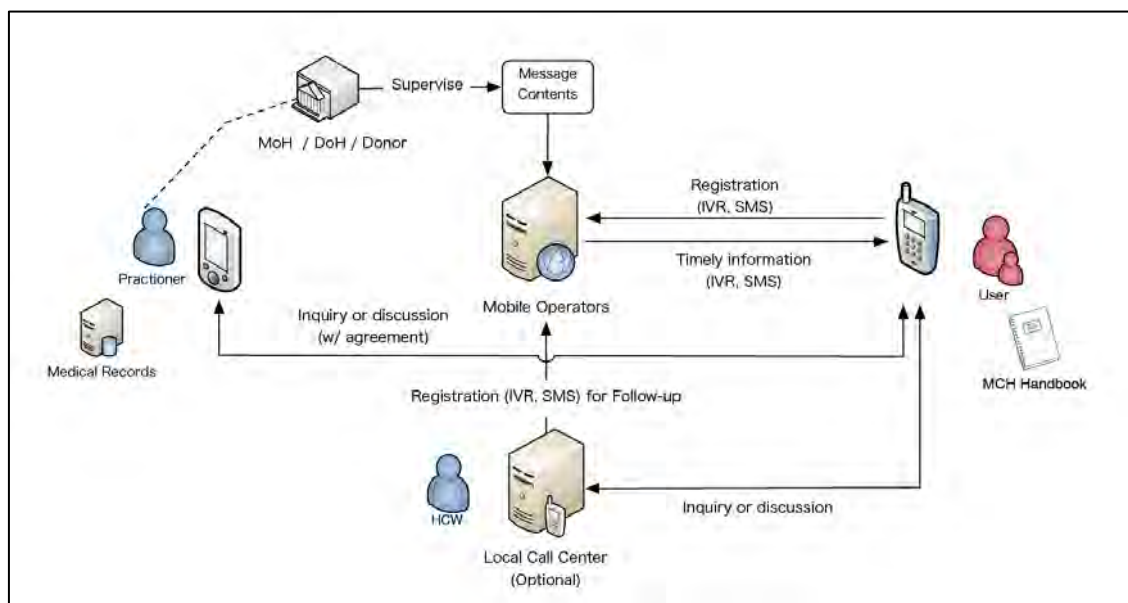


Figure 7.3 Chart of the Model of Sending Health Information via SMS

SMS is defined as a part of the GSM (Global Systems for Mobile communications) series of standards as a means of sending messages of up to 160 characters of standard alphabets and up to 70 characters of other languages (UCS-2; such as Latin, Chinese, Cyrillic alphabets, Arabic characters, etc. that depends on input/output functions of handsets); this is now available on a wide range of networks and almost all handsets.

²⁷² http://crowdworks.jp/lp/category/iphone_apps.html

There are some case examples of using mHealth to send health care information to individuals (e.g. pregnant women and mothers) via SMS. This is an application of the value-added services (e.g. deliver messages to subscribers based on their horoscopes) or broadcast services (e.g. inform temporary suspension of network services to subscribers) of mobile operators.

The most important component is the contents of the SMS (text messages). It is required to form contents that shall be intelligible and medically useful under the ceiling of characters in a message. The contents of messages are able to be compiled uniquely, but also available in the market both paid and free from charges.

A case example of free from charges, MAMA (Mobile Alliance for Maternal Action) provides a series of short text messages related with Mother and Child health care with translation guidelines (require registration to download²⁷³).

A case example of paid one, the Emirates Integrated Telecommunications in United Arab Emirates (“du” brand) provides health care information services in Arabic via SMS to their subscribers by following tariffs. “Source – Purple Teal” is mentioned in some services. The “Purple Teal” is a U.S. based company that provides healthcare contents (general healthcare, stopping smoking, diabetes care etc.) to enterprises. In this case, the Purple Teal sells licenses of their healthcare contents to Du, and Du provides those contents to their subscribers for profit.

Table 7.4 A Case Example of Providing Health Care Contents by “Du”

Title of Services	Tariff
Nutritional - Al Ghithaa Al Mizan from Dr. Jameel Al Qudsi	0.40 AED per day
Nutritional - Sehr Al Khal Wal Rayhan from Dr. Jameel Al Qudsi	0.40 AED per day
Baby Care - Alerts in Arabic	0.40 AED per day
Her Health - Informative tips on women’s health in Arabic (Source - Purple Teal)	1.00 AED per day
Pregnancy Tips - Information about pregnancy changes in Arabic (Source - Purple Teal)	1.00 AED per day

Source: Du Content Service details²⁷⁴ (1 AED ≈ 27 JPY)

The contents (text messages) of SMS shall be short sentences, given the technical constraints of SMS, but subscribers are able to understand easily. Those short sentences are able to be utilized not only for SMS, but also for a variety of printed matters with small areas, such as invoices for public services, packages of products, posters, or calendars.

On the other hand, the effect measurements of sending short sentences like SMS will be difficult due to the tendency of one-way communications. As it stands now, sending short sentences (SMS) will be regarded as advertising activities like posters or billboards.

7.3.4 SNS (Social Networking Services)

In recent years, SNS as typified by “Facebook” is widely utilized by not only personal users but also business entities and public agencies.

Table 7.5 Statistics of Facebook Utilization among Surveyed Countries

²⁷³ <http://www.mobilemamaalliance.org/mobile-messages-download>

²⁷⁴ <http://www.du.com/en/mobile/content-mobile/content-services/content servicedetails?item=lifestyle>

Country	Number of Facebook Users	Ratio of Populations
Palestine	A million (Male 60% : Female 40%)	Ratio to Population: 27% Ratio to Internet users : 69%
Cambodia	740 thousand (Male 62% : Female 38%)	Ratio to Population: 5% Ratio to Internet users: 414% ²⁷⁵
The Philippines	30 million (Male 48% : Female 52%)	Ratio to Population: 30% Ratio to Internet users: 93%

Source: Calculated from SNS statistics by Socialbakers; as of February 2013

Note: “Ratio to Population” means the ratio of the population to the number of Facebook accounts, and “Ratio to internet users” means the ratio of the number of Internet users to the number of Facebook accounts.

SNS can be utilized as a source to send information, for communication with stakeholders, or for public relations in the field of Mother and Child health care. The consideration points are listed in the following table, by taking Facebook as an analogy.

Table 7.6 Consideration Points to use Facebook

Items	Description	Standards
Visibility	Facebook is well known.	The number of Facebook accounts gives an indication of the reach of information in a country.
Organizational utilization	Public agencies or Small-Medium enterprises utilize Facebook as an advertising media.	It shows that Facebook is not under restrictions by the government.
Commercial utilization	Utilizing Facebook is recognized as a business activity.	It is expected that advertising agencies or software development firms are able to provide advices or supports to use Facebook effectively.

Source: Study Team

It is required that special considerations or manners different from personal use for the organizational utilization of Facebook. Not only local advertising agencies or software development firms, but also JICA will be able to provide required knowledge or experiences to utilize Facebook effectively.

7.4 Approaches of the Japanese government

Policies for overseas expansion of Japanese medical services are summarized in this section, since policies specialized for the MCH are not confirmed.

7.4.1 IT Strategy Headquarters (Prime Minister of Japan and His Cabinet)

In the “proposed road map of new IT strategies” in the 54th (May 11, 2013) and 62nd (June 14, 2013) meetings, the following items were shown as “approaches of the medical field” in “2. Regenerate regional linkage”:

1. Realize “My hospital anywhere plans”
2. Realize seamless regional medical interconnections

²⁷⁵ In Cambodia, one person might use more than one Facebook account.

3. Promote efficiency of medical services by utilizing information of health insurance claims etc.
4. Promote “Safety of Drugs” by utilizing medical information databases

The Ministry of Internal Affairs and Communications (MIC), the Ministry of Economy, Trade and Industry (METI), the Ministry of Health, Labor and Welfare (MHLW) have conducted proving trials or invited competitive proposals in accordance with the above road map.

For example, some proving trials based on “My hospital anywhere” and “seamless regional medical interconnections” were conducted in promoting medical information projects in JFY 2010 (NTT data institute of management²⁷⁶).

7.4.2 The Office of Economic Cooperation and Infrastructure Strategy (The office of the Prime Minister)

In the decisions of 4th meeting of the “office of economic cooperation and infrastructure strategy (May 17, 2013)”, strategies for exporting infrastructure systems and diplomatic strategies of international health were presented.

In the strategies exporting infrastructure systems, “(1) Medical field” is presented in the “Promoting approaches to infrastructure systems” to globalize Japanese medical technologies and medical equipment. The following items are mentioned as priority policies:

- Promote international expansion of Japanese medical equipment and medical services, and human resource development through Medical Excellence Japan (MEJ). (METI, MHLW, Ministry of Foreign Affairs (MoFA), Ministry of Education, Culture, Sports, Science and Technology (MEXT))
- Promote international expansion of medicines, medical equipment, medical technologies and medical services in an integrated manner through international medical cooperation. For example, contribution to WHO, bilateral cooperation to ASEAN, promoting research and development of medicines for developing countries by collaboration of governments and private sectors. (MHLW, MoFA, METI, MEXT, JICA)
- Increase concessional funds (Yen Loan) for health field and add medical equipment to applicable scope of STEP (Special Terms for Economic Partnership). (MoFA, Ministry of Finance (MOF), METI)

In the diplomatic strategies of international health (supervised by Global Health Policy Division of MoFA), it is mentioned that international health is one of the main issues of Japanese diplomacy, and the resolution of international health issues (including achievement of MDGs), expanding the role of Japan in the international health field and contribution by utilizing Japanese technologies of health industries are enumerated. The following items are mentioned as priority policies:

- Consider UHC (Universal Health Coverage) as the mainstream
- Implement bilateral cooperation effectively (improvement and general mobilization of aid instruments)
- Interconnect with global activities (build strategic partnerships)
- Enhance human resources for international health
- Approach to realize UHC in African countries

²⁷⁶ <http://www.keieiken.co.jp/medit/240423.html>

7.4.3 The Office of Health and Medical Strategy (The office of the Prime Minister)

“Promoting international expansion” in “approaches of medical equipment (with JETRO and JBIC)” is mentioned in the “policies of promoting medical innovations (October 17, 2011)” by its predecessor (Medical innovation committee). Promoting international expansion (add large scale particle beam medical equipment to applicable scope of export finance for developed countries) and projects for internationalization of medical equipment and medical services (supervised by METI) are presented in above policy.

After that, in the health and medical strategies submitted to the 3rd meeting of the office of health and medical strategy (June 21, 2013), the following items are enumerated for internationalization of medical and services:

1. Build international medical cooperation framework.
2. Promote international medical projects centered on MEJ
3. Promote developing and supplying medicines for Neglected Tropical Diseases, etc. by collaboration with governments and the private sector
4. Utilize ODA (assistance with Japanese medical equipment and services based on international health strategies, implementing bilateral cooperation effectively, cope with global activities, etc.)

7.4.4 Internationalization of Japanese Medical Services (METI)

METI has supervised researches to promote Japanese medical equipment and services since 2010. At the moment, 10 countries (China, Russia, Indonesia, Thailand, India, Iran, Saudi Arabia, Turkey, Morocco, and Brazil) are mentioned as prospective destinations for international expansion.

The above mentioned MEJ (Medical Excellence Japan) has been established by the assistance of METI since 2011. In the beginning, MEJ promoted to accept foreign outpatients to Japan (inbound). But since April 2013, MEH aims to export Japanese medical services to foreign countries (outbound). It is expected as a “single window” of the internationalization of Japanese medical services. MEJ consists of 23 private firms and a lot of medical institutions as alliance partners.

On January 4, 2014, it was reported as a best case of Japanese medical promotion that Fujifilm Corp. was going to receive orders of endoscopes from 10 of hospitals in Vietnam (approx. 200 million JPY; 2 million USD). According to press releases, a combined team (medical equipment manufacturers, medical department of universities, government officials) visited Vietnam to meet with the MoH of Vietnam in August 2013 at first, and then MEJ held a seminar in Vietnam with 150 participants to promote Japanese medical equipment. In October 2013, a training laboratory of endoscopes was established in Hue University hospital and Nagoya University dispatched advising doctors to develop human resources with the assistance of the Japanese government.

JETRO, one of subsidiary organizations of METI, offers a variety of guidance to help international expansion of Japanese firms²⁷⁷ for each theme, including medical equipment and medicines, in a report of world medical equipment market, including the international expansion strategies of Europeans, Americans, and Koreans²⁷⁸.

²⁷⁷ <http://www.jetro.go.jp/library/reference/>

²⁷⁸ http://www.jetro.go.jp/world/seminar/110905/material_110905.pdf

7.4.5 MHLW (The Ministry of Health, Labor and Welfare)

MHLW has opened “Visions of drug industries 2013” and “Visions of medical equipment industries 2013” since June 26, 2013²⁷⁹.

In the “Visions of drug industries 2013”, MHLW established “the office of international medical expansion strategy” to promote international expansion of Japanese medical services or equipment with other related entities. It aims for systematic environmental arrangements, such as promoting simplified screenings, or mutual authentications, by building trustworthy relationships with foreign authorities to back up international expansions of Japanese medical industries.

In the “Visions of medical equipment industries 2013”, policies for the promotion of medical equipment industries are presented. In the “enhancing relationships with foreign regulatory bodies”, promote dialogues with foreign regulatory bodies to make them familiar with Japanese authorization systems. In the “promote exporting”, MHLW will assist sustainability of Japanese medical institutions and manufacturers by building footholds to provide medical services and making networks with local medical institutions through trials or feasibility studies.

²⁷⁹ http://www.mhlw.go.jp/seisakunitsuite/bunya/kenkou_iryuu/iryuu/shinkou/vision_2013.html