NEED ASSESSMENT AND FEASIBILITY OF ELECTRONIC MEDICAL RECORD SYSTEM IMPLEMENTATION IN MARIE STOPES INTERNATIONAL MYANMAR

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Thematic Paper
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ABSTRACT

Using paper-based records in patient care is common in developing countries like Myanmar. Implementing an Electronic Medical Record could help improve the quality of care. Having knowledge on current computer usage, ICT knowledge and user acceptance towards EMR system is of value in implementing such system. A mix-method cross-sectional study was conducted at 13 clinics, interviews were done at 11 clinics and the head office of Marie Stopes International Myanmar. Data regarding socio-demographic characteristics of MSIM employees, availability of ICT at the clinics and the head office, their ICT knowledge and computer usage, and their acceptance towards the proposed system were collected by means of questionnaire and analyzed using SPSS version 18. User concerns and opinions on both current and proposed system were explored by using interviews. With the 93% response rate, the results indicated that computer usage relating to providing care and reporting is not widespread in clinics and ICT knowledge among regions varied. There were differences in perceived usefulness and intention to use among clinics and head office: "Intention to use EMR" was 4.1 on a scale of 5 and the median IT knowledge score was 7 out of 10. The results also suggested that there is a need to strengthen ICT infrastructure at MSIM, and introduce a policy for capacity building. With adequate training and management support, the successful implementation of EMR is not far-fetched.

KEY WORDS: ELECTRONIC MEDICAL RECORD / MYANMAR / INGO / USER ACCEPTANCE

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LIST OF ABBREVIATIONS

ABBREVIATIONS	TERM AND MEANING
ADSL	Asymmetric Digital Subscriber Line
AMIA	American Medical Informatics Association
CSMBS	Civil Servant Medical Benefit Scheme
C.R.A	Cashier/Receptionist/Accountant
C-TAM-TPB	Combining the Technology Acceptance Model and Theory of Planned Behavior
ECOSOC	The United Nations Economic and Social Council
EMR	Electronic Medical Record
HMIS	Health Management Information System
HIS	Health Information System
HITAM	Health Information Technology driven extended Technology Acceptance Model
ICOMP	International Council on Management of Population Programmes
ICT	Information Communication Technology
IDI	ICT Development Index
IDT	Innovation Diffusion Theory
ISP	Internet Service Provider
IT	Information Technology
INGO	International Non-Governmental Organization
MM	Motivational Model
MPCU	Model of PC Utilization
MOH	Ministry of Health

LIST OF ABBREVIATIONS (cont.)

ABBREVIATIONS	TERM AND MEANING
MOPH	Ministry of Public Health
MOU	Memorandum of Understanding
MSI	Marie Stopes International
MSIM	Marie Stopes International Myanmar
NAHIT	National Alliance of Health Information Technology
NGO	Non-Governmental Organization
PEOU	Perceived Ease of Use
PIH-EMR	Partners in Health-Electronic Medical Record
PU	Perceived Usefulness
PC	Personal Computer
SPSS	Statistical Package for Social Sciences
S.R.H.P	Sexual and Reproductive Health Promoters
TAM	Technology Acceptance Model
TB	Tuberculosis
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
UHC	Universal Health Care Coverage
UNAIDS	The Joint United Nations Program on HIV and AIDS
UNICEF	The United Nations Children's Fund
UTAUT	The Unified Theory of Acceptance and Use of Technology
WHO	World Health Organization

CHAPTER I
INTRODUCTION

1.1 Background

The developing world encounters health crises suffer disproportionately from diseases especially preventable ones and other public health problems which jeopardize millions of people, yet are in need of resources and robust healthcare infrastructures in the form of Information and Communications Technology (ICT) (1) The advances in ICT could support tremendously on health-care delivery, public health, research and health-related activities for the both developed and developing countries. Whilst respecting human rights, ethical issues and principles of equity, World Health Organization (WHO) urges member states to consider establishing and implementing eHealth services in various fields of health sectors to improve the surveillance capacity and rapid response to disease and public health emergencies (2). In order to successfully incorporate eHealth in health systems and services, both Ministry of health and Ministry of Information Technology and Telecommunications play a pivotal role (3). EHealth implementations in developing countries have positive impact including improvement in communication between institutions, assist in ordering and managing medications and monitoring patients who might discontinue the treatment (4).

Myanmar healthcare system evolves with changing political and administrative system and has pluralistic mix of public and private system in terms of financing and provision. In private sector, both for profit and not for profit organizations, provides mainly ambulatory care in large cities and some townships (5). Given the importance and nature of ICTs, Myanmar has developed Health Information System Strategic Plan (2011-2015), which is based on guideline provided by the Health Metrics Network and on various needs by different users. The discussion on the Strategic Plan (2011-2015) started in 2009 and finalized in 2010 with the technical support form World Health Organization and Health Metrics Network. Myanmar Health Information System Strategic Plan stated its vision as "*a simple, effective and systematic health information*

system established at all levels of health care delivery for the strengthening of health system" (6). Regardless of the existence of national plan for the development of ICT in health, and eHealth being described as the most effective action in building ICT infrastructure for health sector, the effectiveness is still unknown (7). Besides, the Electronic Medical Record (EMR) system, a digital version of patient medical history, is not a common practice in hospitals in Myanmar; no research regarding EMR implementation and Health Information Technology adoption has been conducted before. Thus, the healthcare service providers cannot track patients over time and the targeted overall quality of care cannot be reached (8).

1.2 Role of International Organizations and Non-Governmental Organizations in Myanmar

Many International Non-Governmental Organizations (hereafter INGOs) implement programs and provide services or technical assistance in various sectors namely agriculture, education, health or microfinance (9). According to Ministry of Health, Myanmar, as of 2013, 37 INGOs and 14 National NGOs are working in Myanmar (10). In the area of reproductive health, there are international organizations such as *United Nations Development Programme (UNDP), United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA), World Health Organization (WHO).*; INGOs such as *Family Planning International Assistance, Care, Medicins du Monde, World Vision International, Population Services International, Marie Stopes International, Medicins Sans Frontiers, the Population Council* and *International Council on Management of Population Programmes (ICOMP)*; and national non-government organizations such as the *Myanmar Maternal and Child Welfare Association* (11). Civil society and private sector play a significant role in achieving national aim to harness Information Communication and Technology in health sector. As a result, in private sector, adopting the appropriate technologies in current system to improve the existing services and to mesh efficiently with globalized world is of importance. In line with the objectives of the national strategic plan, INGOs in Myanmar or local NGO can make up for propensity to implement small scale ICTs projects and if the pilot study succeeds, they can apply these technologies more broadly.

1.3 Marie Stopes International Myanmar (MSIM)

The selected INGO for the study, Marie Stopes International (hereafter MSI) is a global partnership in promoting sexual and reproductive health rights using social business model to provide affordable safe and quality services in 42 hours. MSI in Myanmar (hereafter MSIM), is established in 1998 and focuses in areas such as reproductive health, maternal and child health, prevention and care of HIV. It works through static and outreach/mobile clinics, social marketing, and partnership with private sector. Main functions of MSIM include capacity building for community organizations, HIV counseling and testing, psychosocial support and services in emergency responses, marketing and distribution of low-cost quality reproductive and contraceptive products, emergency obstetric support for public sector delivery facilities, necessary financial and social support for people in needs to be able to access health services, counseling and services for family planning. MSIM has been working in partnership and collaboration with departments of health and social welfare, health professional associations, other INGOs such as Pact, Save the Children, Care and local NGOs. It has employed about 350 staff in 25 nationwide clinics and at Yangon head office (12).

1.4 Problem statement

Quality of care is second rated: long waiting times, inability to retrieve relevant critical health information, and shortages in trained medical personnels are detrimental in the developing world (13). Moreover, paper-based records keeping has proven to become less efficient, fail to meet health care providers' need and make difficulty in communication between providers especially in developing countries. The introduction of EMR system could help to improve the efficiency and quality of care in developing countries (14).

At present in MSIM, each patients is given the clinic's record booklet, in which the service providers write down the clinical diagnosis or at least the presentation and impression, prescribed medications, procedures provided, and if needed, schedule for the next appointment. The clinic keeps the data on clients' record cards and registry books which are stored and sorted by key identifiers of name and address. The

receptionist is in-charge of storing and retrieving these record cards. If the patients misplace or could not bring their booklets and if the client's record card could not be found by the receptionist, they have to re-register at the same clinic. Additionally, in case of relocation to another area or city, the registration process must be done again at another MSIM clinic with or without the previous record booklet of the patient. In both cases, the respective clinics cannot get the complete medical history of the patients and it is virtually impossible for the clinicians to continue the appropriate care, as complete medical history has not been noted down in the record booklet. Even the patients have brought their booklets to the clinics, due to legibility, it still can lead to misinterpretation. The clinics do keep these patients' records in a way that serves mostly for administrative and logistic purposes rather than medical history oriented records and fail to track the follow-ups as well.

The need for effective ICT solutions was called for in MSI, Myanmar due to the setback caused by the current system, and the particular benefit derived from Electronic Medical Record System like improved continuity of care at NGO-supported health post in rural Nepal (14). Stella T. Alamo et al. stated that EMR can help decrease loss of follow-up, reduce waiting time and improve clinic efficiency (15). MSIM wanted to implement the system to improve quality of care for the patients. Ultimately, the system will allow the medical personnel to store, quickly retrieve and update patients' bio-data, treatment and medical history, and to facilitate in exchanging those data across clinics. Moreover, it would eventually lead to provid better services for the clients while reducing medical errors and ensuring data privacy and security. Keeping the benefits of EMR in mind, the researcher proposed the idea for implementing EMR at the clinics to the Country Director. Promising idea was not enough and it needed to study the feasibility and user acceptance at MSIM as a self-review for the organization before EMR implementation.

Little was known about whether it was feasible within current resource context to implement EMR in an INGO providing healthcare in Myanmar as no study had been conducted before. For that reason, this study assessed the feasibility of EMR implementation focusing especially on current IT use at the clinics and office,' IT knowledge and acceptance on proposed system of users, which could eventually be utilized as baseline information in implementing EMR system in MSIM. The study

potentially could be used in similar or comparable process within other NGO's as well as in improving the national medical record system. All in all, the development of such system could contribute greatly in improving the quality of health services provision, making the timely and accurate clinical decision due to better, quicker access to clients' information and optimizing resources utilization of respective project.

1.5 General objective

The general objective of the study was to assess the feasibility for the implementation of EMR system: a case study of Marie Stopes International Myanmar (MSIM).

1.6 Specific objectives

- To assess current Information Technology resources in MSIM
- To assess computer usage of MSIM employees
- To assess Information Technology knowledge among MSIM employees
- To assess user acceptance towards proposed system

1.7 Scope of the study and limitation

- This study was conducted in 13 clinics and the head office operated by MSIM.
- This study was to assess the feasibility for implementation of EMR focusing on current status of IT use and users' attitudes working in the clinics and at the head office of MSIM.
- This study did not focus on economic aspect and operation process of implementing EMR.
- Questionnaires were in both English and Burmese and senior health personnel helped to ensure accurate survey renditions in both languages.

1.8 Operational definitions

E-health, according to WHO, is the transfer of health resources and health care by electronic means (16).

Health Information System means the use of medical offices to computerized processes for maintaining patient medical records, automating administrative tasks of patient management, making patient records available at the point of care, linking clinical information to billing systems, and having a communications infrastructure capable of meeting interoperability standards and opportunities now and into the future (17).

Electronic Medical Record in the study stands for a computerized system of accessing in real time the history of a patient's care within a single practice (17).

International Non-Government Organizations is defined as "any organization which is not established by inter-governmental agreement", "including organizations which accept members designated by government authorities, provided that such membership does not interfere with the free expression of views of the organizations" by The United Nations Economic and Social Council (ECOSOC) (18).

Feasibility refers to "capable of being accomplished or brought about" (19).

Technology Acceptance Model (TAM) is an information system theory, which explains and predicts the users' acceptance and use of technology (20).

Perceived Usefulness (PU) refers to "the extent to which a person believes that using a given would enhance his or her job performance" (21).

Perceived Ease of Use (PEOU) is defined as "the degree to which an individual believes that using a particular system would be free of physical and mental effort" (21).

1.9 Conceptual framework

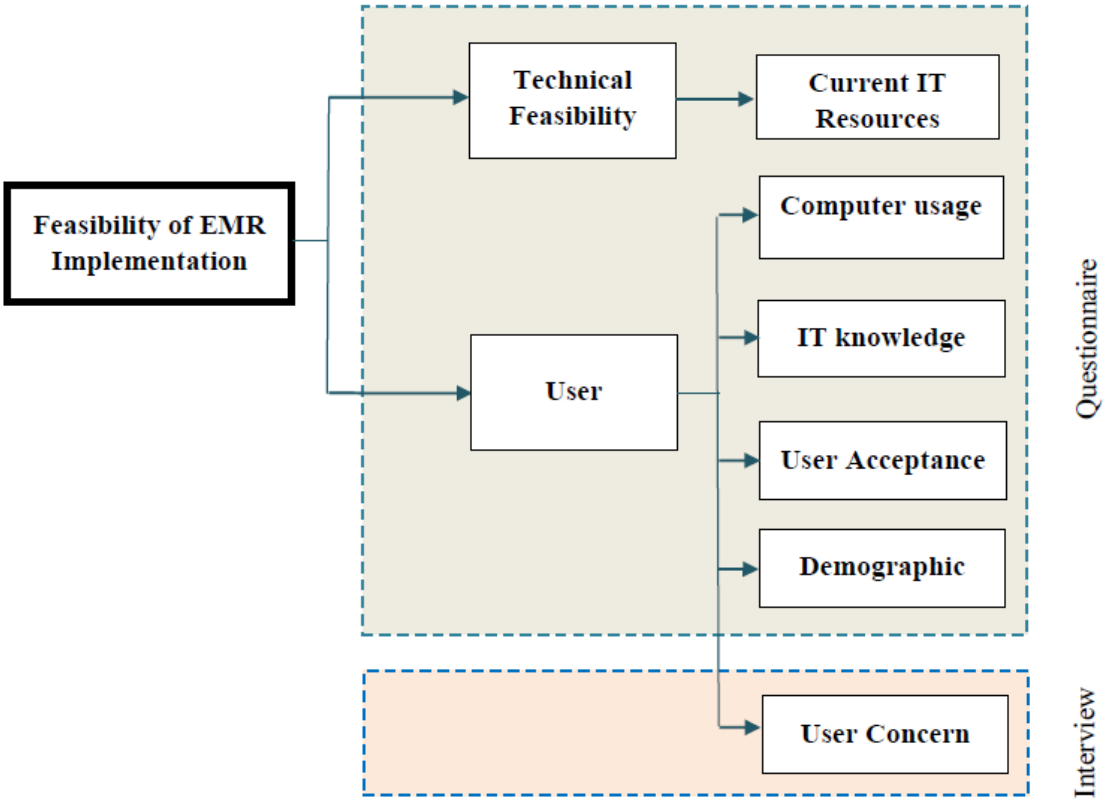


Figure 1.1 Research Conceptual Framework

1.10 Presentation of the research

This study was divided into five parts; first, a description of Myanmar Health System and INGOs, eHealth, EMR, problem statement of the study, objectives, limitations and research framework; second, literature review on eHealth, EMR along with its benefits and challenges, EMR in developed and developing countries, technological feasibility and user acceptance models; third, research methodology; fourth, research findings; fifth, discussions and finally, some conclusions and key takeaways.

CHAPTER II
LITERATURE REVIEW

2.1 Introduction

In this chapter, we reviewed the details of factors that were required in assessing the feasibility of implementing EMR system of selected INGO in Myanmar. Core issues such as the current state of IT usage, the users' familiarity with technology, and their acceptance of proposed system should be critically examined before the EMR system implementation. This review discussed the Information Technologies in the context of healthcare: Health Informatics, E-Health, Electronic Medical Record, the EMR system implementation in developed and developing countries, Myanmar Health Information System and Marie Stopes International Myanmar. Factors needed to consider the feasibility and the user acceptance for the proposed system were also presented.

2.2 E-Health

World Health Organization (WHO) described eHealth as "the transfer of health resources and health care by electronic means in area such as the delivery of health information, public health services, and the use of e-commerce and e-business practices in health system management" (16). In addition, the European Commission defined eHealth as "the use of modern ICTs to meet the needs of citizens, patients, healthcare professionals, healthcare providers, as well as policymakers" (22).

WHO proposed eHealth opportunities such as citizen-centered health systems, online health services, smart cards, electronic health records, ICT for distance learning and education, home-based care supporting self-management of chronic diseases, and public health information and communication systems for high and middle-income countries with low mortality. In the context of low-income countries

with high mortality rate, eHealth issues should link to ensure reliable, robust communications between health centers, laboratories, clinics and medical offices, more widespread telecommunications infrastructure, more reliable and user-friendly access devices, integration of ICT and information management skills into the training of health workers, content that reflects local languages and culture, surveillance systems for health risks and emergencies to be established (23).

E-Health includes a range of patient's medical record, billing and payment information, employees and hospital information and its implementation involves the use of Internet for storing, accessing, and modifying healthcare information (24).

Pagliari et al. stated eHealth as a broad range of informatics applications for facilitating the management and delivery of healthcare including dissemination of health related information, storage and exchange of clinical data, inter-professional communication, computer-based support of patient-provider interaction, education, health service management, health communities and telemedicine, among other functions. Terms that are used interchangeably for e-health include *e-healthcare*, *medical informatics*, *health informatics*, *consumer health informatics*, *telemedicine*, *telecare* or *telehealth* (25).

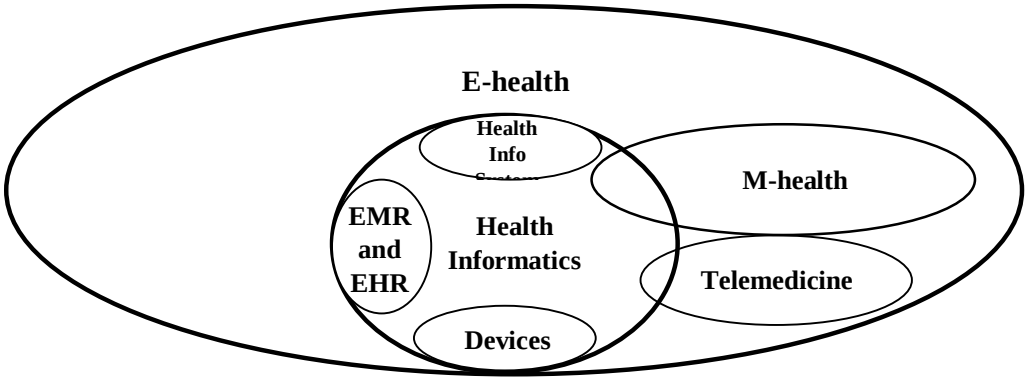


Figure 2.1 The Relationship and Coverage of E-health and Health Informatics (24)

The American Medical Informatics Association (AMIA) viewed the term "health informatics" to capture applied research and practice in clinical and public health informatics (26). Health informatics is the intersection of several fields consisting of information science, computer science, healthcare and business. It has several elements such as electronic medical records, decision support system for healthcare, health information system, protocols for exchange of medical and healthcare information and

devices for medical decisions. In addition, it focused on how a range of information is used in various healthcare processes (24).

2.3 Electronic Medical Record

National Alliance of Health Information Technology (NAHIT) defined Electronic Medical Record (hereafter EMR) as an electronic record of health-related information on an individual that can be created, gathered, managed, and consulted by authorized clinicians and staff within one health care organization (27). An EMR contained the standard medical and clinical data gathered in one providers' office, where as Electronic Health Records (EHRs) was designed to reach out beyond the provider's office that originally collects and complies the data and was built to share information with other health care providers (8).

EHR was, in turn, defined as "an electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be created, managed, and consulted by authorized clinicians and staff across more than one health care organization" by NAHIT (27). In this study, the researcher emphasized on EMR as a first step to achieve ultimate goal of having health information system in Myanmar.

In general, the modules in an EMR include scheduling, patient registration, documenting patient visits, medications, lab results, managing documents, communicating between office, managing interoffice communications, and clinical decision support and billing (28). In this study, EMR is an attempt to put together relevant set of data such as patient's history, and tests and medications needed in the patient care.

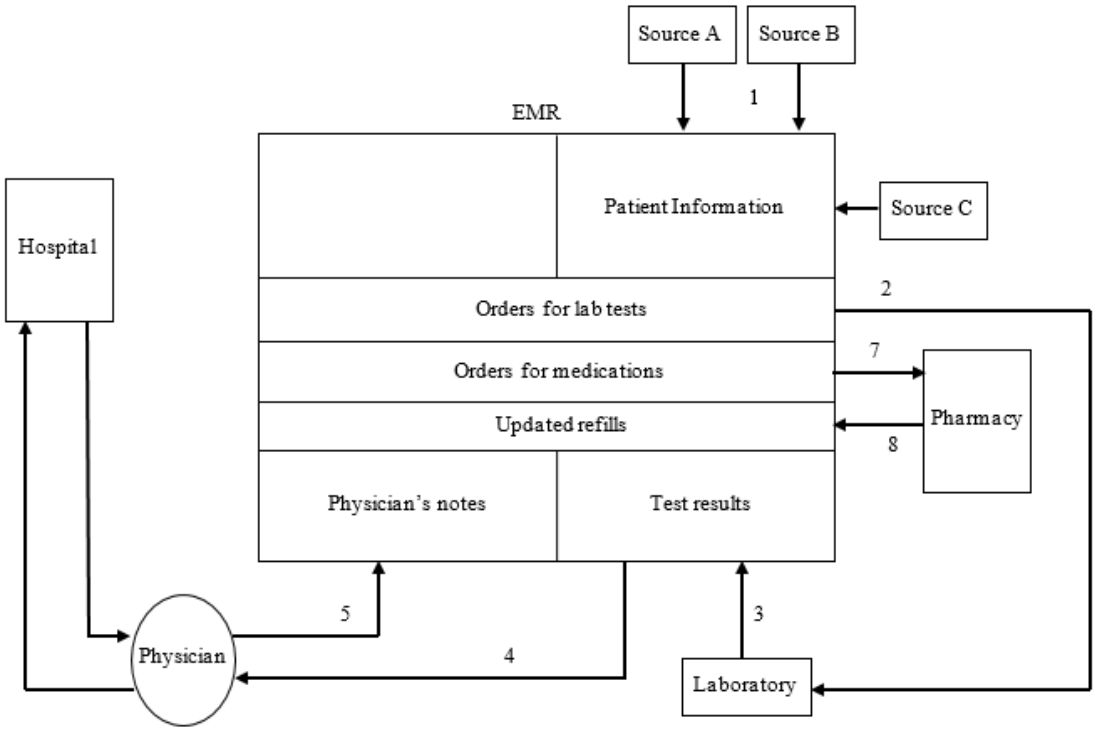


Figure 2.2 The basic structure of EMR along with possible interactions with physicians and laboratories (24)

The information could be displayed in a specific way depending on the type of healthcare facility and the preferences of healthcare personnel. The patient information could be collected from patient himself/herself and old paper-based records by using standardized form, the physicians could order lab tests, and write down some notes. As soon as the lab results were posted, the physician could make diagnosis, order medications after checking for possible interactions with existing medications. EMR was updated to show when the medications had been dispensed (24).

2.3.1 Benefits of EMR

Implementation of an EMR was considered to be more beneficial than paper records as it enabled the providers to track patient's data over time, identify patients who are due for visits and screenings, monitor how patients measure up certain parameters and improve quality of care. Though information stored in EMRs could not easily be shared outside of a practice, it could be printed out, or emailed to other clinics and other members of the care team (8).

An important point in considering EMR implementation in care was cost and benefit: According to Samuel J. Wang et al., the implementation of an EMR system in primary care could lead to a positive financial gain to the health care organization thanks to cost saved in drug expenditures, improved utilization of radiology tests, better capture of charges, and decreased billing errors (29).

Another study also mentioned the positive financial return: Colleen Cook-Moine, and Lynn Cramer stated that the small medical groups could reap significant financial benefits such as eliminated transcription fees and reduced administrative staff by 25 percent to offset the cost of EMR implementation (30).

A study by Barlow S, Johnson J, and Steck J. indicated that the economic impact of implementing EMR at the clinic: Central Utah Multi-Specialty Clinic experienced direct reductions in spending and increases in revenue compared with prior year (31).

Another advantage of having EMR is that their documentation could easily be read in real time and enhance the patients' safety as EMR based notes let the providers immediately view the notes in written format and correct mistakes (30, 32). Similarly, once EMR had implemented, there would be no need to fetch or re-file a paper chart for office visits or other transactions, and no need to look for a misplaced files and storage costs would be eliminated (33).

Consistent with the factors mentioned above, the following report reinforced the benefits of EMR use in primary care such as reducing staff time spent on specific paper- based administrative tasks, a positive return on investment, reduction in the number of duplicate diagnostic tests ordered and improving patient safety through reduced adverse drug events (34).

A stated by Australian Commission on Safety and Quality in Health Care 2010, EMR enabled to reduce errors such as human errors in prescribing treatment, other kind of errors by providing active decision support to clinicians, and errors in primary source data (35) EMRs could be utilized by multiple users at the same time, legible, avoid bias in recollection of medical history when patient filling out the form, could be of used for effective decision making, reduced medical errors due to handwritten notes and prescriptions (24, 32).

Importantly, Richard Hillestad et al supported the fact that EMR can support chronic disease management and prevention by assisting clinicians (32, 36). EMR was critical to the clinic's ability to provide efficient, coordinated, safe and high-quality care. It could provide important information about medications, allergies, and help personnel quickly access and update the patient's record. The doctor could easily pull up test results, and verify past exams or procedures. EMR could be of importance in program monitoring, reporting, budgeting and logistics as well. Perhaps of greater importance was that the researchers could use EMR to analyze large amounts of patient's information efficiently (32, 37).

2.3.2 Challenges of EMR

The challenges in deploying EMRs include cost, the technological infrastructure at healthcare facilities, the disruption of care during transition period from paper-based to electronic medical records without missing or corrupting patient information, and patient privacy as many people can access to those information. To achieve interoperability between different electronic systems in terms of formats, messages, and representations will be challenging as well (24). Other drawbacks in implementing EMR include high initial costs, time to implementation, time for user training, users' habits, and preference of paper-based processes (38).

Another challenge can be found in the research conducted by Hamish SF Fraser, Paul Biodich et al. They have identified barriers such as data security, confidentiality and reliability in implementing EMR in developing countries as most of the present EMR implementation in developing countries focus in HIV/AIDS treatment. Important pitfalls in implementing EMR includes for users side, lack of user training, poor initial design limiting capabilities and expansion potential, systems difficult to use or too complex, lack of involvement of local staff in design and testing of systems, lack of systems and staff training to ensure data quality and completeness, lack of perceived benefit for users who collect the data and for technical side, lack of back-up systems in event of computer loss, poor system security leading to viruses and spyware, unstable power supplies and lack of battery back-up, poor or inadequate data back-ups, lack of technical support staff and/or system hard to maintain (37).

An important factor in determining challenges concerning EMR implementation is substantial investments and government commitment. Apart from those facts, developing countries have other barriers such as lack of resources, poor healthcare infrastructure, computer illiteracy of workforce, absence of IT based training, language as most EMR system are developed in English, available technological infrastructure and sustainability. Given the complex nature of EMR, there are a few issues such as consistent use of standards, ethical, legal and technical issues, security and confidentiality of information, patient data quality, clinical information standards and communication protocols that need to be considered, lack of user involvement, and lack of perceived benefits (32). Doctors and patients are concerned about the web application of EMR, as the medical records might be available for unintended participant, especially those records are transmitted using wireless Internet connection (39).

2.4 EMR in developed countries

The implementation of new technology applications to support Healthcare professionals, to increase efficiency of health services is not a novel concept in developed nations. For instance, countries such as United States, United Kingdom, and Australia have advanced healthcare infrastructure and received support from their government to achieve the objectives related to comprehensive development of medical information system. They have developed the technology and technique over a period of time (40).

With modest investments, Australia, England and New Zealand have obtained breakthroughs in implementing EMRs in primary care (41). In fact, Australia and the United Kingdom, are implemented universal adoption of EMRs at the similar time (42). As stated by the paper developed from the National Alliance for Primary Care Informatics, perhaps of greater importance in their success in EMR implementation is that those countries made a substantial investment to develop strategic framework and standards and provide financial incentives for providers for transition (41).

The developed countries can make investments in research to develop information systems that meet the need of their healthcare system where as in the

developing countries, information technology based solutions are faced with numerous challenges like inadequate funding, lack of resources and weak healthcare infrastructure (32). In transforming the U.S. healthcare system, it is believed that the broad adoption of EMR will lead to significant healthcare savings, reduction in medical errors, and improvement in health. However, the adoption of EMR has been slow (42).

A qualitative study, conducted by Jan-Tore Lium, Aksel Tjora and Arild Faxvaag at two hospitals in Norway, has explored changes after implementation of EMR system: Despite the new system, many old routines continue to exist, which, in turn, limit the potential of EMR (43). It is important to note that, according to survey carried out in 11 countries, financial incentives standards and technical support play an important role in extensive adoption and use of health IT (44).

2.5 EMR in developing countries

In an attempt to implement EMR systems in developing country like Myanmar, it is important to observe at systems that have been successfully installed in the same settings: It is important to look closely at systems that have been successfully deployed in challenging environments, and any available evaluation data.

Medical information systems and EMR become central in developed countries, and the trend has increased in developing countries thanks to large projects, which are funded to treat HIV, Multi-drug resistant tuberculosis (MDR-TB) and Malaria; Global fund supported the development of a variety of information systems for clinical care and telemedicine to reporting, accounting and research in Africa, Latin America and the Caribbean. The Parters In Health – Electronic Medical Record (PIH-EMR) has been in use in Peru, Philippines, the HIV-EMR has been in use in Haiti and Rwanda (45).

The research conducted by Hamish S F Fraser, Darius Jazayeri, Patrice Nevil, et al regarding HIV-EMR system in Haiti indicated that effective information management is also achievable in a poor community with no modern infrastructure and limited technical expertise (46). The other study of HSF Fraser, P Biondich, D Moodley et al found that there were great improvements before and after deployment of Medical Record System in Kenya. The benefits include shortened patient visit, less waiting time,

less interactive time with patient and among clinic personnel, and notwithstanding, the registration and transcribing visit data can be erroneous (37).

In 2005, Department for HIV and AIDS, Ministry of Health, Malawi (MoH), conducted the feasibility study of introducing computers to capture patient data and produce cohort reports at ART clinics: manual paper-based aggregation of data and compilation of reports become unfeasible as patient cohorts on treatment and data increase. EMR was piloted and later endorsed by MoH. It has been suggested that user commitments and perceived value related to system are of significance when deploying technologies (47).

A web-based medical record system, Partners in Health (PIH-EMR) has been deployed in Peru since 2001 to access patient's clinical information, logistics, for research and to generate reports. The system has been ported to Philippines, Haiti and Rwanda to support TB and HIV treatment. Still, it is necessary to evaluate the setting up costs and benefits such as continuum of care, reduction in workload derived from EMR deployment (45).

2.6 Thailand experience

Worldwide, electronic medical records (EMRs) and electronic health records (EHRs) are being implemented to improve patient care, reduce costs and basically change the way in which medicine is practiced. In Scandinavian countries, Denmark, Finland, Norway and Sweden, EMR implementation and national network infrastructures are already advanced. Developed countries like Australia, Canada, England, France, New Zealand and the USA have committed to deliver national electronic networks and medical record systems to support health care delivery. Similarly in Asia, countries such as Hong Kong, Singapore, South Korea, Thailand and Taiwan are implementing e-health policies (48).

In Thailand's healthcare services, paper and computerized patient information are being used in healthcare services. E-Health applications like EMR EMR/EHR, mHealth, telemedicine, are being implemented in Thailand (49).

Thailand has used some form of IT internally to manage drug dispensing, billing, patient card retrieval, scheduling in 82 government provincial and large private

hospitals. In 1997, Ministry of Public Health (MOPH) Thailand has designed a health IT system to facilitate in sharing medical data among healthcare providers and the Ministry's Health Statistic Unit. More than 800 provincial and district hospitals across Thailand are linked in HIT system, known as 12-files system, which incorporates hospital outpatient and inpatient records, financial information, referral data and health coverage data. 18-files system is used in primary care unit throughout Thailand. Data in the system include outpatient data on disease surveillance, behavior, death records, immunization, and family planning, community health prevention and promotion. Challenges in developing and deploying health IT include funding, political commitment, privacy and security and shortages of IT professionals (50).

In 2001, Thailand has achieved Universal Healthcare Coverage (hereafter UHC) through general tax revenue. UHC covers all Thais who are not covered by other social insurance schemes such as Civil Servant Medical Benefit Scheme (CSMBS) and Social Security Scheme (51). MOPH is responsible for country's public health system. Despite widely used computer technology in organizations under MOPH, some projects seem to be unsuccessful owing to numerous factors. Numerous studies pointed out that socio-technical aspect of the IT is essential for the success of the system. As a result, Boonchai Kijsanayotin and Stuart Speedie tried to assess the basic knowledge, acceptance and use of IT among healthcare personnel in community health centers to develop more effective and acceptable information systems to national healthcare system. The result indicated that there is high degree of IT acceptance and use in the health centers (52). Nationwide survey conducted in 2011 indicated that Thai hospitals had adequate level of IT adoption, however, information sharing outside hospitals was minimal (53). Thailand experience in HIT adoption further proved the fact that financial support and government commitment are of significance in deploying national eHealth plan.

2.7 Myanmar at a Glance

The Republic of the Union of Myanmar is the westernmost country in South-East Asia, located on the Bay of Bengal and Andaman Sea. It is bounded by Bangladesh, India, China, Laos, and Thailand on the land area, 1760 miles of the coast

line is bounded on the west by the Bay of Bengal and on the south by the Andaman Sea. The population of Myanmar in 2011-2012 is estimated at 60.38 million with the growth rate of 1.01 percent (5). Myanmar remains a low-income country in South-East Asia; per capita gross domestic product was $1,093 in 2009, while inflation averaged 24.9 per cent per year between 2000 and 2008. Patients' out-of-pocket co-payments represent approximately 87% of the overall expenditure (54).

In March 2011, Myanmar has marked the start of civilian government and the country has since experienced rapid social, economic and political changes. The health care infrastructure covers the whole country up until the grassroots level. Myanmar has 14 states and regions, which are again sub-divided into districts; one district health department oversees 3-7 townships under its jurisdiction. There are 52 districts, 324 township, 13,762 village tracts and 65,235 villages in the country.

One of the main problems in most developing countries like Myanmar is the imbalance coverage of health services due to disparity in health personnel distribution: Distribution of government medical doctors across states and divisions vary from 6 to 59 per 100,000 populations, and the distribution of Nurses is also related to the distribution of medical officers. Distribution of midwives also varies from 89 per 100,000 populations in Chin State to 25 per 100,000 populations in Bago Region. There are 67 hospital beds per 100,000 population in government medical institutions in Myanmar (55).

In measuring the health status by means of morbidity and mortality, TB, malaria and AIDS are among the priority disease problems in Myanmar: Myanmar is one of the world's 22 highest tuberculosis burden countries, with a TB prevalence rate three times higher than the global average and one of the highest in Asia (56). The prevalence of Malaria is 10.75 per 1000 populations in 2007 and 2008.(10) According to UNAIDS' HIV and AIDS estimation in 2011, the number of people living with HIV in Myanmar is 220,000 [180,000-260,000] and the prevalence rate of adults aged 15 to 49 is 0.60% [0.50%-0.80%] (57).

2.7.1 Myanmar Health Information System

Health Information systems refer to any system that captures, stores, manages or transmits information related to the health of individuals or the activities of

organizations that work within the health sector (58). The Ministry of Health (MoH), Myanmar is providing comprehensive health care services, covering activities for promoting health, preventing diseases, providing effective treatment and rehabilitation. Myanmar health care system has a pluralistic mix of public and private system both in the financing and provision. Health care is organized and provided by public and private providers. The Department of Health, one of (7) departments under the MOH plays an important role in providing comprehensive health care throughout the country including remote and hard to reach border areas. Considering health sector as a whole, the MOH is strengthening the public private partnership for the health development, inter-sectoral and non-governmental cooperation to promote infrastructure development commenced in 2001.

The national eHealth plan, which includes development of infrastructure and human resources and the establishment of eLibraries, is mentioned among the most effective actions taken in building an enabling environment for the use of ICT in the health sector. Health Management Information System (HMIS) is one of twelve programs under the National Health Plan (2006–2011). HMIS includes programs such as hospital information, public health information, human resource information, logistic information and information communication technology development.

Health Information System Strategic plan was developed based on findings of HIS assessments with technical and financial assistances from WHO and Health Metrics Network from Geneva. The general objective of HIS Strategic Plan is "to improve the availability, accessibility and utilization of quality health information" and strategic objectives include to enhance the HIS commitment, coordination and HIS resources, to improve the quality of the hospital data recording and reporting, to improve the quality of the public health data recording and reporting, to develop a reporting system for private health sector, to improve the coverage and quality of vital registration system, to improve surveillance system on disease and health, to encourage population based survey, to improve data management, and data sharing encompassing IT development and to promote utilization of health information in decision making process (5).

Myanmar has no up-to-date legislation related to all component of health information system. However, Central Statistical Authority Act has been established

since 1952 and there are also regulations and procedures in collection and release of vital data, notifying diseases data and social insurance data except private sector data. All legislations cover confidentiality together with fundamental principles of official statistics (59).

In 30th April 2004, The State Peace and Development Council, the Union of Myanmar, enacted the Electronic Transaction Law. As stated by the law, "Electronic record" is defined as "a record generated, sent, received or stored by means of electronic, magnetic, optical or any other similar technologies in an information system or for transmission from one information system to another". According to Chapter III, namely, Application, "the provisions contained in this law shall apply to any kind of electronic record and electronic data message used in the context of commercial and non-commercial activities including domestic and international dealings, transactions, arrangements, agreements, contracts and exchanges and storage of information. Article 20 from Chapter VIII mentioned that, "the originator and the addressee shall, in accordance with the stipulated means, perform the sending, receiving or storing of electronic record, electronic data message or electronic signature. However, if there is a specific agreement between them, it may be performed in accordance with the means of such agreement" (60).

Rapidly changing technology, insufficient funding, limited access to the Internet and insufficient bandwidth are listed as the most significant challenges in building an enabling environment for the use of ICT in the health sector. A national plan for the development of ICT in health was implemented in 2005; its effectiveness is still unknown (5).

2.8 Marie Stopes International Myanmar and Description of Current System

INGOs typically operate in Myanmar under various framework agreements with the government, such as Memorandum of Understanding (MOU) or Letters of Agreement with a relevant ministry. INGOs believe that aid can be effectively implemented and has a positive impact in Myanmar (61). There are two sets of INGOs working in Myanmar; the first group focuses on human rights and political reform, and,

the second group centers on humanitarian and development organizations which provide services or technical assistance in sectors such as agriculture, education, health or microfinance (9).

Equitable and quality healthcare is far from being realized in developing countries due to limited human and capital resources. There is insufficient focus on maternal health, neonatal and under-5 mortality or family and community practice and no systematic approach in addressing underlying causes of poor health outcomes. In this context, non-state providers are considered as having the potential to have a significant role in filling the gap in delivery in basic services and are major contributors to service provision in health (54).

Marie Stopes International (MSI), a UK based an International Non-Governmental Organization, is one of the largest international family planning organizations in the world. It has been established in Myanmar to provide health services including family planning, maternal and child health care, diagnosis and treatment of sexually transmitted infections, HIV/AIDS prevention, social marketing, partnership with private sector and education, awareness and marketing since 1998.(12) MSI in Myanmar has been working in partnership and collaboration with departments of health and social welfare, health professional associations (12).

In MSIM clinics, they use paper-based patient records system where the efficiency and accuracy of these records are unknown. Problems linked to paper-based records include longer waiting time during the retrieval of old medical record, inability to track one's health information and follow the detailed treatment plans. The other inconveniences include uneasy access to those records by others as there is no way to keep track of who sees these records, no quick access to the patient's medical history, no guarantee for information backup, legibility of records and prescriptions, and reliability on patient's recall for his past medical history (62).

The head quarter performs patients analysis, which includes aggregation of old and new patients registered during the previous quarter. As the number of patients increases, the implementation of computerized systems are needed, as paper-based systems cannot work efficiently and/or accurately. Implementing electronic medical record (EMR) system at the clinics can eliminate the manual update of paper registers and the system is expected to provide patients' medical history accurately and quickly,

while complying with all clinical, legal, and administrative requirements.

2.8.1 Current patient workflow at MSIM

The workflow describes the work process at a clinic or hospital provides health care to patients, where health officers are providing health care to patients. Patient registration is an example of a process, as is writing a prescription (63). Keeping patient record in paper-based format is common practice in MSIM clinics. Patient information is collected and kept in three places: *the clinic record card* and *the registration record* which are kept at the clinic and *the clinic record booklet* which is given to the patient. Since patient is given the clinic record booklet, some problems arise when the patient does not bring the clinic record booklet to the clinics due to misplace or lose or simply forgetfulness and the booklet has been tempered with. In all cases, they have to re-register. If the patient relocates to other area; the registration process is a must at another MSI clinic with or without the booklet. The client record cards are stored and sorted by key identifiers of name and address. Type of data kept at the clinics comprise of clinical observations, lab results, schedule appointment. On the other hand, patients are given clinic's record booklet, which generally includes information on clinical diagnosis, prescribed medications and procedures provided, and next scheduled appointment. The inconvenience of paper-based record system for the clinic includes high maintenance cost, missing documents, storage problem, and slow access.

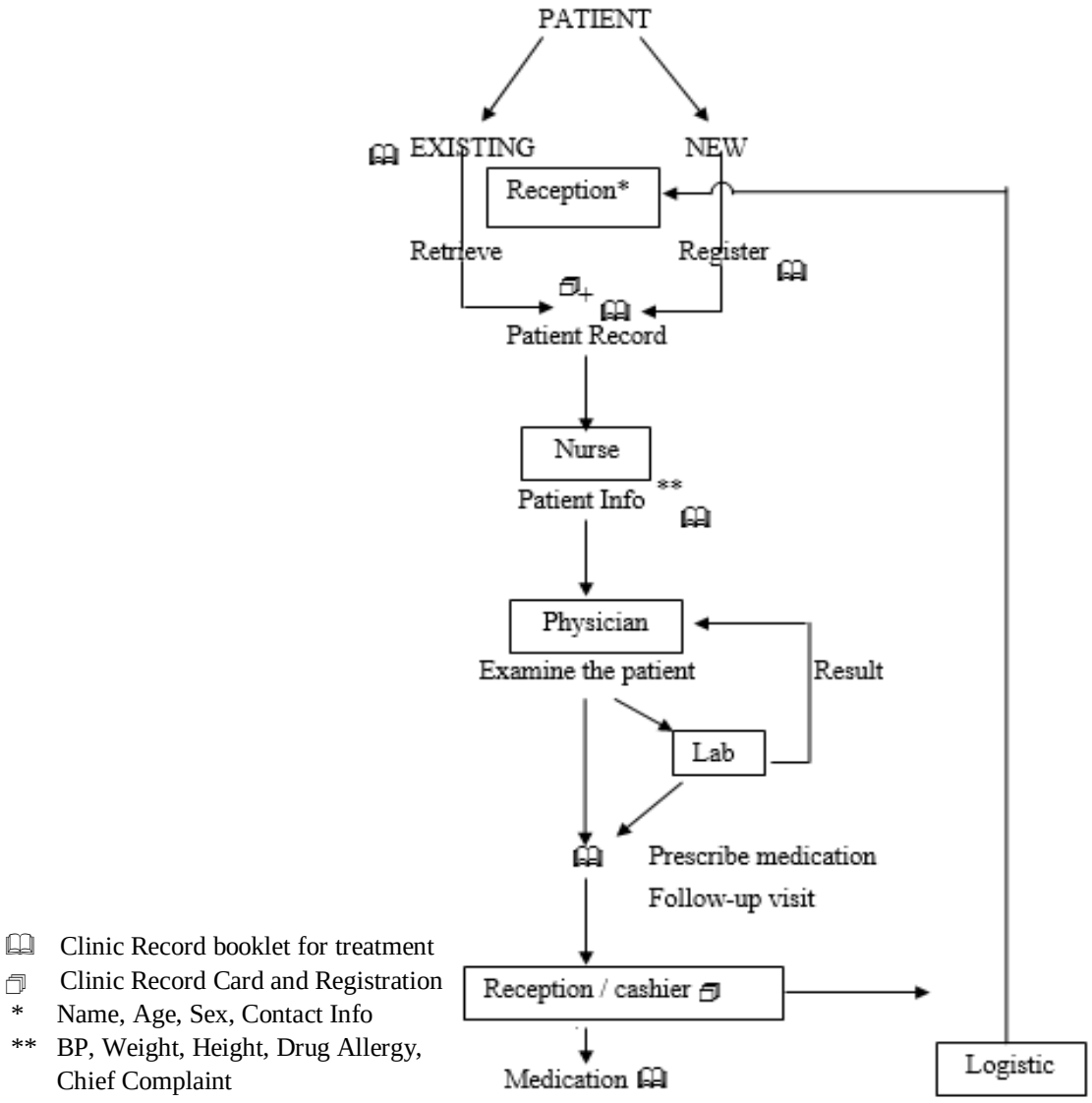


Figure 2.3 Current Patient Visit Workflow

The following represents current patient workflow in MSIM clinics.

1. A patient wants to get treatment or have an appointment at one of the MSIM clinics.

2. Patient goes to the clinic.

3. If he/she is a new patient, the receptionist registers him/her as new patient.

4. Reception desk manually records the patient information such as name, address, etc. in clinic record card, registration book which is kept at the clinic and clinic record booklet which is given to the patient.

4. If he/she is an established patient, the receptionist checks the patient's clinic record booklet and retrieve the patient record card and registration number from

the clinic.

5. Receptionist also updates the other necessary patient demographics information such as patient current address, phone number and allergy, etc.

6. Reception desk puts the patient in the waiting room.

7. Nurse/midwife collects the information such as chief complaint, vital signs, etc. from the patient and writes down that information both in clinic record book and patient's booklet.

8. Once the doctor is available, the nurse/midwife sends the patient from the waiting room to the doctor's room.

9. Doctor goes through collected information from the patient's clinical record booklet and if necessary, he can add any other significant information.

10. Doctor will conduct the physical examination on the patient.

11. According the patient's condition, the doctor will write down information in the clinic record booklet and clinic record card such as prescription for medication, lab orders, instruction to the patient, and schedule the follow-up visit if necessary.

12. Patient comes out of the doctor room and contact the reception desk for any or all of the following: payment for the medication bill if needed, and get prescribed medication.

13. In case of relocation, even though the patient brings his/her clinic record booklet, data written down in the booklet may not be legible, so, he/she will have to re-register at the new MSIM clinics.

14. In case the patient loses his/her clinic record booklet, the patient has to re-register again and information related to treatment plan, medications, etc would have been lost in which case.

The limitation of the current system is that the respective clinic cannot get the complete medical history of the patients, as medical history has not been described fully in the booklet and the record card. Since the MSIM clinic keeps the record for the patient's visit, though the clinic record card is documented and updated but still is difficult to file and retrieve sometimes. Keeping patient records in three places, with the patient and at the clinic, causes the huge daily filing problem for the clinics: it is hard to locate if those records are not filed by the end of each day.

Operationally, the current system might lead to loss of records; take up considerable amount of space to keep these records, time consuming in filing and retrieval and more prone to errors. Most importantly, the physicians need complete and accurate patient's record in order to achieve optimal treatment decisions.

2.8.2 Proposed Patient Workflow at MSIM

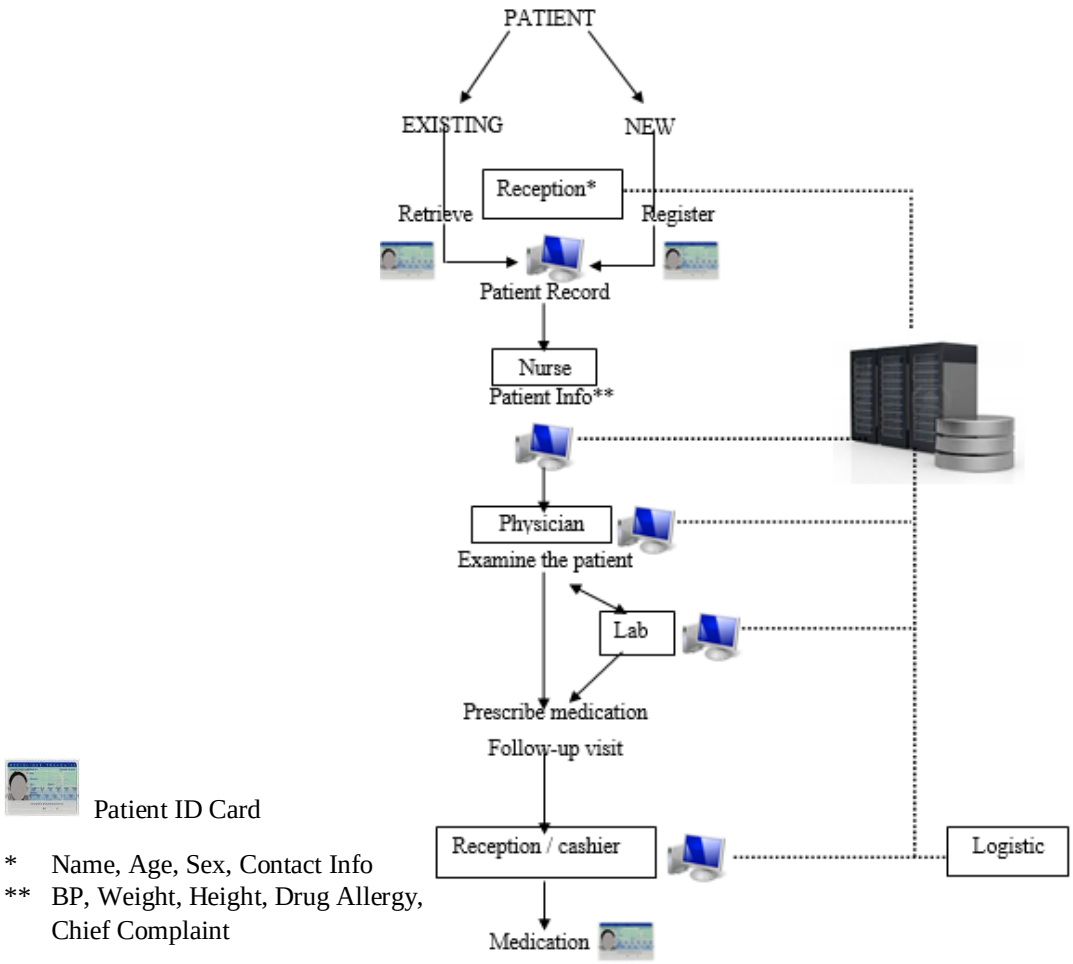


Figure 2.4 Proposed Patient Visit Workflow

The following steps represent basic workflow after implementing EMR in MSIM clinic. There is at least desktop computer at the front desk, waiting room, and treating room. A share a printer may be located in doctor's office. Every staff member uses the EMR for different functions depending on their roles.

1. A patient wants to get treatment or have an appointment at one of the MSIM clinics.

2. Patient goes to the clinic.

3. If new patient, the receptionist registers him/her as new patient.

4. Reception desks record the patient information such as name, address, etc. electronically, which can be viewed by other users from the clinic and give clinic record booklet to the patient. (Patient's clinical record booklet still has to use in transition period)

4. If he is an established patient, receptionist checks the patient's clinic record booklet and retrieves the patient's medical history from the system.

5. Receptionist also updates the other necessary demographics information of the patient such as current address, phone number, etc. in the system.

6. Reception desk puts the patient in the waiting room.

7. Nurse/midwife collects the information such as chief complaint, vital signs, allergy, current medication, past medical history, and past treatments from the patient depending on the patient's condition and updates these in the system.

8. Once the doctor is available the patient is sent from the waiting room to the doctor's room.

9. Doctor goes through information in the system such as reasons for the visit, test results if any, and makes necessary updates after checking the information collected by the nurse/midwife.

10. Doctor will conduct the physical examination to the patient and enter pertinent information into the EMR system.

11. According the patient's conditions, doctor will enter all or any of these orders in EMR system: Prescribed medication, lab orders, and schedule the follow-up visit if necessary.

12. Patient comes out of the doctor room and contact the reception desk for any or all of the following: payment for the medication bill if needed, get medication, and confirm the next appointment.

13. In case of relocation, upon patient's request, the medical history stored in EMR system can be shared easily across clinics by email or in printing.

15. In case the patient loses his/her clinic record booklet, the complete medical data kept in the system are still accessible.

Before the EMR can be introduced, the clinic needs to consider a number of factors such as: the cost involved, available funding, computer skills and expertise of

medical and clerical staff; and resistance by some medical personnel while transforming from manual to electronic documentation (64). Office staff and medical personnel are often hesitant to change, since they are very much used to the old system.

One of the objectives in implementing the EMR in the clinics is to have continuity of care. EMR system would capture timely and accurate data that will be used by healthcare workers during patient's visits to supplement decision-making: Every time a patient come to get treatment at the clinic, without the booklet, it is difficult to answer the following questions: What is wrong with the patient? Is this something new or an old problem? What happened last time? Are there any concurrent problems? As patients also fail to remember and/or inability to answer precisely, many details and important information might get lost. In addition, the processes of investigation and diagnosis have to be repeated again, which leads to waste of time, money and effort. Implementing an EMR could help significantly to address the difficulty mentioned earlier in MSIM clinics, and ultimately, it could help create a health data for the patients to provide continuum of care. To provide effective and timely treatment, the clinics need to have information about patient, such as known allergies, chronic conditions, current medications and other relevant health care data. No matter how important to have accurate and up-to-date information, without proper system, information such as patient's medical history is not always available.

After deploying the EMR system in MSIM, at the clinic level, collected data can be used for effective patient management. Summary indicators, in turn, can be used for management, planning and procurement purposes and they are then used for organizational governance. Application of EMR system would allow the clinic health personals to have quick access to patient information, to be able to make better-informed decisions by having the right information at the point of care and to improve staff productivity and performance in delivering patient care. On top of that, with EMR, the clinic can work on other health related statistical analysis such as identification of cases per disease and per age group, percentage of patients, etc. as a result of easy medical information retrieval. Having the system implemented at the clinic would allow the staff to generate the budget planning and reports for donor more easily. After literature review on the EMR, it seems as a promising tool for aiding data organization and thus improving quality of care.

2.9 Feasibility

Digital technologies are costly and demand professionalism for successful implementation of e-projects. Availability and effective use of ICT-Infrastructure are necessary for E-health implementation. ICT-infrastructural components such as Internet, hardware and software and IT-professionals are of significance in determining the successful e-Health implementation (65).

In the recent years, there have been significant breakthroughs in the area of healthcare informatics systems, especially the use of electronic medical records. Having known the benefits and challenges of EMR, it is necessary to determine if the intended project of implementing EMR systems is feasible. The project feasibility can be assessed in three ways: operationally, technically and economically. The feasibility study will allow the management whether to proceed with the systems or not (66).

Likewise, EMR implementation requires health care organization to identify their needs and readiness so as to prepare individuals and organizations for any organizational changes as well. In determining technical feasibility, one must observe whether the current technical resources, human resources and software packages available to support the proposed system (67).

In this paper, core issues related to technical feasibility and their acceptance of the proposed system will be discussed before the implementation of system. Technical feasibility is used to find out whether it is possible to develop the new system given the current technical resources (66). Technological feasibility include accessing availability and affordability of hardware and software, infrastructure quality, computers linked to internet per personnel, the internet connectivity type, use of websites, use of electronic data exchange, ICT expert availability, and IT security in the organization (68). In this regard, this study will assess current IT availability and usage in MSIM to determine the technical feasibility of the proposed system implementation. Hence, this study will adapt the questionnaire from the previous study by Boonchai Kijsanayotin and Stuart Speedie, titled, “Are Health Centers in Thailand Ready for Health Information Technology?: A National Survey”. Their objective was to survey the current usage, basic knowledge, acceptance and use of IT among healthcare personnel at community health centers in Thailand (52) which correlate with the objectives of this study.

Economical feasibility and operational feasibility are, however, beyond the scope of this study: Economic feasibility is utilized to consider the cost of doing a full systems study, the estimated cost of software or software development, and the estimated cost of hardware. If short-term costs produce no immediate reduction in operating costs, the system is not economically feasible. If both technical and economic resources are adequate, the operational feasibility will be considered. It mainly depends on human resources available for the project and users involvement in design process. If the proposed system is supported by management, the system will be accepted and used.

The user willingness to support the new system is of importance as well (67). Financial feasibility analysis is an analytical tool used to evaluate the economical viability of an investment. Management can assess economic feasibility by doing the cost-benefit analysis, or break-even point analysis (69). Studies examining the financial feasibility of EMR have produced mixed findings. Financial feasibility study of EMRs conducted by Simon Steven John demonstrated that EMR can provide both tangible (monetary) and intangible (quality of care) returns in one medium-sized physician practice (70).

A feasibility study, an analysis of viability of an idea, is a preliminary study undertaken to determine a project's viability. The result will be used to decide whether to proceed with the proposed project or not. It is, in fact, an analytical tool used during a business development process to show how a business would operate under assumptions such as the technology used, financing and so on. A feasibility study will not determine if the project will be initiated, since that depends on the decision makers. However, the information, data, and facts offered in a study, given realistic assumptions, provide the basis for a decision (71).

2.10 Models of Technology Acceptance

Implementing EMR system brings challenges of its own; one of these is the fear of change. The potential users should understand implicitly that the changes could positively affect the quality of care they deliver (62). At the user level, a complex system such as EMR will likely to create learning burdens on potential users.

According to Rockefeller Foundation's Making the eHealth Connection: Global Partnerships, Local Solutions Bellagio Center conference series, users readiness is a key success factor, along with critical considerations such as training, staffing, and planning tools. Potential users involvement and acceptance are necessary for the change and can be done simply by inviting them to participate in the system design and implementation (72). In principle, information technology is used to enhance employee performance, and yet the benefits derived from the technology are often lost due to users' unwillingness to accept and use the information system.

The issue of technology acceptance has been studied in information's systems (IS) and ICT research to predict and explain behavior across many domains. In this study, some of the notable models such as Theory of Reasoned Action, Theory of Planned Behavior, Technology Acceptance Model and The Unified Theory of Acceptance and Use of Technology will be discussed, as those models were developed to help estimate and measure Information System innovation success.

2.10.1 Theory of Reasoned Action

In Theory of Reasoned Action (hereafter TRA) by Fishbein and Ajzen (1975), behavior is determined by the behavioral intention to emit the behavior. Two major factors determining behavioral intention are a personal or "attitudinal" factor and a social or "normative" factor (73).

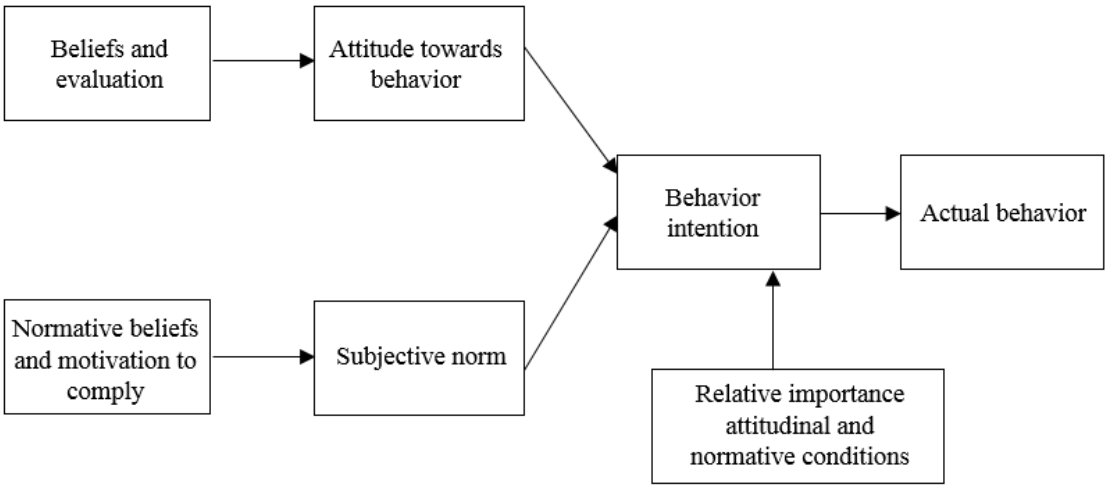


Figure 2.5 Theory of Reasoned Action (Ajzen & Fishbein, 1980)

The aim is to explain volitional behaviors whilst excluding spontaneous or mindless behavior, as it might not involve a conscious decision. It also excludes

behaviors that may require special skills, unique opportunities or resources or the cooperation of others to be performed. TRA described one's behavioral intention is a result of both an individual influence and a normative influence. According to theory, the more favorable the attitude towards the behavior and the subjective norm in respect to the behavior, the stronger the individual's intention to perform the given behavior (74). In a doctoral thesis by Shu-Ting Chuang, TRA has been applied to study the determinants of user behavior of Mobile-service. The results indicated that social influences in TRA really made a great impact on users and TRA well demonstrated individual's adoption of new technology (75).

2.10.2 Theory of Planned Behavior

In 1991, Ajzen proposed the Theory of Planned Behavior (hereafter TPB), which is based on TRA. The aim of the theory is to better explain an individual's behavior in specific situations: individual behavior is determined by a joint function of intention and perceived behavioral control (76).

TPB is different from TRA in its inclusion of perceived behavioral control, which, in fact, plays a significant role in the model, as it would allow prediction of behaviors that were not under complete volitional control. TPB postulates three independent determinants of intention or predictors, namely attitude towards the behavior, subjective norm, and perceived behavioral control. In general, the magnitude of individual intention to perform the behavior under consideration is based on the favorable attitude and subjective norm with respect to a behavior and the perceived behavior control. Importantly, the TPB traces attitudes, subjective norms, and perceived behavioral control to an underlying foundation of beliefs about the behavior (77).

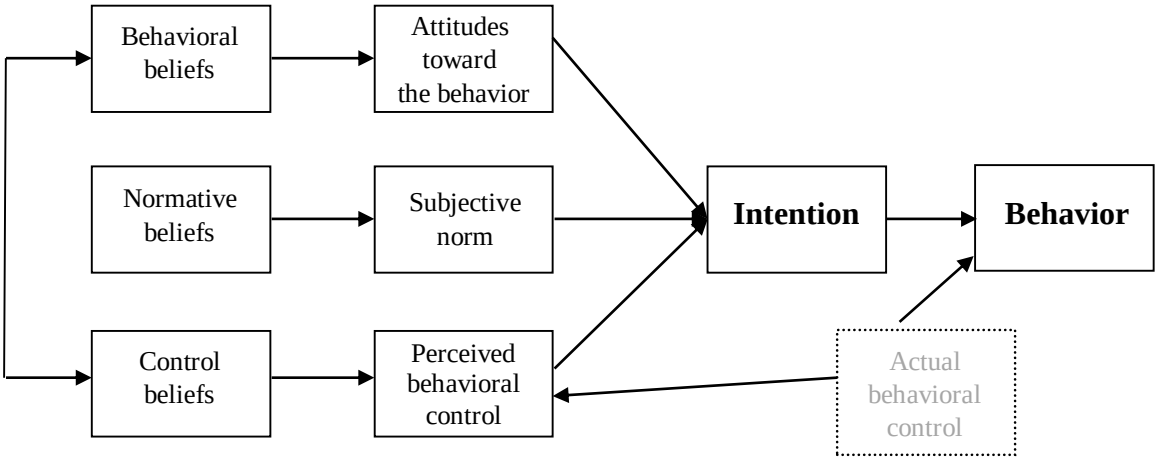


Figure 2.6 Theory of Planned Behavior diagram (Ajzen, 1991)

TRA and TPB have been used in a study conducted by Gokhan Ozer and Emine Yilmaz (2010) to investigate the behavioral dimensions of IT usage of accountant. The result showed that TPB is superior to TRA in predicting participants' intention to use IT (78). Another study conducted by Stefanie A Fila and Chery Smith, TPB is used to study decision-making behavior associated with health, and the result indicated that TPB is beneficial in predicting factors related to healthy eating behavior (79).

2.10.3 Unified Theory of Acceptance and Use of Technology

In 2003, Venkatesh et al. reviewed eight models, which describe user acceptance of technology such as the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model (MM), the Theory of Planned Behavior (TPB), a model Combining the Technology Acceptance Model and the Theory of Planned Behavior (C-TAM-TPB), the Model of PC Utilization (MPCU), the Innovation Diffusion Theory (IDT), and the Social Cognitive Theory and formulated Unified Theory of Acceptance and Use of Technology (UTAUT) (80).

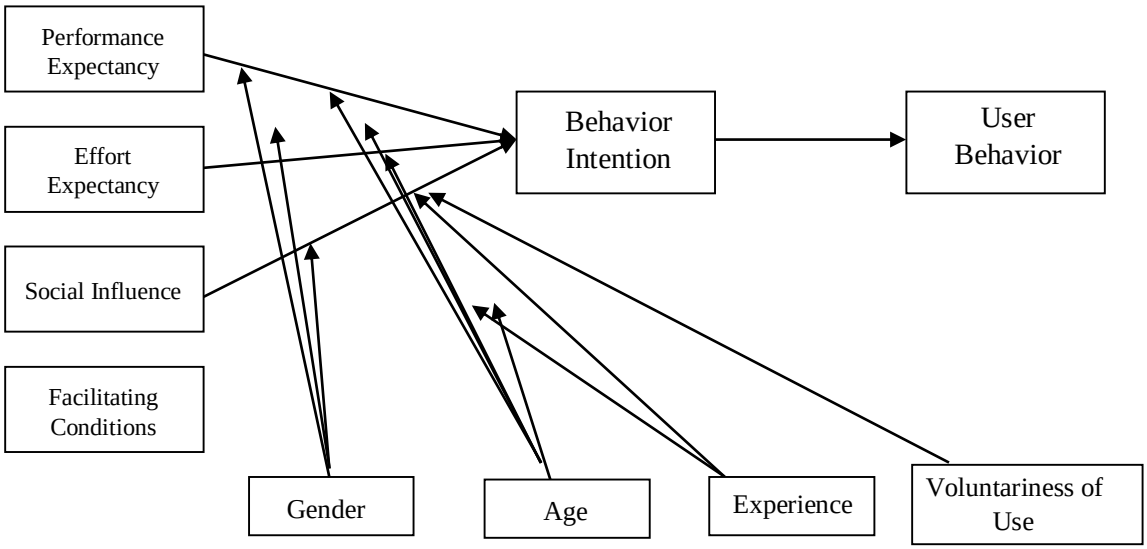


Figure 2.7 Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003)

The model, which integrates acceptance determinants across several competing models, tries to give an explanation of user intentions to use an Information System and usage behavior. It has been applied and empirically tested in different domains and it is believed to be more robust than other model in evaluating and predicting technology acceptance (81).

2.10.4 Technology Acceptance Model

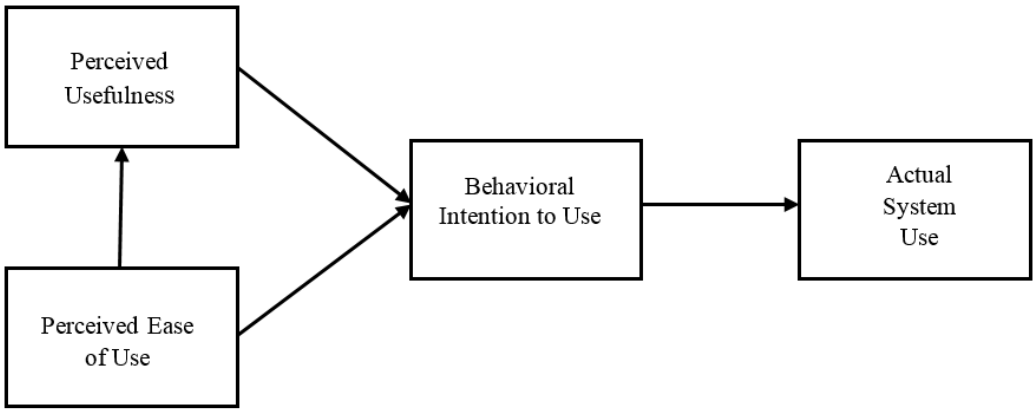


Figure 2.8 Technology Acceptance Model (Davis et. al. 1989) (21)

Technological Acceptance Model (TAM) by Davis (1989) provides means for predicting acceptance and discretionary use of information systems, and is based on Fishbein and Ajzen's Theory of Reasonable Action (TRA). TRA theorizes that a person's attitudes toward a particular behavior are determined by his or her beliefs.

Davis indicated that users' motivation can be described by three factors such as Perceived Ease of Use, Perceived Usefulness and Attitude towards using the system and TAM incorporates beliefs specific to technology adoption and generalizes to different computer systems and user populations. Several studies has highlighted the importance of perceived ease of use and perceived usefulness in predicting person's behavior.

Davis defined Perceived Usefulness as " the degree to which an individual believes that using a particular system would enhance his or her job performance and Perceived Ease of Use as " the degree to which an individual believes that using a particular system would be free of physical and mental effort" (20). TAM postulates Behavior Intention to Use as, "the use of an information system is decided by users' behavioral intentions". TAM states that the success of a system can be determined by user acceptance of the system, which can be measured by the above-mentioned factors. The user's perception about the system's usefulness and ease of use will result in behavioral intention to use the system (21).

All in all, TAM is useful in predicting how acceptable a particular technology will be. There has been several studies such as Adams et al., (1992), Davis et al., (1989), Hendrickson et al. (1993), Segars & Grover (1993), Subramanian (1994), and Szajna (1994) to validate TAM , to provide empirical evidence on the associations that exist between usefulness, ease of use and actual system use (82). TAM has been extended in a study by Jeongeun Kim, Hyeoun-Ae Park (2012). They developed and verified the Health Information Technology driven extended Technology Acceptance Model (HITAM) in health care and concluded that the extended TAM can be used to describe health consumer's behavioral intention (83).

A study by Abu-Dalbouh, H.M utilized TAM to investigate the user acceptance towards mobile health application (84). Wong AM, Chang WH, Ke PC et al. has used modified TAM to evaluate users' intention of using the Medication Reminder and Intelligent Watch (85). A study by Melas CD, Zampetakis LA, Dimopoulou A, and Moustaki V. has used TAM to explain the intention to use clinical information systems in medical staff in Greece. TAM predicted significant proportion of intention to use the system (86). A modified Technology Acceptance Model has been presented and utilized in a study to determine the influencing factors in technology acceptance decision among the physicians in Penang private clinics as well (87).

Since this study attempts to identify users' attitudes towards the system prior to the implementation, the format of the questionnaire has to be minimally modified: the respondents will be asked to evaluate the desirability of features of a planned system. But, it will not be possible to investigate between users' attitudes towards the system and actual system use.

The body of research outline in this literature review describes the EMR including its benefits and challenges along with its implementation in developed and developing countries. With the aim to provide continuum of care through new system in the MSIM clinics, the concept of feasibility in implementing new project is discussed. Since the user acceptance in technology is of importance, Technology Acceptance Model (TAM) and other related models are described. Leveraged gained through the secondary research, the primary research will measure the current IT Usage, IT knowledge of staff and attitude toward proposed system by means of a survey and a qualitative interview.

CHAPTER III
MATERIALS AND METHODS

"Research has one end: the ultimate discovery of truth. Its purpose is to learn what has never been known before; to ask a *significant question* for which no conclusive answer has been previously been found; and, by collecting and interpreting relevant data, to find an answer to that question"(88).

3.1 Research design

This research entitled "Need Assessment and Feasibility of Electronic Medical Record System Implementation in MarieStopes International Myanmar" was a cross-sectional study. A cross-sectional survey refers to the survey, which collects data at one point at in time to make inferences regarding population of interest(89).The aim of this thematic paper was to assess the feasibility for the implementation of EMR system in MarieStopes International Myanmar (MSIM). Several factors determined the research approach taken to conduct this study: Both qualitative and quantitative approaches were considered.

The study was conducted after receiving the permission from Ethical Committee from Mahidol University and MSIM committee. The rationale was discussed and explained in terms of development of the instrument, population, sample, data collection, and data analysis.

3.2 Population

The population of this research was the employees working at MSIM clinics and the head office. MSIM 25 Clinics are located in 6 Regions and one State, namelyYangon Region (4 clinics), Bago Region (2 clinics), Mandalay Region (5 clinics),

Sagaing Region (4 clinics), Magway Region(2 clinics), Ayeyawaddy Region (5 clinics) and Mon State (3 clinics). Head office is located in Yangon, Yangon Region in Myanmar. Figure 10 represents the MSIM clinics' location in Myanmar. Regarding human resources, there are about 350 all national staff employed at MSIM. The clinic personnel usually consists of one medical doctor, two nurses or one nurse and one midwife, one counselor, 3 to 10 field workers called Sexual and Reproductive Health Promoters (SRHP), one cashier/ receptionist/ accountant (hereafter C.R.A), one security and one utility worker. There is one lab technician if a lab is attached and a driver if there is a rented or owned car as well.

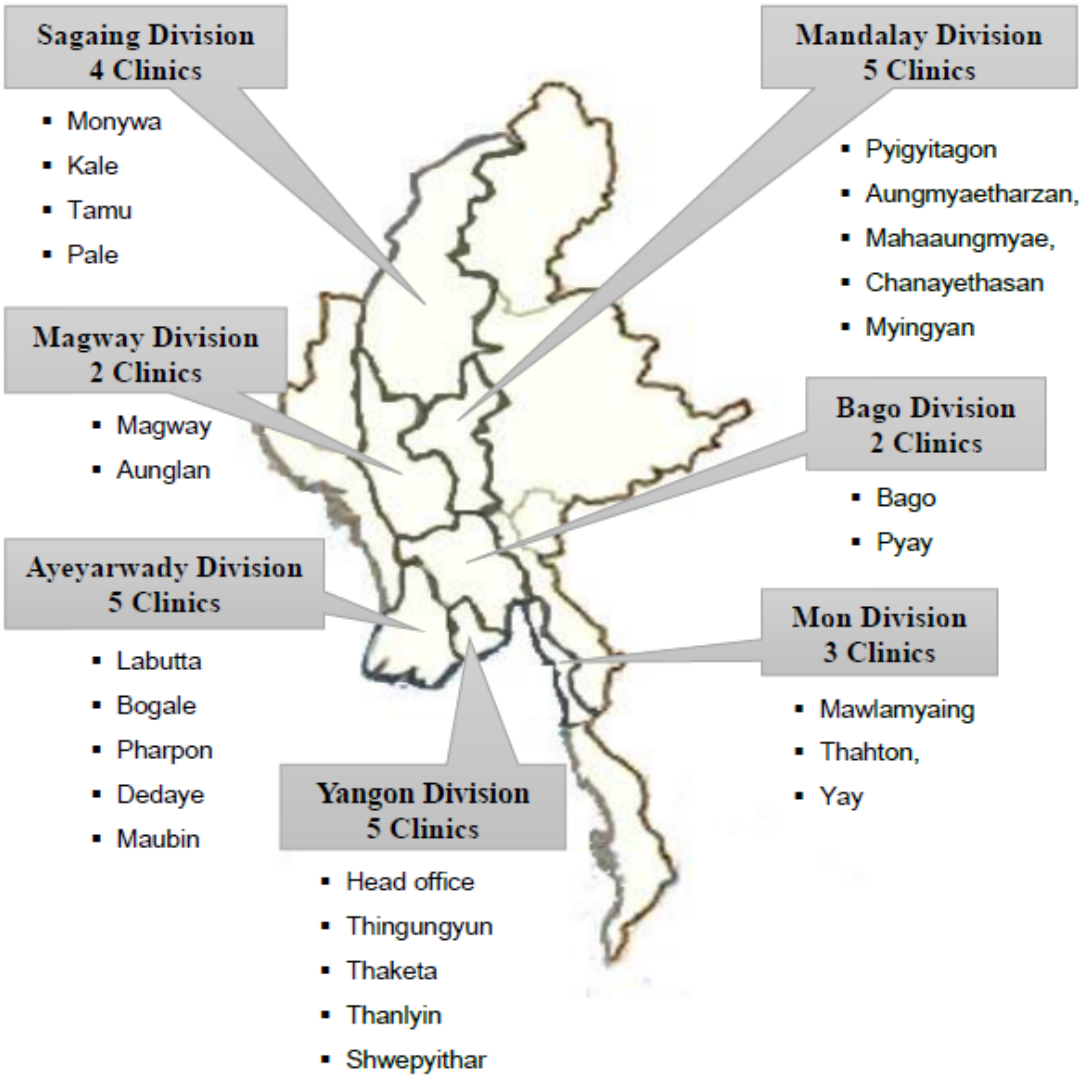


Figure 3.1 Marie Stopes International clinics' location in Myanmar

3.3 Sampling method

In order to enhance the impact of the study, the sample size is calculated by purposive sampling method by strategically choosing the location and stakeholders to reach a wide range of variation on dimensions of interest. Purposive sampling can be defined as selecting units based on specific purposes related to answer a research objective. It is a type of sampling in which specific setting, events, persons are intentionally selected for the information they can provide that cannot be got from other choices(90). This method has been used when a research question need an intensive investigation of a small population(91).

As a matter of fact, the survey took place in the head office and at least 50% of total clinics, particularly from Yangon Region, Mandalay Region, Sagaing Region, Bago Region, and Mon State. The samples selected from each clinic comprised of key stakeholders such as potential users and potential operators. Inclusion criteria for the participants of this study were potential users such as medical doctor, nurse, midwife, C.R.A, S.R.H.P, lab technician as well as potential operators consisting of management and administrative staff from both clinics and the head office. The persons who will not be using the proposed system and who did not want to participate in the study are excluded. Regarding the response rate, it was expected to receive around 90% based on the previous survey taken place in Myanmar(92-94).

3.4 Research tool

Data were collected by both questionnaires and interviews, which is constructed and developed after intensive literature reviews of related studies and several rounds of group discussion with thematic paper committee members and experts. The survey was designed to be anonymous to ensure honesty and direct feedback, which would be more valuable in getting an understanding of their intention to use.

Generally speaking, the reasons for information systems failure include communication, complexity, organization, technology and leadership(95). Hence, it was indispensable to determine the technical feasibility of the project and user acceptance in order to successfully implement IT related project. The definition of

feasibility in this research meant “capable of being accomplished or brought about”(19). In fact, the technical feasibility could help the management makes a decision whether to proceed with the development of such project.

To determine technical availability, the survey assessedthe current status of IT use in MSIM clinics, focusing on the staff’s computer usage, staff’s IT knowledge, the technology availability, and network availability at the clinic/office at MSIM. For this part, the questionnaire was adapted but minimally modified from the previous study, namely, “Are Health Centers in Thailand Ready for Health Information Technology?: A National Survey” which was conducted by BoonchaiKijsanayotin and Stuart Speedie, in which instruments had been tested and shown acceptable level of reliability and validity(52). Knowing the staff current use of IT, their level of IT literacy was crucial for management to determine feasibility of implementing EMR.

One of objectives of this survey was to access the users’ acceptance towards a proposed EMR system. Rather than developing a new model of the factors influencing user acceptance of new technology to the healthcare, this study adapted David’s Technology Acceptance Model (TAM)’s questionnaire. The TAM (by Davis, 1989) measured perceived usefulness and perceived ease of use as predictors of a user’s intention to use computer technology(21). The exact constructs for perceived usefulness and perceived ease of use is based on doctoral thesisby Mary Morton (96) and intention to use from a study conducted by HaslinaMohd and Sharifah Syed Mohamed (97). The proposed system EMR success and failure depends on potential users’ willingness to accept and use the system, even though it would help to improve employee performance. The Likert-type TAM instrument was considered one of the most robust and parsimonious models for predicting user acceptance. Limitation in using only three TAM constructs in this study was that it reported only the perception and intention to use of proposed system, rather than actual usage behavior, as the system was not yet in place. There was a possibility that the perception and intention to use may be different after implementation and the study was restrained by participant’s self-reported behavior and their willingness to respond.

There were participant information sheet and consent form explaining the information obtained was subject to anonymity and confidentiality and was used only

for the purpose of the study. The questionnaire was structured and divided into four parts, please see the Appendix C in English and D in Burmese for more details.

3.5 Questionnaire

Section A. User Acceptance

The following section pays attention to users based on Technology Acceptance Model by Davis et al. (1989) particularly perceived usefulness and perceived ease of use factors. It focuses on the determinant that is expected to influence behaviors based on TAM model(21).

This section had items relevant to perceived usefulness and perceived ease of use for proposed electronic medical record system (96): Four items were used to construct perceived ease of use, and the respondents were asked to indicate their agreement with each item on a five point numerical scale, ranging from 1-strongly disagree to 5-strongly agree. An example of perceived ease of use item was “Learning to use the EMR will be easy for me.” Perceived usefulness wasmeasured using seven items and respondents were asked to indicate the extent of their agreement with each item on the same five point numerical scale as perceived ease of use. An example of perceived usefulness item was “Using the EMR will improve the quality of my work in providing better patient care.” Intention to use is also included in the statement, for example “I intend to use EMR in my work”(97).

The five choices for each statement and score in each choice were rated as follows:

	Score for statement
Strongly Agree	5
Agree	4
Neither Agree/Disagree	3
Disagree	2
Agree	1

The score were divided into two groups according to score interval based on median score as follows:

User Acceptance	**Score Interval**
Low	1 -52
High	53-65

Section B. Information Communications Technology Knowledge

This section has 10 questions to collect data regarding basic ICT knowledge, which is adapted from one study conducted in Thailand (52). According to that survey, those IT statements were guided by European Computer Driving Licenses (ECDL) basic IT sample test and by a study of computer literacy in U.S. university freshmen. Out of 20 questions for ICT knowledge inthe original paper, this study had used only 10. In this part, statements related to basic knowledge such as operating system, software, virus, printer, network, Internet, etc. were included. There were three choices for each statement, i.e, True, False, and Not Know.

The scores in each choice were rated as follows.

Choices	Scores
Right Answer	1
Wrong Answer	0
Not Know	0

Then the scores for the knowledge were divided into two groups according to median as follows:

Knowledge	Score Interval
Low Level	1 - 7
High Level	8 - 10

Section C. Demographic

The third section consisted of 2 parts: , information about the office/clinic and about the participants, and questionnaires were adapted from BoonchaiKijsanayotin and Stuart Speedie's study(52).

The first part with 8 questions intended to collect information about technological availability and network availability at work, such as the availability of computer systems, type of software, Internet availability, service providers, means of

accessing the Internet, number of people working at the clinic/office and number of people routinely using computers.

The second part had eight questions concerning the personal characteristics and educational background of the participants, which includes gender, age, the highest level of education and the position held at the organization, working experience in the healthcare field, the amount of time spent on particular work associated tasks and the training need if EMR install.

Section D.Computer Usage

This section was to collect data on current computer usage of clinic/office staff. It had 5 questions to assess the individual's technology usage, as it was an important factor in this research. The questionnaire was designed to reveal information about participants' experience, how long they have been using it, how often they use it, what kind of computer they use, what kind of activities they do with computers and what kind of training and experience with computers they have previously. Computer usage associated with activities in office/clinic includes 10 items, which was measured from zero (never perform this task) and three (always use a computer). The ten items comprised of recording patient data, retrieving patient clinical record, writing, preparing presentation slides, communicating with colleagues, searching for information associated with office tasks, searching for information associated with personal interest, performing statistical analysis and generating mandatory reports. The 10 items for IT use was adapted from the previous survey(52). According to them, the IT use questions were tested and had acceptable test reliability and internal consistency.

The score in each choice was rated as follows.

	Score for statement
Never perform this task	0
Never use a computer	1
Sometimes use a computer	2
Always use a computer	3

Then the scores were then divided into two groups according to score interval, median. The score interval for computer use activities in clinic/office was as follows:

Computer Use Activities	**Score Interval**
Low Level	0 - 17
High Level	18- 30

The last question of this section collected information on the training or experience of the staff with computer.

3.6 Interviews

User concern assessment

In addition to the questionnaire survey, interviews were conducted to understand interviewees' major concerns of current system and to explore their aspect of proposed system. According to Kvale (1996), the purpose of interview was described as "obtaining qualitative descriptions of the life world of the subject with respect to interpretation of their meaning". Semi-structured interview has a sequence of themes to be covered, as well as suggested questions (98).

The key people at all level who will be affected by new system and/or people suggested by the organizational contact were interviewed at l1 MSIM clinics and the head office. The key interviewees included clinicians and non-clinicians at the head office.In addition to the key personnel, the researcher interviewedat least one person from each clinic: and surveyed clinics. Each interview took not more than 30 minutes. The interview started with general introduction; the researcher/interviewer introduced about oneself and briefly explained the background of the study and assured the interviewees/participants that the data collected were kept confidential. Then, the permission (consent) for interview was taken. The interviewees were told to ask any questions if questions were not clear. Questions outlined for interviewees at the clinics were as follows:

Open questions

- What is your opinion of the current paper-based system in your clinic?
- On average, how many patients visit to clinic per day?

- On average, how long does it take the whole process of treating the patient?
- Does the clinic receive any complaint from patients regarding their services?

Closed questions

- Is it easy to use, retrieve patients' information in the current paper-based system?
- Do you provide medical report to patients?
- Does the clinic maintain full patients' medical report?
- Are you concerned about loss of productivity during transition to the new system(s)?
- Are you concerned about inappropriate disclosure of protected health information?

As for **headoffice**, other than questions mentioned above, the following additional questions were asked.

- Can the organization get funding?
- Does the organization have IT personnel/expertise?
- Do they have capacity to train their staff?
- Are they concerned about the ability to keep patients' data private and secure?
- Are they concerned about obtaining or maintaining wireless access?

The interview results were coded and analyzed into broad themes and were used to assist in interpreting the responses.

3.7 Questionnaire validity and reliability

1. Content validity. Bring the preliminary developed questionnaire to consult advisors and experts to examine the clarity of questions, the accuracy of the language used, and the validity.

2. The questionnaire was pre-tested for the purpose of detecting problems in the questionnaire instructions or design, by distributing Burmese language questionnaires to fellow Myanmar students.

3. In order to identify any problems with the survey instruments and EMR presentation, a pilot test was performed 5 to 10 health personnel whose characteristics were similar to targeted population before conducting the actual survey. A total of 5 participated in the pilot study and provided feedback regarding survey items. The survey took respondents on average 20 minutes to complete and 35 minutes being the maximum complete time.

Since the survey was conducted in Myanmar and staffs from the selected INGO normally used Burmese Language for everyday life, it was appropriate to conduct the survey in Burmese even though the employees have sufficient English proficiency to understand an English questionnaire. Two bilingual individuals participated independently in the translation process.

3.8 Data collection

Data were collected by survey questionnaire and by interviews, which were conducted as follows: The researcher had requested permission from MSIM to conduct both quantitative and qualitative research in its head office and the clinics. The researcher coordinated with MSIM staff and explained about the EMR by using presentation in Burmese language (Appendix F). After distributing information sheet, and getting the consent from the potential users and operators from the respective clinics and head office, the researcher askedthem to complete the survey questionnaire developed in this study.

The researcher also interviewed Country Director, Program managers and staffs from eleven surveyed clinics and all interviews were conducted in Burmese. One limitation of the study was that despite best efforts, it was not possible to include all the clinics across country.

3.9 Data analysis

Data collected from interviews were coded, analyzed in both Microsoft word and Microsoft spreadsheet and generated into descriptive format report.

Data from the survey were manually entered into an SPSS database and were double-checked for quality control.

1. Descriptive statistics, i.e. percentage, mean, median, and standard deviation were used to describe personal characteristics, work experience factors, etc.
2. ANOVA was used to examine differences in scores on computer usage, ICT knowledge and user acceptance among regions and among employees.
3. Pearson correlation was used to examine the relationship of attitudes toward the proposed system, EMR.
4. Regression analysis was used to predict the intention to use of EMR.
5. A statistical significance level was determined at 95% (α=0.05).

3.10 Ethical considerations

To maintain the high level of ethical standard throughout the thematic paper process, the researcher was mindful about the ethical issues. Ethical principles from Declaration of Helsinki, developed by the World Medical Association will be used as guidance and kept in mind especially No. 20: "The subjects must be volunteers and informed participants in the research project"(99).

The permission to conduct the survey has been approved by the MSIM, which can be found in Appendix G. The study was conducted after receiving the approval both from Mahidol University Research Ethics board and from MSIM committee.

CHAPTER IV
RESULTS

The aim of this chapter is to present the results and findings from the interviews and questionnaires carried out with the staff working at MSIM head office and 13 clinics. Mixed methods had been used as each methodology has its own strengths and limitations and using both could emphasize the strengths and minimize the limitations. The first part of this chapter represents the findings from quantitative method and the second section depicts the themes emerging from qualitative interviews.

The quantitative survey was conducted by using questionnaire to find out the current technological availability, staff's computer usage and computer knowledge, and the user acceptance on proposed system. The results in this chapter would fulfill the specific objectives of the study:

- To assess current Information Technology use in MSIM
- To assess computer usage of MSIM employees
- To assess Information Technology knowledge among MSIM employees
- To assess user acceptance towards proposed system

The survey took place in the head office and 50% of total 25 clinics in Yangon Region, Mandalay Region, Sagaing Region, Bago Region, and Mon State. The 120 questionnaires were distributed and the sample was chosen from employees at MSIM, ranging from healthcare providers to administrative staff. Of the 120 questionnaires distributed, 112 responses were received with the response rate of 93%. However, there were missing answers to some questions as the participants opt not to answer the questions.

The staff being invited to participate in this study included clinicians, nurses/midwife, lab technician, Cashier/Receptionist/Accountant (C.R.A), Sexual and

Reproductive Health Promoter (S.R.H.P), counselor, supervisor, field coordinator, project officer, manager, program associate and administrative staff. The

questionnaire was returned and received from all surveyed clinics and the head office. The response from one clinic was limited due to the number of staff being employed at that clinic.

Participants were also asked whether they were present at the time of presentation. Eighty-six (76.8%) respondents answered yes, 3 (2.7%) answered no whilst 23(20.5%) participants did not answer that question.

4.1 Demographic data

For demographic data, general analysis consisted of minimum, maximum, frequency, percentage, mean and standard deviation. The general characteristics of the respondents working at MSIM were based on gender, age, education level and position held, which is presented in Table 1.

Total demographic particular showed that 81.2% of the participants were female and 18.8% were male. The mean age of the participants was 35.06 years old (SD=9.5, range= 22 -63), with the youngest age of 22 and oldest age of 63. In general, most of the surveyed participants were in the less than 30 years of age group, representing 43.8%.

Regarding education level, the majority of the respondents graduated with a bachelor's degree (74.1%), and 15.2% completed high school, and 1.8% with the vocational diploma. The highest education of the surveyed participants was master's degree representing 8.9%.

For participants' employment, 20.5% of all participants were S.R.H.P, 12.5% were doctors and public health professional, 11.6% of nurses and midwives followed by 10.7% of lab technicians. The percentage of management and administration, supervisor, and C.R.A represents 19.6%, 11.6% and 10.7% accordingly. Participants' job description was further classified into two groups, clinical staff (30.4%), which included doctor, nurses, midwives and lab technicians, and non-clinical staff (69.6%), C.R.A, S.R.H.P, counselor, supervisor and management and administration. (Table 4.1)

Table 4.1 General characteristics of respondents

Characteristics	**Group**	**Head Office (n=25, %)**	**Other (n=87, %)**	**Total (n=112, %)**
Gender	Male	8 (32.0)	13 (14.9)	(21, 18.8)
	Female	17 (68.0)	74(85.1)	(91, 81.2)
Age				
	<30	4 (16.0)	45(51.7)	(49, 43.8)
	31-40	10(40.0)	26(29.9)	(36, 32.1)
	41-50	8 (32.0)	12(13.8)	(20, 17.9)
	>50	3(12.0)	4(4.6)	(7, 6.3)
Education level				
	Master	8 (32.0)	2(2.3)	(10, 8.9)
	Bachelor	17(68.0)	66(75.9)	(83, 74.1)
	Diploma	-	2 (2.3)	(2, 1.8)
	High School	-	17 (19.5)	(17, 15.2)
Position held				
	Clinical	6 (24.0)	28 (32.2)	(34, 30.4)
	Non-Clinical	19(76.0)	59 (67.8)	(78, 69.6)

In response to the working experience in healthcare, the majority (50.9%) of the participants have been working in healthcare for more than 6 years, followed by 4-6 years representing 28.6%. As for working at the respective clinics or head office, 38.4% of the survey respondents worked at the clinic/office for more than 6 years, 33% for 4-6 years, and 1-3 years represented 18.8%. (Table 4.2)

Table 4.2 Working experience in healthcare and working at MSIM

Characteristics	Group	Head Office (n=25, %)	Other (n=87, %)	Total (n=112, %)
Working in healthcare	<6 months	1 (4.0)	3 (3.4)	4 (3.6)
	7-11 months	-	2 (2.3)	2 (1.8)
	1-3 years	4 (16.0)	13(15.0)	17(15.2)
	4-6 years	4 (16.0)	28(32.2)	32(28.6)
	>6 years	16(64.0)	41(47.1)	57(50.9)
Working at MSIM	<6 months	1 (4.0)		
	7-11 months	1 (4.0)	5 (5.7)	6 (5.4)
	1-3 years	8 (8.0)	4 (4.6)	5 (4.5)
	4-6 years	6 (24.0)	13(15.0)	21(18.8)
	>6 years	9 (36.0)	31(35.6)	37(33.0)

4.2 Current Information Technology Use in MSIM

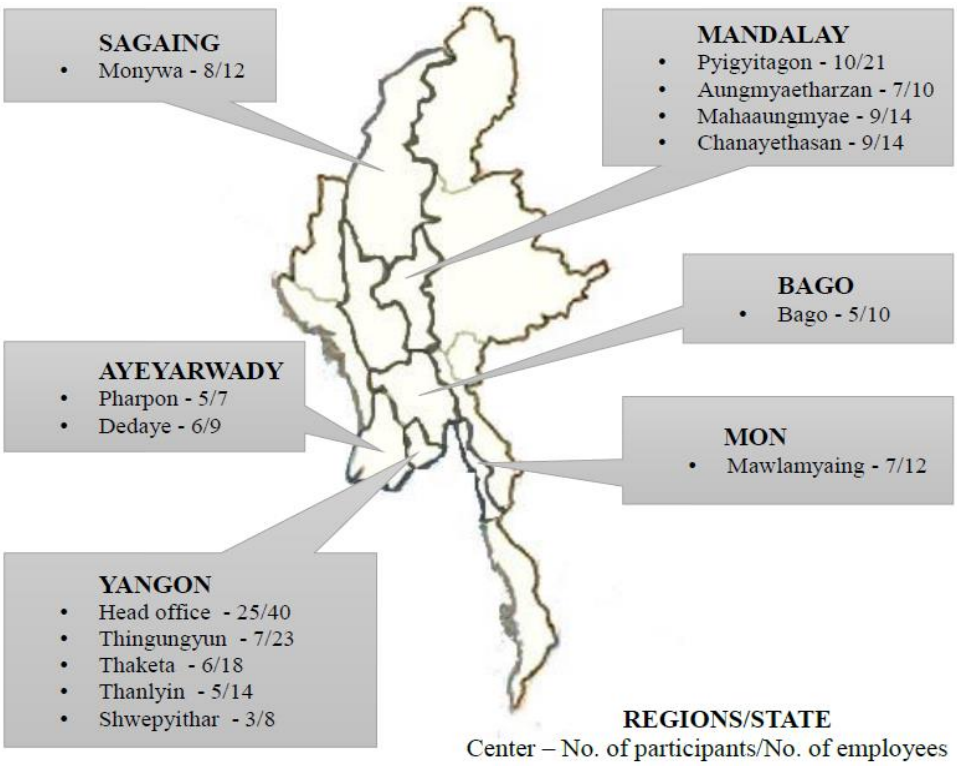


Figure 4.1 Number of participants and total number of persons working at the surveyed clinics and the head office.

The researcher had collected data from 13 clinics and the head office. Figure 4.1 described the number of persons working at the clinics, which varied from one clinic to each other. Pharpon clinic had the minimum number of person working at clinic (7) and Thingangyun clinic the highest with 23 persons. As for the head office, 40 persons were employed at the time of data collection. The number of persons working at the clinics was varied depending on the project activities and population density.

At the time of survey, all surveyed MSIM clinics and office was equipped with computers. However, the number of available computers ranged from 1 to 36 per site depending on the size of the clinics and office. Server was installed only at the head office. Total number of personnel working at the surveyed clinics and office were 212, of which 89 had routinely used computer.

4.2.1 Type of software, Internet service and Internet Access Method at MSIM

The type of software the clinics were using most was Microsoft, especially Microsoft Word, Microsoft Excel, and Microsoft PowerPoint. Approximately 27% of the respondents stated that SPSS had been installed and 22.3% had both Internet and email system installed.

Internet connection was available only at the head office. All the respondents who answered “Yes” to Internet connection at clinic/office also reported (personally) using paid Internet Service Provider (ISP).

With respect to the method of the Internet access of the participants, the majority, 45.5% had used Internet café, 20.5% at home and 22.3% had used at their office using Asymmetric digital subscriber line (ADSL) and paid ISP, such as red link. On the other hand, 2.7% stated that they had never accessed to the Internet.

4.3 Computer usage of MSIM employees

This section described computer usage of MSIM staffs based on the following categories: respondent’s computer experience, and training skill, overview of computer usage in MSIM clinics and its head office, categorization of computer usage,

differences in computer usage of various tasks in the head office, regions and state, and among employee, and computer usage level among MSIM employee.

4.3.1 Respondent's computer experience

Table 4.3 represents the time that the respondents had experience in using computer: 52.3% had used computer for more than 6 years whilst 1.8% reported using computer for less than 6 months. Results from survey respondents reported that approximately 30% used computer several times a day, while 11.6% reported not using computer at all.

Table 4.3 Experience and frequency of using computer

Characteristics	Group	Number of Participant	Percentage
Experience using computer (n=107)	Never	9	8.0
	<6 months	2	1.8
	6-11 months	6	5.4
	1-3 years	18	16.1
	4-6 years	13	11.6
	>6years	59	52.7
	Missing	5	4.5
How often use computer (n=109)	Don't use at all	13	11.6
	<a week	12	10.7
	Once a week	23	20.5
	Several times a week	28	25.0
	Several times a day	33	29.5
	Missing	3	2.7

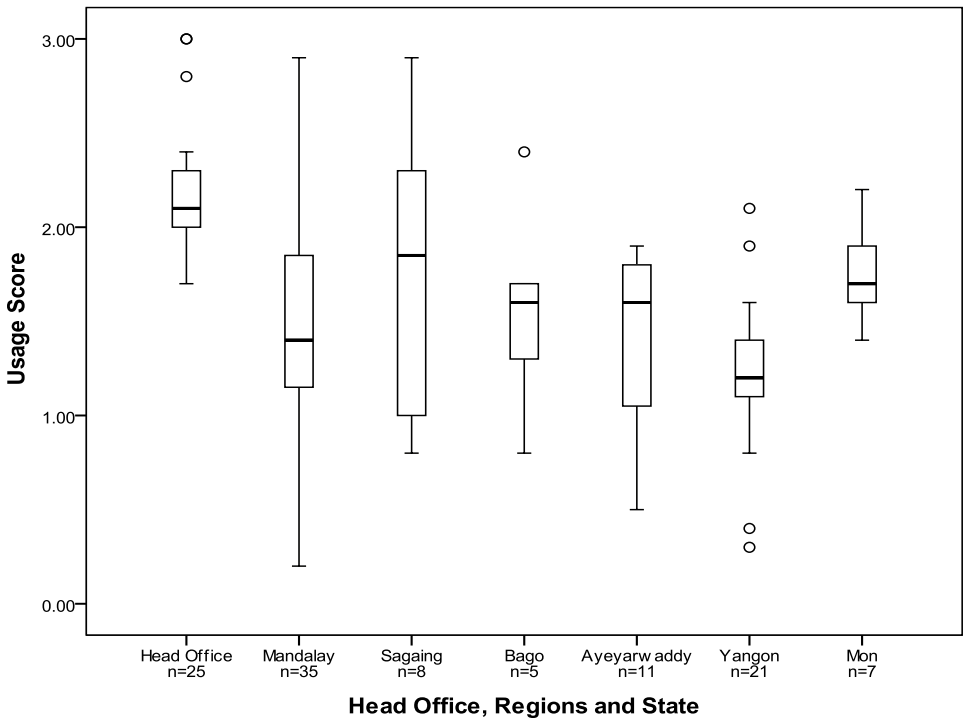
4.3.2 Respondents' Training Skill

According to the survey result, out of 112 respondents, 89 (79.5%) had training related to computer. Among them, the majority 92.2% of the participants had

short course training, and 7.8% had training at University. Among participants with no formal training, 18 (78%) participants had self-guided training while 5(22%) had no training at all. 98 % of the participants expressed the need for training if EMR is implemented.

4.3.3 Overview of Computer Usage in MSIM Clinics and the Head Office

Computer usage of MSIM clinics and the head office were investigated based on 10 aspects. It had been scored from 0=Never perform, 1= Never use a computer, 2= Sometimes use a computer, to 3=Always use a computer. Figure 4.2 described the summary of computer usage between regions, states and the head office: The average usage score ranged from the minimum of 0.2 to the maximum of 3.0 points. The head office had higher level of computer usage compared to the clinics, while Yangon had the lowest computer usage. As for Mandalay and Sagaing, computer usage among participants varied. Outliers could be found in the head office, Bago Region and Yangon Region.



Measurement scale: 0=Never perform, 1= Never use a computer, 2= Sometimes use a computer, 3=Always use a computer

Figure 4.2 Overview of computer usage in MSIM clinics and the head office

4.3.4 Computer Usage in Three Categories

The ten aspects of computer usage were then grouped into 3 major categories: Providing care and reporting usage, Administration usage, and Communication usage with mean and standard deviation can be found in Table 4.4. The administrative usage is apparently higher than providing care and reporting usage and communication usage in MSIM.

Table 4.4 Computer usage in three categories

Variable (n=112)	Number of Items	Mean ±SD
1) Providing Care and Reporting Usage Recording patient's information Recording patient information Retrieving patient clinical record Generating mandatory report	4	1.30±0.56
2) Administrative Usage Writing official letters Preparing presentation slides Analyzing data using Excel	3	2.01±0.86
3) Communication Usage Communicating with colleagues Searching for information associated with office Searching for information associated with personal interest	3	1.65±1.03

Measurement scale: 0=Never perform, 1= Never use a computer, 2= Sometimes use a computer, 3=Always use a computer

4.3.5 Computer Usage of Various Tasks in the Head office, Regions and State

Table 4.5 represents the computer usage of various tasks at the clinics in 6 studied provinces and the head office. ANOVA analysis showed that there was a statistically significant difference in administration usage ($p<0.01$) and communication usage ($p<0.01$) among regions, states and the head office. However, there were no differences in computer usage for providing care and reporting among those groups. To find out which specific groups differed, Bonferroni post-hoc test was performed: For

administration usage, the head office had significantly higher computer usage compared with Mandalay, Sagaing, Ayeyarwaddy, and Yangon, $p<0.05$. Similarly for communication usage, the head office had statistically higher computer usage compared to Mandalay, Ayeyarwaddy and Yangon with the $p<0.05$ and Sagaing with Yangon, $p<0.05$.

4.3.6 Computer Usage of Various Tasks among MSIM Employees

Table 4.6 indicates the mean and SD of computer usage by profession. As determined by one-way ANOVA, there was a statistically significant difference between occupation for administration usage ($p < 0.01$), and for communication usage ($p < 0.01$). A Bonferroni post-hoc test revealed that there was statistically different usage in both administration and communication usage for doctor and management and administration compared to others ($p < 0.05$).

Table 4.5 Computer usage of various tasks in Regions, State and Head Office

Computer Usage	Total	Head Office	Mandalay	Sagaing	Bago	Ayeyar-waddy	Yangon	Mon	Statistics df=6
	n=112	25	35	8	5	11	21	7	
	Mean ± SD								ANOVA *p* value
1*	1.30±0.56	1.41±0.73	1.35±0.67	1.25±0.55	1.3±0.27	1.25±0.31	1.17±0.32	1.25±0.35	0.863
2†	2.01±0.86	2.87±0.23	1.76±0.91	1.92±0.85	1.87±0.96	1.55±0.86	1.67±0.67	2.24±0.65	0.000
3‡	1.65±1.03	2.59±0.46	1.37±1.01	2.08±1.44	1.6±0.79	1.39±0.55	0.86±0.92	1.95±0.40	0.000

Measurement scale: 0=Never perform, 1= Never use a computer, 2= Sometimes use a computer, 3=Always use a computer

* 1: Providing care and reporting † 2: Administration ‡ 3: Communication

Table 4.6 Computer usage of various tasks among MSIM employee

Usage	Total	Doctor	Nurse/ Midwife	Lab tech	C.R.A*	S.R.H.P†	Counselor	Super-visor	Mgt and Admin	Statistics (df=7)
	n=112	14	13	7	12	23	8	13	22	
	Mean± SD									ANOVA *p* value
1 ‡	1.30±0.56	1.57 ±0.60	1.10±0.41	1.18±0.31	1.23±0.32	1.41±0.66	1.59±0.65	1.13±0.30	1.22±0.67	0.175
2§	2.01±0.86	2.74±0.43	1.05±0.92	1.71±0.93	1.92±0.58	1.75±0.69	1.92±1.58	1.67±0.95	2.79±0.31	0.000
3 ‖	1.65±1.03	2.17±0.88	1.38±1.02	1.48±0.66	0.92±1.00	1.29±0.63	1.58±0.66	1.38±1.66	2.47±0.60	0.000

Measurement scale: 0=Never perform, 1= Never use a computer, 2= Sometimes use a computer, 3=Always use a computer

*C.R.A: Cashier/Receptionist/Accountant †S.R.H.P: Sexual and Reproductive Health Promoter

‡ 1: Providing care and reporting §2: Administration ‖3: Communication

4.3.7 Computer Usage Level among MSIM Employees

The computer usage level was also determined by using median score, 1.7: The result indicated that more than 43.7% hade computer usage above the median, while 56.3% had computer usage below the median. (Table 4.7)

Table 4.7 Computer usage level among MSIM employee

Category	Participant (n=112)	%
Low Usage (0-1.7)	63	56.3
High Usage (1.8-3.0)	49	43.7
Missing	0	0
Mean ± SD; Min-Max, Median	1.62 ± 0.60; 0.20 -3.00, 1.70	

4.4 Information Communication Technology Knowledge in MSIM

This section described ICT knowledge in MSIM clinics and the head office based on the following categories: ICT knowledge questionnaire and answers, overview of knowledge score in the head office, regions, and state, ICT knowledge difference in regions and among employee, and ICT knowledge level among MSIM employee.

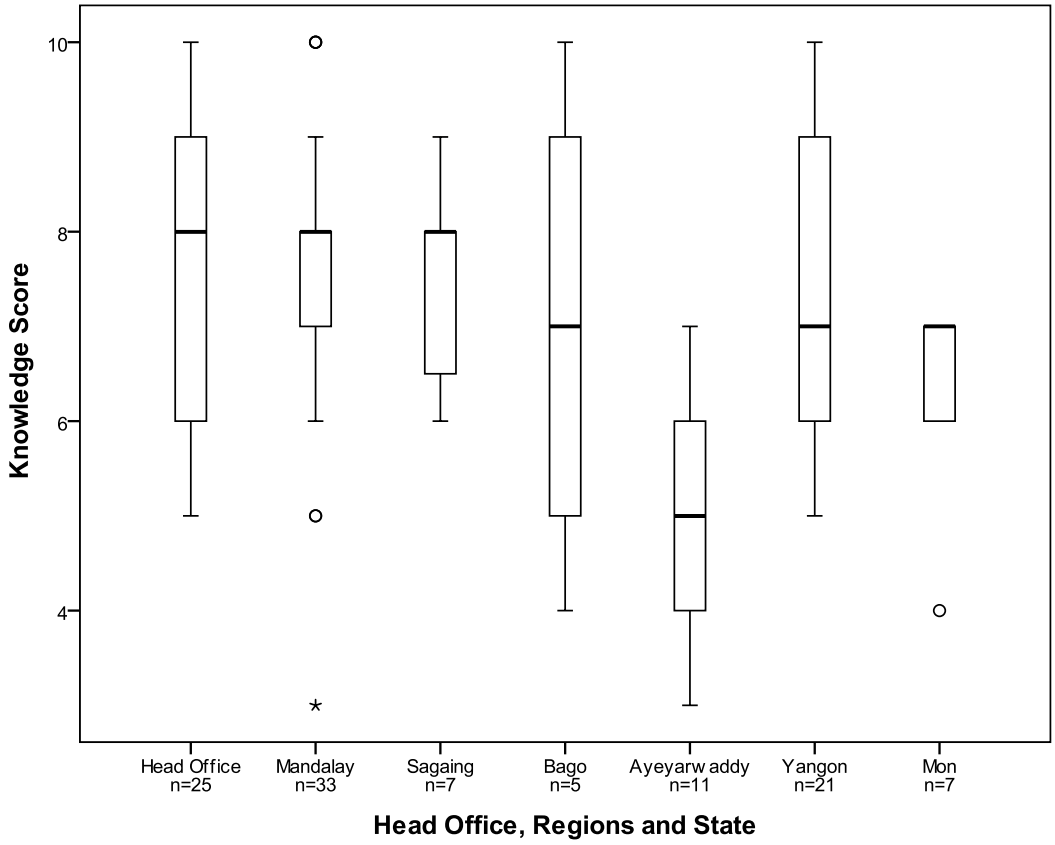
4.4.1 ICT Knowledge Questionnaires and Answers

There were 10 statements for ICT knowledge questions and three choices for each statement, i.e, True, False, and Not Know. Their score for each statement was rated as follows: Right Answer =1, Wrong Answer=0, and for Not Know=0. The overall percentage of correct answers of the participants was 71.88%, equivalent to the average number of correct answers of 7.1/10. The question with the highest correct answer (97.3%) was “Examples of Microsoft Office softwares are Microsoft Excel, Microsoft PowerPoint, and Microsoft Word”. The statement with the lowest number of correct answers was “A computer network is a social network like Facebook”. (Table4.8)

Table 4.8 ICT knowledge questionnaires and answers

Items in the questionnaire	Correct Answers	Wrong Answer	Missing
Examples of Microsoft Office software are Microsoft Excel, Microsoft PowerPoint, and Microsoft Word.	109 (97.3%)	3(2.7%)	0
Printer is an output device.	105 (93.7%)	7 (6.3%)	0
Computer monitor is a screen that displays from a computer.	104 (92.9%)	8 (7.1%)	0
Window is an example of an operating system.	103 (92%)	9 (8%)	0
Computer virus is software that can safeguard computer from malware.	85 (75.9%)	27 (24.1%)	0
Examples of Internet browser are Google Chrome, Internet Explorer, Firefox.	83 (74.1%)	29 (25.9%)	0
Software is not a series of instruction that can make computer to do something.	59 (52.7%)	52 (46.4%)	1 (.9%)
LAN stands for Local Area Network.	57 (50.9%)	53 (47.3%)	2 (1.8%)
USB stands for University of Sanfransisco Bay.	51 (45.5%)	61 (54.5%)	0
A computer network is a social network like Facebook.	49 (43.8%)	62 (55.3%)	1 (.9%)
Total Percentage	**71.88%**	**27.76%**	**3.6%**

4.4.2 Overview of Knowledge Score in the Head office, Regions, and State



Measurement scale: Right Answer =1, Wrong Answer=0, Not Know=0

Figure 4.3 Overview of knowledge score in the head office, regions, and state

This boxplot generally indicates the knowledge level by regions. The minimum score is 3 and the maximum score is 10. Head office, Bago, and Yangon's long box plot indicated that the participants have different level of knowledge. Moreover, the whiskers extend to the maximum in those regions mean that there were participants who had the highest score. Meanwhile, Ayeyarwaddy had low middle score, low range of score in knowledge compared to other regions.

4.4.3 ICT Knowledge in Head Office, Regions and State

Mean knowledge and SD based on provinces and the head office was shown in Table 4.9 and ANOVA result indicated that the mean IT knowledge were statistically significant difference between regions, state and head office (p<0.01). A Bonferroni post-hoc test revealed that the knowledge score of Ayeyarwaddy region had statistically

lower knowledge score than those of head office, Mandalay, Sagaing, and Yangon (p<0.05). There were no significant differences between Bago, Mon with other regions and head office (p=>0.05).

4.4.4 ICT Knowledge Score among Employees

Mean knowledge and SD of MSIM employee were described in Table 4.10. The result from ANOVA indicated that there was a statistically significant difference between the mean ICT knowledge score among employee (p<0.05).

Table 4.9 ICT knowledge in Head Office, Regions and State

Know-ledge score	Total	Head Office	Mandalay	Sagaing	Bago	Ayeyar-waddy	Yangon	Mon	Statistics df=6
n	109	25	33	7	5	11	21	7	ANOVA
Mean ± SD	7.21±1.76	7.96±1.71	7.45±1.56	7.43±1.13	7±2.55	4.91±1.22	7.43±1.13	6.29±1.11	0.000*

Measurement scale: Right Answer =1, Wrong Answer=0, Not Know=0, * *p* value

Table 4.10 ICT knowledge score among employees

Know-ledge score	Total	Doctor	Nurse/ Midwife	Lab Tech	C.R.A*	S.R.H.P†	Counselor	Supervisor	Mgt and Admin	Statistics df=7
N	109	14	11	7	12	23	8	12	22	ANOVA
Mean ± SD	7.21±1.76	8.36±1.33	6.64±1.85	7.57±1.51	6.50±1.31	6.74±1.91	7.13±1.88	6.75±1.65	7.82±1.79	0.040‡

*C.R.A: Cashier/Receptionist/Accountant, †S.R.H.P: Sexual and Reproductive Health Promoter, ‡ : *p* value

4.4.5 ICT Knowledge Level among MSIM Employees

With regard to the knowledge level, the median knowledge score (7) was used as a cut off point for interval. As a result, 54.5% of the respondents had lower ICT knowledge whilst 42.9% had higher ICT knowledge. (Table 4.11)

Table 4.11 Knowledge Level among MSIM employee

Category	Participant	%
Low Knowledge (1-7)	61	54.5
High Knowledge (8-10)	48	42.9
Missing	3	2.7
Mean ± SD; Min-Max, Median	7.21 ± 1.77, 3-107	

4.5 User Acceptance towards Proposed System

This section consisted of descriptive statistics of Technology Acceptance Model constructs, overview of user acceptance score, score of perceived usefulness, perceived ease of use, intention to use, user acceptance in regions and among employee, user acceptance level, relationship between computer usage, computer knowledge and TAM constructs and prediction of Intention to Use.

4.5.1 Technology Acceptance Model constructs

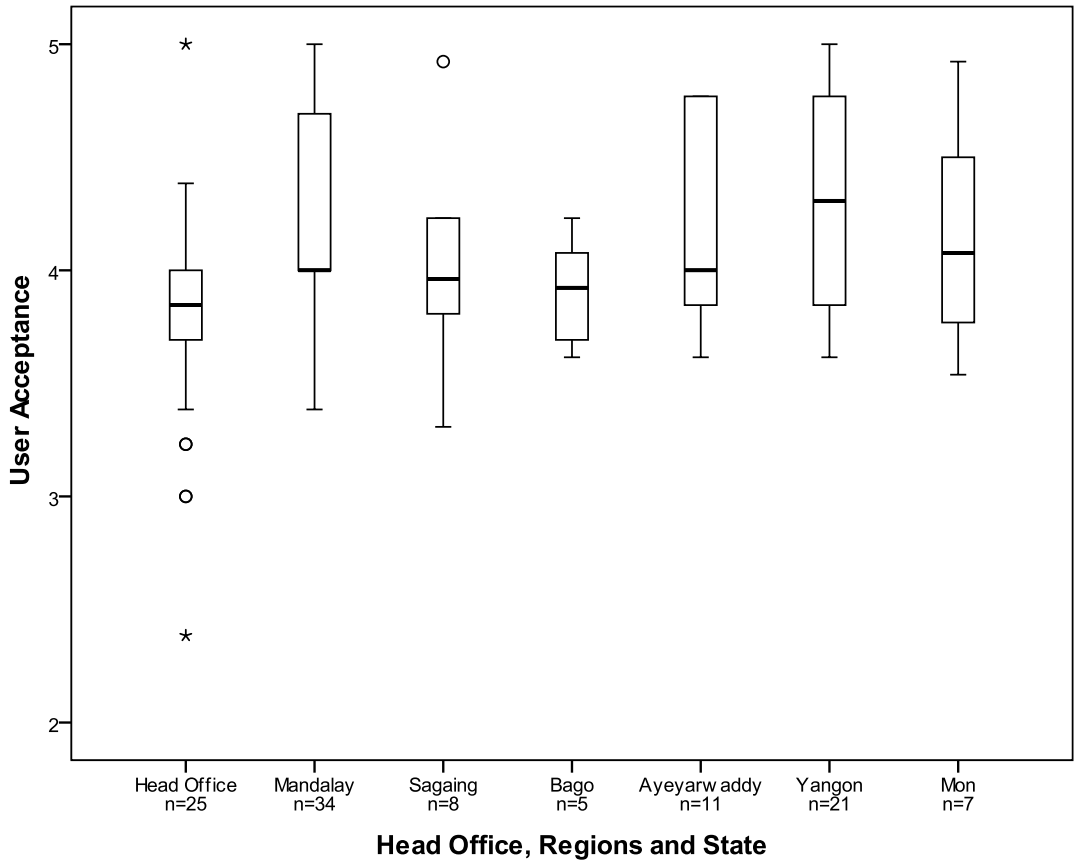
This section represented the User Acceptance based on Technology Acceptance Model: it consisted of 13 items with five point numerical scale of 1-strongly disagree to 5-strongly agree: Perceived usefulness had 7 items, perceived ease of use had 4 items and intention to use had 2 items. Mean and standard deviation of those variables were described in Table 4.12. The lowest mean score is the item “EMR is easy for staff to use” item (3.89±0.649) and the highest mean score item was to “Accomplish task more quickly” with 4.23±0.629.

Table 4.12 Technology Acceptance Model constructs' Mean and SD

Variables	Number of Items	Mean±SD
Perceived Usefulness (PU)	7	
- Improve quality of work		4.10±0.73
- Greater control over work		4.16±0.69
- Accomplish task more quickly		4.23±0.62
- EMR allows to accomplish more work		4.13±0.61
- Enhance overall effectiveness		4.21±0.61
- Job easier to perform		4.12±0.70
- EMR is a useful tool		4.14±0.72
Average score		**4.15±0.53**
Perceived Ease of Use (PEOU)	4	
- Clear and user friendly		4.02±0.60
- Learning will be easy		4.12±0.65
- Skilled at EMR		4.08±0.68
- Easy for staff to use		3.89±0.64
Average score		**4.03±0.47**
Intention to Use (IU)		
- Intend to use EMR at work		4.14±0.72
- Intend to use EMR everyday		4.06±0.78
Average score		**4.10±0.72**

Measurement scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

4.5.2 Overview of User Acceptance Score

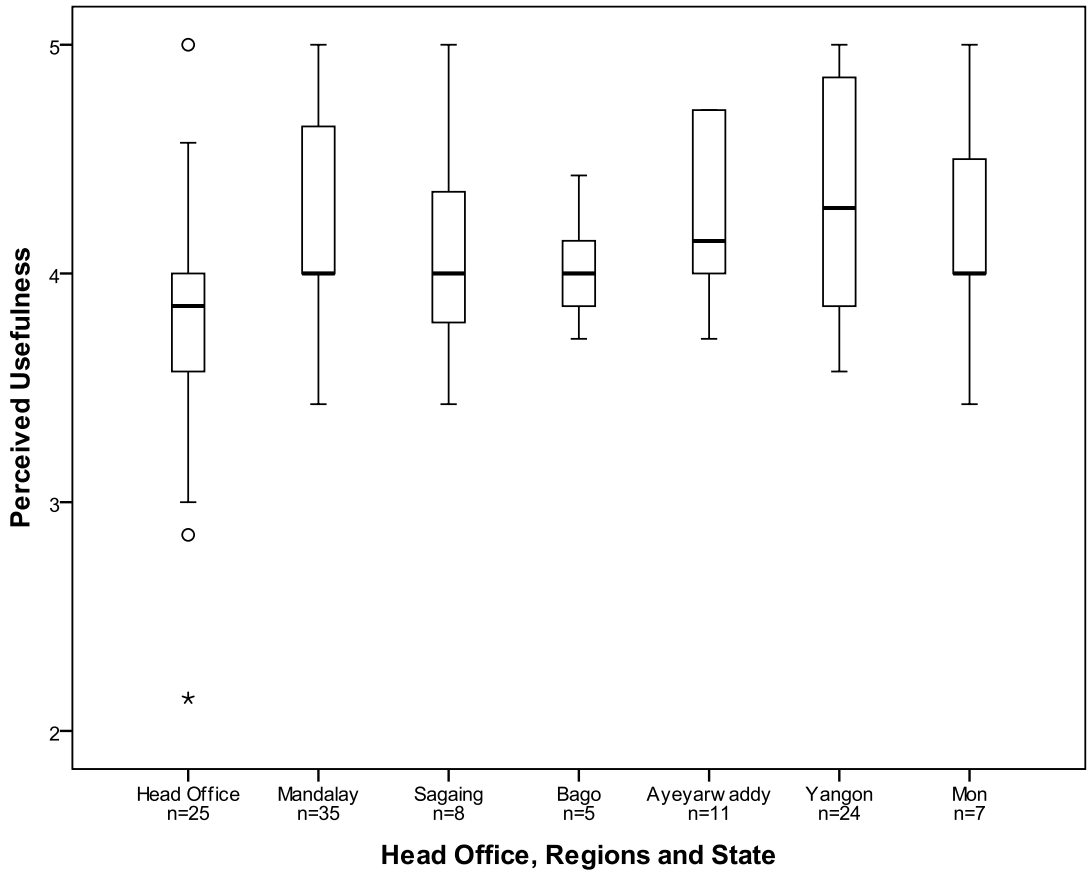


Measurement scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Figure 4.4 Overview of user acceptance score by head office, regions and state

The above figure described the overall user acceptance score by the head office, Regions and State. The score ranged from the lowest of 2 to the highest of 5. The head office had the lowest user acceptance score with the median of 3.85 with some extreme values represented as the outliers. As for Ayeyarwaddy and Mandalay, the higher upper quartile revealed more respondents with high user acceptance score. Meanwhile for Bago, the short box plot showed the less variation in user acceptance score.

4.5.3 Perceived Usefulness Score

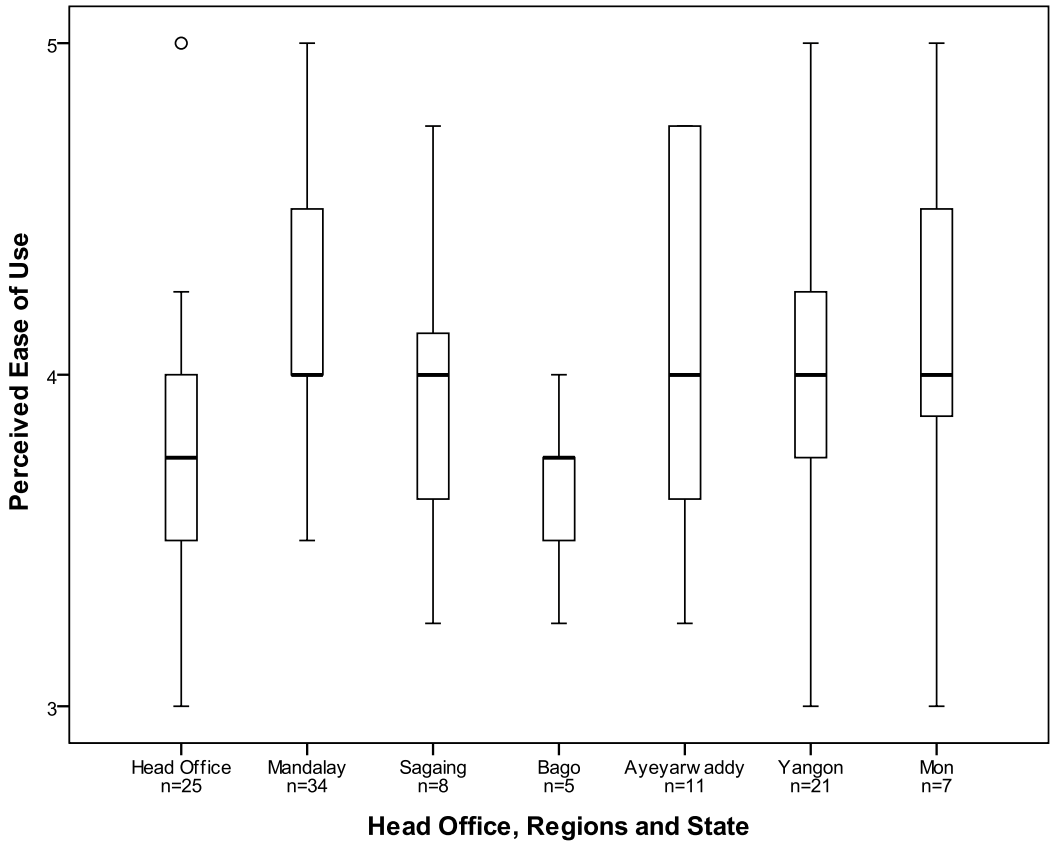


Measurement scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Figure 4.5 Perceived usefulness score by head office, Regions and State

Figure 4.5 illustrated overall perceived usefulness score of the 6 regions and head office. The item "Perceived Usefulness" had 7 items with 5 level Likert scale. The score from the head office ranged from the minimum of 2 to the maximum of 5. Extreme outliers and outliers can also be found in head office. Mandalay Region, Sagaing Region, and Mon State's boxplots suggested that there were variation of perceived usefulness score, from the minimum of 3 to the maximum of 5. The comparatively tall upper quartile in Ayeyarwaddy and Yangon's boxplot suggested that the participants have different opinion about the usefulness, though their central tendency is relatively higher than other region.

4.5.4 Perceived Ease of Use Score

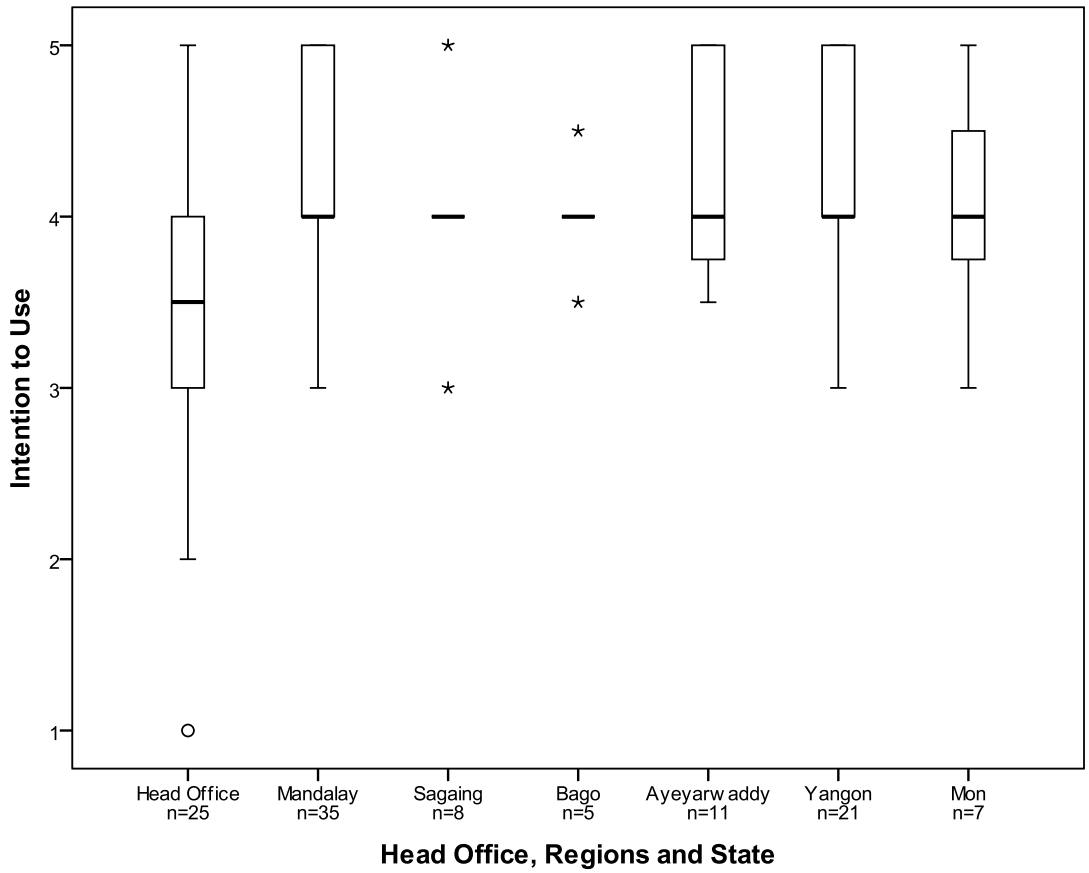


Measurement scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Figure 4.6 Perceived ease of use score by head office, Regions and State

The above figure portrayed the overall perceived ease of use score by regions and head office. It had 4 items with the scale ranged from 1=Strongly Disagree to 5=Strongly Agree. Outlier was found in head office and overall median score for all regions, and head office was around 4. Perceived ease of use score from Bago participants had little variation from with the highest score of 4. Mon and Yangon Region's relatively long boxplot suggested the variation in participant's score with the highest score of 5 and lowest score of 3.

4.5.5 Intention to Use Score



Measurement scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Figure 4.7 Intention to use score by head office, Regions and State

The above figure described the Intention to Use by regions, state and the head office. For Ayeyarwaddy, the intention to use score ranged from 3.5 to 5 with no outliers. While in the head office, the score ranged from 2 to 5 with low score outlier. The median score of head office's intention to use is lower than those of regions and state. With the median score of 4, extreme outliers for both high and low score can also be found in Sagaing and Bago. Ayeyarwaddy long upper quartile indicated participants' intention to use score ranged above the median score.

4.5.6 User Acceptance in Head Office, Regions and State

The mean and SD of perceived ease of use, perceived usefulness and intention to use based on regions and head office were shown in table 13.The analysis to find the difference of those 3 items between regions was performed by using

ANOVA. The result indicated that there was a statistically significant different mean of perceived ease of use ($p<0.05$), perceived usefulness ($p<0.01$) and intention to use ($p<0.05$). (Table 4.13)

Bonferroni post-hoc test revealed that perceived usefulness score of Yangon ($p<0.01$) and Mandalay ($p<0.01$) was statistically higher than those of the head office. Similarly, intention to use score of Mandalay ($p<0.01$) was statistically higher than those of the head office.

4.5.7 User Acceptance among Employees

The table (Table 4.14) illustrated the mean and SD of user acceptance variables' score based on job description. To find out whether there was a statistically significant different mean concerning user acceptance among employees, ANOVA was performed. The result revealed the statistically significant difference in perceived usefulness ($p<0.01$) and intention to use ($p<0.01$) among participants. Bonferroni post-hoc test was also performed and the result indicated that C.R.A had high Perceived Usefulness ($p<0.01$) compared to management and administration group. Similar result can be found in Intention to Use construct between C.R.A ($p<0.01$) with management and administration group.

Table 4.13 User acceptance score in head office, regions and state

Variables	Total	Head Office	Mandalay	Sagaing	Bago	Ayeyar-waddy	Yangon	Mon	df=6
	n=111	25	34	8	5	11	21	7	
	Mean ± SD								*p**
POEU†	4.03±0.47	3.82±0.41	4.19±0.37	3.94±0.45	3.65±0.28	4.07±0.58	4.08±0.54	4.11±0.65	0.046
PU‡	4.15±0.53	3.77±0.59	4.29±0.43	4.09±0.49	4.03±0.27	4.30±0.42	4.35±0.52	4.20±0.54	0.002
IU§	4.10±0.72	3.68±0.96	4.31±0.54	4.00±0.53	4.00±0.35	4.23±0.64	4.26±0.64	4.07±0.73	0.034

Measurement scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

* ANOVA †PEOU: Perceived Ease of Use ‡ PU: Perceived Usefulness §IU: Intention to Use

Table 4.14 User acceptance score among employees

Variables	Total	Doctor	Nurse/ Midwife	Lab Tech	C.R.A*	S.R.H.P†	Counselor	Super-visor	Mgt and Admin	Statistics df=7
	n=111	14	13	7	11	23	8	13	22	
	Mean ± SD									ANOVA‡
PEOU§	4.03±0.47	4.18±0.54	4.00±0.36	3.93±0.47	4.19±0.33	4.13±0.49	4.00±0.55	3.96±0.61	3.83±0.40	0.316
PU‖	4.15±0.53	4.29±0.62	4.32±0.47	4.00±0.42	4.46±0.47	4.22±0.39	4.09±0.48	4.22±0.43	3.77±0.59	0.005
IU¶	4.10±0.72	4.29±0.69	4.27±0.43	3.64±0.74	4.50±0.52	4.26±0.51	4.19±0.53	4.08±0.67	3.64±0.96	0.007

Measurement scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

*C.R.A: Cashier/Receptionist/Accountant †S.R.H.P: Sexual and Reproductive Health Promoter
‡ ANOVA p value §PEOU: Perceived Ease of Use ‖PU: Perceived Usefulness ¶ IU: Intention to Use

4.5.8 User Acceptance Level

Overall User Acceptance level was also determined by using median score 4 as a cutoff point from total score of 5: The result indicated that approximately 60% had low user acceptance level, while around 40% had high user acceptance. (Table 4.15)

Table 4.15 User Acceptance level among MSIM employee

Category	Number of Participants	%
User Acceptance		
Low (1-4)	64	57.1
High (>4)	47	42.0
Missing	1	0.9
Mean ± SD; Min-Max, Median	4.11±0.50, 2-5, 4	

4.5.9 Relationship between TAM Constructs

In this part, Pearson's correlation coefficient is used to analyze the relationship between PU, PEOU and IU. Results from Table 16 showed there was a significant positive relationship between PU and PEOU (r=0.701, p<0.01), PU and IU (r=0.846, p<0.01), and PEOU and IU (r=0.627, p<0.01). However, there was no statistically significant correlation between ICT knowledge, current computer usage and TAM constructs (p>0.05). The positive r in PU/PEOU is an indication that if participants' PU and PEOU change positively, then their IU is likely to improve to an extent of 84.6 and 62.7 respectively.

Table 4.16 Correlations between PU, PEOU and IU

Variables	PU	PEOU	IU
PU	1		
PEOU	0.701**	1	
IU	0.846**	0.627**	1

** Correlation is significant at the 0.01 level (2-tailed)

4.5.10 Factors influencing Intention to Use

A multiple regression was performed to predict the "intention to use" from perceived usefulness, perceived ease of use, computer usage and ICT knowledge. The "adjusted R square" in table 4.17 indicated that the combination of PU, PEOU, current computer usage and ICT knowledge predict 70.9 of the variance in participant's IU. The result indicated that only PU (ß=0.303, $p<0.01$) is a significant indicator for intention to use after adjusting ICT knowledge, computer usage and PEOU. It is interesting to note the negative sign of ß coefficient for computer usage. In addition, PEOU in this regression analysis is not significant anymore due to high correlation with PU, which makes PEOU insignificant while it should be significant.

Table 4.17 Regression analysis between computer usage, ICT knowledge, PU, PEOU and IU

	Dependent Variable: Intention to Use (IU)		
Independent Variables	**Beta coefficient**	***p* value**	**Adjusted R^2**
Constant	-1.918	<0.05	0.709
Usage	-0.004		
ICT Knowledge	0.067	0.129	
Perceived Usefulness (PU)	0.303	<0.01	
Perceived Ease of Use (PEOU)	0.055	0.341	

4.6 Interviews

This research received the approval from both University of Mahidol Ethical Committee and MSIM Internal Committee together with the letter of permission to conduct the survey from the country director of MSIM. In addition to quantitative study, the researcher also conducted a qualitative study. Purposive sampling, guided by the research objectives, has been used for the interview to find out the individuals' concerns and opinions on current and proposed system.

Informed consent was obtained from interviewees and to ensure the anonymity of the participant's center, identifiable information like region has been removed from the data. The researcher used structured interviews to allow complex questions to be explained, when necessary to the interviewees. Each interview consisted of explaining the purpose of the interview and asking questions regarding concerns on current system as well as expectation, opinion and concerns on proposed EMR system.

4.6.1 Data Analysis

The researcher sought the participants' views on the following points: opinion on current system, average number of patient per day and average time spent per patient, information retrieval, concerns on proposed system and patient's privacy. The time for the interviews was shortened due to the numbers of patients to be treated; the notes were taken during the interviews and later transcribed. For the interviews, participants answered the questions, and in such instances the researcher took notes.

Interviews were transcribed and analyzed thematically and this paper described the themes that were mentioned by at least two interviewees. Researcher independently analyzed the transcripts and coded into themes. Outlier theme was also included to provide data representation. Firstly, phrases from the interviewees were examined and later assigned the phrases codes using their words to develop the codes. Inductive codes, which are codes developed by the researcher by examining the data, allowed themes to emerge from the interviews.(100) For example, the phrase, "Every evening, it takes time to put the clinics record card back to the shelf" was given 2 codes, "current system" and "time consuming". In total, it has 6 codes representing four major themes, concerns with the current system, concerns with transition period, perceived challenges on proposed system and opinions on proposed system.

4.6.2 Participants

The researcher sought to recruit the potential users and potential operators from clinics and head office as the findings could generate important insights. None of the invited participants refused to participate in the interview. The researcher included clinicians and non-clinicians identified by the center manager as a person who will handle EMR system if install. Semi-structured interviews were conducted face to face

at 11 centers and at the head office with 10 Doctors and 4 C.R.A (Cashier/ Receptionist/ Accountant), 1 Supervisor, 2 Lab Technicians during data collection period. (Table 4.18)

Table 4.18 Characteristics of Interviewees

Characteristics	**Group**	**Number of Participant**	**Percentage**
Gender	Male	4	23.5
	Female	13	76.5
Age	<30	9	52.9
	31-40	4	23.5
	41-50	2	11.8
	>50	2	11.8
Working in healthcare	<6 months	1	5.9
	7-11 months	-	-
	1-3 years	3	17.6
	4-6 years	6	35.3
	>6 years	7	41.2
Working at MSIM	<6 months	2	11.8
	7-11 months	-	-
	1-3 years	4	23.5
	4-6 years	5	29.4
	>6 years	6	35.3

4.6.3 Clinics

Generally, the clinics treat 15-100 patients per day and open Monday to Friday, except for a few clinics which open on Saturday. MSIM Approximately 300,000 patients get treatment at MSIM annually. Overall treatment time varies from 10 minutes to 1 hour depending on the treatment plan. Patients are encouraged to complain about

the service at the clinics, but there is no complaints regarding waiting time nor service provided. Clinics provide medical report if patient request.

Table 4.19 Study sites characteristics

Characteristics	
Regions	11 clinics and the head office
Patient per day	15-100
Duration of treatment time	10 minutes – 1 hour
Total patient treated at MSIM	≈ 300,000 per annum

4.6.4 Themes from the Interviews

The following table represents four themes and sub-themes from the interviews.

Table 4.20 Themes from Interviews

Main Themes from Interviews	
Concerns with the current system	
	• Time consuming • Duplication of record card and booklet • Information retrieval
Concerns with transition period	
	• Training • Workload
Perceived challenges on proposed system	
	• Data Privacy • Technical Support • Unstable power supply • Sustainability
Opinion on proposed system	
	• Expectation • Hesitation • Future Possibility

4.6.5 Concerns with the Current System

This section covered references made to the difficulties occurred from the current system.

Time consuming

All interviews participants from clinics mentioned that recording patient information in paper-based format was time consuming. Disadvantages cited by four interviewees regarding current system included: time consuming in patient information retrieval, filing and re-filing of clinic record card.

Duplication of record card and booklet

Misplaced and loss of clinic booklets and record cards were the two common concerns mentioned by the clinics staff. Moreover, they also stated that with the paper-based records, patient data has lost in the storage. Besides, patient information has been scattered throughout the record systems, clinic card, record booklet, etc and data were not found where anticipated, particularly because data were documented at multiple place.

One respondent expressed that, sometimes, there were two record cards for one patient, as they could not find the original one when needed and had to create a new one. In addition, patients usually lose or misplace their record booklet, often forget what name that they use at the registration , for example, nick name (Ma Khine) or real name (Ma San San Myint) and did not remember when the last visit was. In that case, it was difficult to retrieve their files and the clinic had no choice but to have a new booklet as well as new record card.

Information retrieval

Paper-based recording system is currently used in MSIM clinics. The most commonly described challenge is the difficulty in retrieving patients' information, in this case, record card in which patient information is documented, especially existing patient with no appointment. C.R.A reported that the patient record card system within the current system is fairly organized. However, retrieving is still challenging.

Two participants stated that their centers keep patients' record for 3 years only: there is no clinical or personal data were kept at the respective clinic after 3 years of the last treatment. When it comes to patient information retrieval, such incidence results incomplete patient information.

Table 4.21 Quotes from interviewees regarding current system

Themes	Quotes
Concerns with the current system	
-Time consuming	"We have a lot of patients with the same first name. For example, starting with Aung, and by the end of the year, we have a bout a few hundreds. When the patient with the same first name comes, it is time consuming to look for the record card."- C.R.A
-Duplication of record card and booklet	"Patient usually loses the booklet and does not remember his/her last visit. So we either re-register them or re-issue the booklet." - C.R.A
-Information retrieval	"Retrieving patient information is always a problem with current system."- C.R.A

4.6.6 Concerns with Transition Period

The following section indicated the two sub-themes emerged for the transition period.

Training

According to many interviewees, training is of importance as they anticipated EMR system as difficult program. As a result, they wish to have sufficient training before the system is introduced. Participants were also worried about other underlying barriers such as probable power cut-off at the clinics and extra workload during the transition period.

"During transition period, I am concerned about the staff training and double workload. If the staff are not fully trained, it will impact on the workflow and decrease productivity"- Clinician.

Workload

At every interview, almost all the respondents were optimistic about the proposed system, believing that it would be the better system. However, one concern has been emerged related to proposed system and transition period, which intend to improve workflow as well as efficiency, is workload itself. Three interviewees are worried about their productivity during transition, as they have to handle both paper-based and electronic based system.

There were questions like "Will the organization keep the record card system even after installing the proposed system? I don't want to handle the patient information in both paper-based and electronic based system."-C.R.A

Table 4.22 Quotes from interviewees regarding transition period

Themes	Quotes
-Training	"During transition period, I am concerned about the staff training and double workload. If the staff are not fully trained, it will impact on the workflow and decrease productivity"- Clinician.
-Workload	"Will the organization keep the record card system even after installing the proposed system? I don't want to handle the patient information in both paper-based and electronic based system."- C.R.A

4.6.7 Perceived Challenges on Proposed System

The interviewees' view on EMR implementation reported different perspectives, which are described as follows.

Data Privacy

Regardless of the benefits derived from EMR system, the challenges such as patients' privacy and data security were the concerns from some participants. One participant mentioned, "Currently, though data are not particularly protected, they are not easily accessible. With the proposed system, due to increased data accessibility, patients' privacy might be breached and compromised."

Technical Support

One center manager perceived the technical support regarding EMR implementation as a challenge, as it will need IT personnel either at the center or at the region. "I am worried about the unstable power supply and the availability of technical support. We had a computer breakdown in the past. It took more than a week for the technician to come and check what was wrong."- Center manager/Clinician. Power cut is not un-common in Myanmar and most interviewees are worried about the down time if the EMR system exists.

Unstable power supply

The current technological infrastructure of the country resulted in hesitancy about the proposed EMR system, particularly in some regions. Hardware, software, server were not the concerns from the participants, nonetheless, the concept of EMR was weakened by unstable power supply, the technical support and training availability. There are questions from the participants like "What will happen when the power is cut off? If it happens, do we have to use paper-based system or electric generator will be installed for the power back-up?"- C.R.A

Sustainability

Another center manager/clinician was also concerned about the technology availability and current infrastructure. Their concerns concentrated on current technological infrastructure of the region leads to the ultimate question of sustainability, which is in line with the issue raised by head office staff. "It is quite clear that everyone wants the new system as it seems to solve problem related the patient information

retrieval at the clinic. However, given the current situation in Myanmar, will the system be sustainable?"-Staff

Table 4.23 Quotes from interviewees regarding perceived challenges on proposed system

Themes	**Quotes**
-Data Privacy	"Currently, though data are not particularly protected, they are not easily accessible. With the proposed system, due to increased data accessibility, patient's privacy might be breached and compromised."-Staff
-Technical Support	"I am worried about the technical support. We had a computer breakdown in the past. It took more than a week for the technician to come and check what was wrong."- Center manager/Clinician
Unstable power supply	"What will happen when the power is cut off? If it happens, do we have to use paper-based system or electric generator will be installed for power back-up?" – C.R.A
Sustainability	"It is quite clear that everyone wants the new system as it seems to solve problem related the patient information retrieval at the clinic. However, given the current situation in Myanmar, will the system be sustainable?"-Staff

4.6.8 Opinions on EMR

Interview participants highlighted the advantage about having the EMR system in place as follows: the patients' files will contain the related care plan and notes,

which are helpful and can be retrieved at any time and remove the data redundancies. There was general consensus that EMR system would provide more consistent and detailed patient information than paper-based system and would improve coordination of care: Clinician/nurse can write down detailed treatment plan, lab-technician can upload the results, which can be later searched electronically, and C.R.A can update patient's personal information, record the current visit, schedule the next visit, etc. in the system.

Expectation

Many interviewees supported the envisioned EMR implementation and they stated their expectation with respect to the system. The participants' opinion could be influenced by their perceived benefits from EMR system, especially the increased accessibility to the patient's information.

Current system had limited the ability to retrieve information. As one respondent mentioned, "EMR would help manage the patient's visit. After patient visited the doctor or saw the counselor, we can just update the file and close it. The file can be easily retrieved in next visit and all the information needed will also be there". Most interviewees did not want their work routines to change radically from paper-based to EMR. From their point of view, writing will be easier than typing as most staff only had basic computer training. However, they also believed that retrieving patient information on EMR would be a lot easier.

Staffs from the head office were particularly interested in the ability to remotely access the patient information. Some C.R.A expected that implementing such system would allow them to organize the patient's record more effectively and reporting would thus be easier. According to one center manager, since the implementation of EMR allows the health providers to overview the data, the decision-making could improve and patient does not have to have the record booklet. "EMR would allow the clinic staff to access patient information more easily and I hope it could provide more security than paper-based system."-Staff

C.R.A sought user-friendly and efficiency with the proposed system. The interviewees were positive about the EMR implementation and most of the clinics were willingly to participate from the pilot stage. However, they were concerned about using

the program. They would like to have the program, which is easy-to-use for users at different computer knowledge level. In addition, the potential users hope that EMR would be simple and easy to learn. Some users want to have modules, which consist of budgeting, logistics and patient information. One lab technician stated that EMR would improve efficiency and two C.R.A believed that reduced time in filing activities would increase efficiency. "I think it is a good thing: it will be easier for C.R.A to work"-Clinician

Hesitation

However, some interviewees showed their reluctance to use the proposed system. Two participants expressed their hesitation to install EMR in the clinics at the time of interview whereas the rest of the interviewees are willingly to have EMR system. They were uncertain with the staff ability to use the system and wanted to leave the clinic out from the pilot stage. "My clinic staffs were quite novice in computer usage and the number of patient treated here are not much compared to other centers. As a result, we don't have much problem with the current system and we are in no rush to have EMR system installed in the clinic."-Center Manager/Clinician

One interesting fact stated by C.R.A if EMR system is installed is that "I am more concerned with the relationship with the patient. Current system allows us to interact with patient. If EMR installs, I am afraid we don't spend much time with patient." – C.R.A

Table 4.24 Quotes from interviewees regarding opinions on proposed system

Themes	Quotes
-Expectation	"Days like Monday or Friday, we see 80-100 patients. It is quite difficult to handle patients' record cards and hope that the EMR implementation could solve the problem"-Supervisor.
-Hesitation	"EMR seems to be promising ideas for the problems currently faced at the clinics, but is it, really?"-Staff

Future possibilities

A selection of questions was prepared to find out whether the organization could get funding, provide technical assistance, and data privacy. Based on the interviews conducted at MSIM head office, there was a strong possibility to implement proposed EMR system in the future. Funding will be requested and training will also be provided if the proposed system is to be installed.

Given the perceived barriers and users' expectation, a range of organizational supports is required to ensure the successful implementation of the EMR. The findings highlighted the importance of training and technical support, which was in line with the findings from one research conducted by Frankel et al.(101) Even though the studied clinics were situated in different regions, overarching themes were identified across sites.

CHAPTER V
DISCUSSION

Electronic medical record system deployment increases quality of care (29) as well as physicians and patients' satisfaction (102). However, the success of system implementation relies on factor including users' response on new system (103). A general presumption of implementing EMR is to improve quality and effectiveness of healthcare delivery. Implementing such system is never easy while taking into account of baseline data like who will be the users, their ICT knowledge, and their acceptance towards the system. In fact, top three reasons for project success are user involvement, management support and a clear requirement statement (104). However, EMR adoption has been hindered due to several reasons: infrastructure, application and organization of the implementation process (105), and user resistance (106). It is of assistance for policy makers, developers to have an insight of organization's current IT availability and users' computer usage and ICT knowledge, and their acceptance of EMR before implementing it (52).

The first objective of this study was to assess the current IT resources in MSIM. The survey showed that all the clinics are currently equipped with at least one computer and the users are familiar with Microsoft Office software. The main limitation is the fact that the server was only available at the head office; a successful implementation of EMR system will require a number of computers, backup servers and stable power supply (electricity). Currently, most IT related tasks are outsourced in MSIM and the organization might need to employ more IT personnel if the proposed system is to implement

Internet is available only at the head office. However, the majority of the respondents accessed to Internet via Internet café. In 2012, the International Telecommunication Union estimated that only 1.07% of Myanmar population used internet (107). Limited ICT availability in clinics is in line with current Myanmar ICT infrastructure: According to International Telecommunication Union (2013), Myanmar

overall ICT Development Index (IDI) level is 134 out of 155 in 2012which indicates that IDI value of the country is still low in the world. Myanmar has the lowest rank in ASEAN countries with 134, whilst Thailand, Cambodia and Lao P.D.R ranked 95, 120 and 123 respectively. Similarly, Myanmar ranked 150 for IDI access sub-index, 156 for IDI use sub-index in 2012 indicating the lowest rank in ASEAN countries (108). There is still a lack of sufficient technological infrastructure to implement the EMR system at MSIM.

The current available IT infrastructure affirmed the users' concern such as *technical support* and *unstable power supply*: "What will happen when the power is cut off? If it happens, do we have to use paper-based system or electric generator will be installed for power back-up?"

The users find challenging if EMR is to be deployed. Unfortunately, it is the case for any IT related project (37). A survey carried out in 11 countries found that financial incentives and technical support play a major role in health IT adoption (44). Lack of technical support and unstable power supply were, again, major challenges listed by EMR implementers in developing countries (32). Trevor Lewis et al. mentioned that lack of necessary infrastructure for stable power supply and Internet access were concerns (109). One more major concern regarding EMR implementation is *sustainability*. Kimaro and Nhampossa also argued that e-health projects in developing countries failed because of lack of IT professionals and the knowledge about the system (110).

Another research confirmed that availability of the *stable power supply* is of importance in healthcare delivery development (111). Some potential users were worried about the system downtime, which is consistent with the actual incidents mentioned in a study conducted by Jan-Tore Lium et al. in Norway. Their qualitative study with physicians in 2 Norwegian hospitals and one of the results was the downtime, which influence the attitude towards the system (112).

The second objective of the study was to assess computer usage of MSIM employees: three areas of computer usage were assessed in this study, i) for providing care and reporting ii) for administration and iii) for communication. In general, computer usage in term of providing care and reporting is relatively low in every region and clinics, as, at present, every center is using the paper-based record system.

According to computer experience result, 9 participants were reported having no experience with computer due to the type of jobs they do. For example, counselor and S.R.H.P's do not require any computer background. Computer usage is strongly influenced by the type of jobs i.e. Doctors and staff in management and administration highly used computer in administration and communication tasks, while CRA does not frequently use computer for reporting or communication.

Usage score suggested that there was a variation in regions, state and the head office. As a result, MSIM should need to account for those who have less experience in computer when it comes to providing training. Paying attention to computer literacy and engaging training for participants, who have reportedly never used computer and/or who have not use computer at work, are of importance during EMR system implementation (113).

With respect to computer usage level at the surveyed clinics and the head office, around 56% have computer usage below the median. As a matter of fact, a high level of computer usage in all components i.e. providing care and reporting, administration and communication can be found in the head office compared to other regions or state. Computer usage of Yangon Region is the lowest for communication task, as they use other types of communication channel, e.g. via telephone, messenger, etc.

To assess the ICT knowledge of MSIM employees is the third objective of this study: Though ICT knowledge questions used in this survey did not completely measure all aspects of IT knowledge, the results did provide the general idea of ICT knowledge among the MSIM staffs. The quantitative results revealed that there was a difference in ICT knowledge level among regions and among participants. C.R.A, Nurse/Midwife, and supervisor knowledge level were just below the median knowledge level. Majority of the respondents have had some computer related trainings, but very few people have IT background.

Doctor and management and administration staffs have high level of ICT knowledge owing to their job nature at the organization: Doctors stationed at the clinics act as the center manager. They are responsible for reporting patient data, and logistics information on regular basic via email, post and courier service to the head office. As for management and administration staff, their job mostly involved with IT, such as

reporting, communication among stakeholders, and disseminating information. Most management and administration staffs were from the head office where the Internet and computers are available for every workstation.

With respect to ICT knowledge level, approximately 56% have knowledge level below the median. Knowledge among regions, state and the head office showed significant difference in knowledge level mainly due to one region, Ayeyarwaddy. Staffs working at that region have relatively low knowledge level and have expressed their need for some training, which are often parts of project establishment. Differences in ICT knowledge posed a challenge for implementing EMR system in MSIM.

Eighty-nine out of 112 respondents have training related to computers. Yet, during the interviews, participants expressed their concern on training need. The implementation of EMR system will require notable investment on training. More training about computer will help improve ICT knowledge and promote future application of EMR system. Availability of *training* facilities for healthcare workforce has been considered as an important factor for a successful EMR implementation in developing countries (32, 114). The other way around, lack of users training can be a pitfall in implementing EMR system (37). According to Q. A. Qureshi et al., capacity development via training in e-health applications ensures the successful implementation of ICT in organization (65).

At this point, it is worth mentioning the MSIM's current (unwritten) policy: since English language skills and computer skills are part of the selection criteria, the office does not provide any financial support for those capacities. The policy unknowingly poses as a challenge: ICT Capacity development is a critical component if EMR system is to be employed at MSIM. Implementing EMR system in MSIM have put some hopes to MSIM staff some opportunities to be trained and to improve their ICT knowledge and skills. In fact, the initiation of training should be an integral part in EMR implementation.

To assess User Acceptance towards the proposed system was the fourth objective of this study. Using TAM model, user acceptance was measured in three aspects; perceived usefulness, perceived ease of use and intention to use. The quantitative study data observed on the 5-point Likert scale were 4.15, 4.03 and 4.10 in each aspect respectively. Those responses reflect a positive perception on EMR system.

Users' perceived ease of use indicated the lowest score among the three aspects, probably due to users were unfamiliar with the EMR system and they were not able to fully imagine using EMR would be easy for them. Overall, approximately 42% of the respondents have user acceptance level to the proposed system above the median. User acceptance varied from one region to another. The user acceptance at the head office was the lowest in all three aspects. Among the regions and state, Yangon, Mandalay and Ayeyarwaddy Regions have high intention to use score. The most obvious reason behind may be the Regions and State are the service providing units and the head office is for administration and management.

High "perceived usefulness" and "intention to use" can be found in both C.R.A and doctor. C.R.A, who take responsibilities of Cashier, Receptionist and Accountant in MSIM, and doctor, who are center managers, have high enthusiasm in the proposed system due to challenges encountered from paper-based system. Whereas for Management and Administration group has low perceived usefulness and low intention to use as they did not directly involved with the patient and paper-based medical record system. Their low level of perceived usefulness and intention to use are barriers, which may be even more important to address, as they have to provide necessary support to the clinics and field staff.

Taking into account of their role and responsibilities, for head office staff, there may be less expectation of the capacity and lack of consideration for the field teams and probably worries over their possible extra responsibilities to train the field staff. This also posed as a challenge in implementing the proposed system. In terms of field staff high intention to use, apart from the apparent challenges of paper-based record system, the field staff might expect for the possibility of having a chance to receive training on computer usage at office expense as well.

In this study, the result showed a strong Pearson correlation among the variables: Perceived Usefulness ($r=0.846$) and Perceived Ease of Use ($r=0.627$) both correlate strongly with the Intention to Use towards the proposed system. The result indicated that there is a positive relationship between PU and PEOU with IU and suggested that there is strong evidence to conclude that the PU and PEOU of an EMR will have impact on the intention to use of MSIM staff. However, high correlation among variables in this study does not imply causation.

Nonetheless, the relationship between ICT knowledge, current computer usage with IU was not statistically significant. In this case, regardless of their ICT knowledge, and computer usage, the users intention to use mainly depends on their perceived usefulness of the proposed system and the participants are determined to use the EMR system as part of their job. Based on the result, PU has demonstrated to have a significant relationship with the intention to use, which is similar to the following literature: Yi et al.(115), Tung et al. (116), Aggelidis and chatzoglou (117). Moreover, the result indicated that when participants perceived EMR is easy to use, it will lead to their intention to use such technology, which agree with Davis (1989)(21) and Annie Ng Cheng San and Choy Johnn Yee (87).

Major limiting factors for paper-based system listed by interviewees in MSIM are time consuming, duplication of record card and booklet, and information retrieval. Studies have confirmed that implementing EMR reduced in time spent by administrative staff to pull charts (33, 34, 118, 119).

"Patient usually loses the booklet and does not remember his/her last visit. So we either re-register them or re-issue the booklet."

As for proposed system, training, workload, data privacy, technical support, unstable power supply and sustainability were factors that users concern the most. Lack of electricity, lack of infrastructure, and limited trained health professionals were also found to be the limiting factors in Rawanda's HIT implementation (120).

"I am worried about the technical support. We had a computer breakdown in the past. It took more than a week for the technician to come and check what was wrong."

Data privacy and workload were the two concerns mostly raised by the interviewees in this study. One article mentioned that using web based EMR raise concerns for privacy as the medical record might be available to unintended third party (39). The implementation of EMR system will describe challenges concerning patient privacy. Though the code of conduct for health professionals ensures patient's data confidentiality, the organization should become more vigilant for external attacks. As a matter of fact, Myanmar has enacted Electronic Transaction Law in 2004. However, there is no comprehensive legislation about data protection law in place (121).

According to a study conducted by W.O. Hackl et al. (2010), in which the

authors tried to gain insight into negative emotions related to proposed national electronic record system implementation in Austria, the participants expressed concerns of additional workload caused by the new system and data privacy (122). Moreover, same result regarding concerns on information privacy can be found in doctoral thesis conducted by Theera-Ampornpunt (53).

As stated by numerous interviewees, the burden of *double workload* was inevitable during transition period as the users had to handle both paper-based and electronic based system. Joseph K. Rotich et al. mentioned the similar burden during the computer-based patient record system in Sub-Saharan Africa (123). Previous study by Simon et al. (2007) also stated that workflow and privacy remained issues for most physicians in Massachusetts (124).

In this chapter, the current ICT availability, usage, knowledge and acceptance results in the context of INGOs in Myanmar were discussed. The result demonstrated the current situation of IT availability and difference in users' IT knowledge, computer usage and limited acceptance of the system. Some of the concerns from the users, training, limited resources, limited IT infrastructure of the country, differences in ICT knowledge can be considered as barriers in the proposed system implementation. Easy to use EMR system, end-user involvement since early stage, and providing necessary training will help increase user acceptance of the system.

CHAPTER VI
CONCLUSION

The research on need assessment and feasibility of Electronic Medical Record system implementation in Marie Stopes International Myanmar (MSIM) was a descriptive cross-sectional study. It aimed to access the current Information Technology resources of the MSIM, computer usage, knowledge of the staff and their acceptance towards the proposed system. The questionnaire and interview were employed for data collection. The sample composed of 120 MSIM staff from 13 MSIM clinics situated in Yangon Region, Bago Region, Ayeyarwaddy Region, Mandalay Region, Sagaing Region and Mon State and Yangon head office. Data collection has taken place after receiving approval from Ethical Committee. Overall, 17 respondents had been interviewed and the response rate for quantitative study was 93% with 112 questionnaires returned. The quantitative data was then analyzed by using descriptive statistics, such as frequency, percentage, mean and standard deviation, and inferential statistics such as one-way ANOVA, Pearson's Product Moment Correlation Co-efficiency and Regression Analysis. Interviews were coded and described accordingly. The results of the study can be summarized as follows:

6.1 Summary of the results

There were more female (81.2%) working at MSIM compared to male (18.8%). Most of the survey respondent aged less than 30 years (43.8%) and majority of the participants (74.1%) hold Bachelor degree. Around 60% have been working in healthcare for more than 6 years and 38.4% have been working in MSIM for more than 6 years.

There were 212 employees working at the surveyed clinics and head office, and among them 89 employees routinely used computers. All the surveyed clinics were

equipped with at least one computer and only head office had a server. Microsoft office is the common software used in every clinics and 45.5% of the respondents accessed to Internet via Internet café.

Regarding computer usage, 52.3% of the respondents used computers for more than 6 years and only 30% of total respondents use computers several times a day. Approximately 80% of the surveyed participants had computer related training, and 73.2% answered having short course training while 6.3% had training in the University. The computer usage level was determined by using median as a cutoff point and 56.3% of the respondents had low level computer usage.

It appeared that Ayeyarwaddy Region had lower knowledge score compared to other regions. With respect to job classification, C.R.A has lower score than other profession. In general, 42.9% of the respondents were considered having high ICT knowledge. Nonetheless, majority of respondents stated the need of training if EMR is installed.

There were differences among regions and head office concerning user acceptance and all the surveyed regions expressed a high degree of intention to use the proposed system. Among employees, lab technician and management and administration group showed less intention to use compared to other job description.

This study further reinforced the strong relationships between the original TAM constructs in predicting intention to use. Perceived usefulness is an important construct when determining the participant's intention to use. The results found that ICT knowledge was no significant predictor for user acceptance towards proposed system. However, those results can be used to assist in the planning and realization of EMR system. The difference in ICT knowledge, computer usage and acceptance level of the respondents can be taken into account in order to implement system that progresses their routine work rather than hindering it.

Interviews were conducted to gain access to users' concerns and opinions on the current and proposed system. Seventeen respondents, chosen by purposive sampling method, participated in interview. Interviewees described that the current paper-based system had shortcomings such as difficult to retrieve patient's information, data redundancy due to loss of booklet, and time consuming. Throughout the interviews, the respondents did not limit their concerns on current system. Their opinions on

proposed EMR system have also been explored: training and workload were two aspects that most users concerned, while data privacy and sustainability of the proposed system were the points highly considered by potential operators. Technical support and unstable power supply were the other concern that the users pointed out during interviews. Despite no available technology at the clinics, there is a general awareness among interviewees of the benefits of the EMR system.

6.2 Conclusions

This thematic paper started with a description with the current paper-based medical record system at MSIM, and why it is necessary to change to EMR system. However, in deciding whether to deploy EMR system in developing countries is still challenging. Thus, it is indispensible to know current technological availability at the organization, computer usage, ICT knowledge and user acceptance towards proposed system. Transforming from paper-based recording system to EMR system is complex as it involves major changes in workflow not only to physician but also to other staff.

The required training and user involvement are of importance in transitioning the process change. Despite the challenges such as unstable power supply, lack of technical expertise, funding and ICT infrastructure, the implementation of computer-based medical record system has shown feasible (111).

This study found that MSIM clinics have low level of usage in health IT and described high intention to use towards proposed system. However, there is a difference among geographic regions and job description: Head office and management administration group were more reluctant to use the proposed system compared to other regions and job description.

There are three possible results for a feasibility assessment: feasible, feasible with changes and infeasible (125). As it is the feasibility study, the researcher tried to access the current IT infrastructure, users' IT knowledge, computer usage, and acceptance towards proposed system. The information mentioned above can be used as a guideline for decision makers to move forward in deploying health IT in MSIM. However, they have to consider other factors like current IT infrastructure of the country, users' perception on proposed system and their IT knowledge.

Operation feasibility considers the available infrastructure and human resource needs to successfully implement the project. Given high intention to use to the EMR system at the clinics, with the careful planning, adequate training, easy user interface and involvement of users since early stage, the proposed project is operationally feasible.

The aspect of technical feasibility had been explored by finding out technology availability in MSIM: the health IT usage is currently low in MSIM and the required technology for EMR implementation may be challenging to establish given the current IT infrastructure of the country.

Since MSIM relies on grants, economic feasibility is not the case in this study and the decision to implement the proposed system in MSIM is mainly driven by the technical and operational feasibility. However, MSIM need to sustain the project as the renewal of the grant might be based on projected goals and outcomes of the proposed project.

The vision of deploying EMR system in MSIM to improve patient care, manage data more effectively is not far-fetched. Making the vision happen needs a lot of effort to successfully overcome the users concerns and other prevailing factors, such as current technology infrastructure of the country, potential user's familiarity with the technology, regardless of user's favorable attitude towards the system. Ultimately, knowledge derived from this study is of assistance to MSIM and MSI in order to implement the proposed project.

6.3 Recommendations

Based on the results, the following recommendations are made.

- Results from this study highlighted the need for strong leadership and management support in EMR system implementation. To ensure successful implementation, the use of well-founded project management techniques is necessary.

- Respondents in this study expressed their need for a system that is user-friendly and effective: the implementation team should work closely with the potential users to develop a system that support users' needs and facilitate their workflow. The management team, users and IT professional should take part in the planning stage. In

doing so, having health information management professionals as a liaison between clinicians and IT professional would be beneficial.

- Involving users from the beginning is vital to gain the user acceptance of the proposed project. With the users' involvement since the early stage, the whole process of EMR system implementation would give the potential users and operators a "sense of ownership" to the proposed system.

- Given the unrealistic nature of deploying EMR system in all MSIM's 26 clinics simultaneously, a roll-out schedule starting from "pilot" to "late" implementation for clinics should be developed. As for choosing the pilot project site, the selection should be based on size of the clinics, and easy accessibility to the project sites in order to provide technical assistance if needed. Current system should be maintained until the proposed system is fully operational (126).

- Adequate training is a must for both initial success and program sustainability: MSIM should focus on capacity building as they will need IT personnel since from the beginning of the proposed project and those personnel should be retained. To mitigate resistance to change and maximize acceptance, users' willingness can be developed by training to healthcare professional on regular basis, by involving users in EMR system implementation process (72).

- The technical considerations are important in this project and it is necessary to focus not only to social management but also on what is the best technical design given the current IT infrastructure of the country.

- Concerns towards patients' privacy can be tackled by carefully drawing policies of who should have access to what kind of information and patient data should be protected under legislation.

6.4 Strengths, Weaknesses and Challenges of the Study

The results of the study can be used as baseline information for decision-making indicators and move forward in deploying EMR system in MSIM. One of the study strengths was the use of mixed methods, the combination of both quantitative and qualitative methods; data are stronger and more extensive than data from study using only one method and the limitations from single method can be minimized (127).

Another strength of this study was the description of current IT usage, ICT knowledge level and user acceptance level at MSIM. Moreover, the supports and enthusiasms from MSIM team were one of the strengths of this study. Despite the best effort, one weakness of the study is that it is impossible to conduct the survey at all MSIM clinics in Myanmar due to time constraint. In addition, the challenges in conducting this study include the transportation infrastructure of the country and resistance to change from a few potential users.

6.5 Study significance

This study is probably the first study for health IT adoption in non-profit organization in Myanmar. It provides a useful insight for management, as understanding the knowledge and their intention to use will help facilitate a smooth EMR implementation. The result indicated that there was a variation in computer usage, ICT knowledge and intention to use towards the proposed system among the study sites and among employees, which is beneficial for management in development and implementation stage as well as in providing necessary training.

6.6 Limitations of the study

First of all, the interviews and quantitative survey captured only a snapshot view of users' concerns, opinion and expectations regarding EMR implementation, users' ICT knowledge, and computer usage at the selected clinics. Nonetheless, the overall findings highlighted the important issues if EMR implements in the respective clinics. Secondly, one main criticism for this study using TAM model is that it tried to predict the users' intention to use instead of actual usage data. Bagozzi explained that intention may not be representative for actual system use as other factor might influence users' decision to adopt certain technology. (128) Thirdly, the findings from this study do not necessarily represent all health service providing INGOs in Myanmar. Fourthly and last, the results of the survey can only apply to EMR system, as the questionnaires and interviews focused on this specific health IT.

6.7 Area for future research

The result indicated the low user acceptance in the head office and with management and administration group. As a result, follow-up studies such as focus group discussion with those groups should be carried out to give us an understanding of their reluctance. This study examined the pre-implementation "intention to use" and a post-implementation study on "actual system use" should be conducted. This study conducted with potential users and operators in MSIM clinics and the head office, further research could be conducted with the similar user groups in other health service providing INGO in Myanmar. Moreover, similar study should be conducted in government hospitals and private clinics to determine if the "intention to use" varies by care setting.

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APPENDICES

APPENDIX A
COVER LETTER FOR QUESTIONNAIRE IN ENGLISH

Dear Sir/Madam,

My name is Mrs. Win Min Thit, a student of M.Sc. program in Biomedical and Health Informatics at Mahidol University, Thailand. As part of my thematic paper for M.Sc. degree, I am conducting a study entitled with "Need Assessment and Feasibility of Electronic Medical Record System Implementation in Marie Stopes International Myanmar" to describe IT Resources, current IT use, computer knowledge and IT acceptance in Marie Stopes International Myanmar. The result of the study will be used as a baseline in implementing proposed system in MSIM.

I would like to invite you to participate in this study. The survey is completely confidential and voluntary. Only group data will be reported as an outcome of this research. Never will we publish your personal data and scores, nor will these be traceable in this study. If you decide to participate, you are free to withdraw at any time. You are also free to skip any questions you think are too personal or intrusive. This survey questions are in six pages booklets. It will take about 25 to 35 minutes to finish the questionnaire. You will be asked to fill out the questionnaire and return it to me.

If you have any questions regarding the survey please feel free to ask me. You can email me at winminthit@gmail.com.

Thank you very much for your support.

Sincerely,
Win Min Thit

APPENDIX B

COVER LETTER FOR QUESTIONNAIRE IN BURMESE

ကျွန်မဓါ်အမည်မှာ မဝင်းမင်းသစ် ဖြစ်ပြီး Mahidol Unversity တွင် ပညာသင်ကြားနေသူတစ်ဦးဖြစ်ပါသည်။ M.Sc. program in Biomedical and Health Informatics ရရှိရန်လိုအပ်သည့် "Need Assessment and Feasibility of Electronic Medical Record System Implementation in Marie Stopes International Myanmar" အမည်ရှိစာတမ်းကို ပြုစုနေပါသည်။ ဤစာတမ်းဓါ် ရလာဒ်များကို အဆိုတင်သွင်းသည့် စနစ်နှင့်ပတ်သတ်၍ ဆုံးဖြတ်ချက်ချရာတွင် အသုံးပြုပါမည်။

ကျွန်မဓါ်စာတမ်းတွင် ပါဝင်ဖြေကြားရန် ဖိတ်ခေါ်အပ်ပါသည်။ ဤစာတမ်းတွင် ဆန္ဒအလျောက်ပါဝင်နိုင်ပြီး တစ်ဦးချင်းစီဓါ် ကိုယ်ပိုင်အချက်အလက်များကို ရလာဒ်တွင် မဖော်ပြပါ။ ပါဝင်ဖြေကြားမည်ဟု ဆုံးဖြတ်ပြီးသော်ငြားလည်း အချိန်မရွေး နုတ်ထွက်နိုင်ပါသည်။ မေးခွန်းများတွင် ကိုယ်ရေးကိုယ်တာနှင့် ဆက်စပ်နေသည်ဟု ထင်ပါက ဖြေဆိုရန်မလိုအပ်ပါ။ မေးခွန်းစုစုပေါင်းမှာ ၆မျက်နှာရှိပြီး ဖြေဆိုချိန် ၂၅ မှ ၃၅မိနစ်ခန့် ကြာမြင့်ပါမည်။ မေးခွန်းအားဖြေဆိုပြီးလျှင် ကျွန်မအားပြန်ပေးရန်ဖြစ်ပါသည်။

စာတမ်းနှင့်ပါတ်သတ်၍ မေးမြန်းရန်ရှိပါက အချိန်မရွေး winminthit@gmail.com. သို့ ဆက်သွယ်မေးမြန်းနိုင်ပါသည်။

ကျေးဇူးတင်ပါသည်။

ရိုးသားစွာဖြင့်

မဝင်းမင်းသစ်

APPENDIX C
QUESTIONNAIRE IN ENGLISH

ID _____ ICT Availability, Use, Knowledge and Acceptance

Section A User Acceptance

Electronic Medical Record in the survey stands for a computerized system, in which we can register and record, store, access and retrieve the patient's information and medical history within a clinic. This part of the questionnaire asks for your opinion about perceived ease of use, perceived usefulness and intention to use EMR system. Please indicate your degree of agreement by choosing only one response for each statement below.

	Statement (please circle one response for each)	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1	My interaction with the EMR will be clear and understandable "user- friendly".	1	2	3	4	5
2	Using the EMR will improve the quality of my work in providing better patient care.	1	2	3	4	5
3	Learning to use EMR will be easy for me.	1	2	3	4	5
4	Using the EMR will allow me to accomplish tasks more quickly.	1	2	3	4	5
5	I expect to become skilled at using the EMR.	1	2	3	4	5
6	Using the EMR will give me greater control over my work	1	2	3	4	5
7	Overall, I expect the EMR will be easy for staff to use.	1	2	3	4	5
8	Using the EMR will allow me to accomplish more work than would otherwise be possible.	1	2	3	4	5
9	Using the EMR will enhance my overall effectiveness in my job.	1	2	3	4	5
10	I intend to use EMR in my work.	1	2	3	4	5
11	Using the EMR will make my job easier to perform.	1	2	3	4	5
12	I intend to use EMR every day.	1	2	3	4	5
13	Overall, the EMR should be a useful tool for practicing my profession.	1	2	3	4	5

Section B Information and Communication Technology Knowledge

Below are questions that relate to basic ICT knowledge. Please select only one answer for each question.

	Statement (please circle one response for each)	True	False	Not Known
1	Window is an example of an operating system.	1	2	3
2	Examples of Microsoft office software are Microsoft Excel, Microsoft PowerPoint, and Microsoft Word.	1	2	3
3	Software is not a series of instruction that make computer to do something.	1	2	3
4	Computer virus is software that can safeguard computer from malware.	1	2	3
5	USB stands for University of Sanfrancisco Bay.	1	2	3
6	Computer monitor is a screen that displays from a computer.	1	2	3
7	Printer is an output device.	1	2	3
8	LAN stands for Local Area Network.	1	2	3
9	A computer network is a social network like Facebook.	1	2	3
10	Examples of Internet browser are Google Chrome, Internet Explorer, Firefox.	1	2	3

Section C Demographic

About your clinic/office

1. How many persons currently working in the clinic/office?

   _____

2. Computers system currently used in your clinic/office

   ❑ 1) None (Go to Question number 9)

   ❑ 2) Yes

3. If yes, what kind?

   ❑ 1) Desktop /Laptop, number _____

   ❑ 2) Server, number _____

   ❑ 3) Other (Please specify): _____ number_____

4. Type of software being used in your office. (Answer all that apply)

   ❑ 1) Word processor (e.g. Microsoft Word)

   ❑ 2) Spreadsheet (e.g. MS Excel)

- ❑ 3) Presentation (e.g. MS PowerPoint)
- ❑ 4) Database software (e.g. MS Access)
- ❑ 5) Statistic Software (e.g. SPSS)
- ❑ 6) Internet
- ❑ 7) E-mail Software
- ❑ 8) Other (Please Specify) _____

5. Any Internet connection(s) in your office/clinic?
   - ❑ 1) Don't know (Go to Question number 7)
   - ❑ 2) No (Go to Question number 7)
   - ❑ 3) Yes via (Answer all that apply)
     - ❑ 1) Dial up Modem
     - ❑ 2) ADSL
     - ❑ 3) Wimax
     - ❑ 4) ip star
     - ❑ 5) Mobile broadband connection via a portable device using mobile telephone networks (so called 3G or 4G)
     - ❑ 6) Other (Please Specify) _____
6. Who is your office's Internet Service Providers?
   - ❑ 1) Don't know
   - ❑ 2) Paid ISP such as Myanmar Post and Telecommunication, Yadanapon Teleport, Skynet, Red Link, etc.
7. How do you get access to the Internet? (Answer all that apply)
   - ❑ 1) Never access the Internet
   - ❑ 2) At the clinic
   - ❑ 3) At the office
   - ❑ 4) At home
   - ❑ 5) At Internet Café
   - ❑ 6) Other (Please Specify) _____
8. Number of person in your clinic/office routinely using computers: _____

About yourself

9. Gender (select one):

❑ 1) Female ❑ 2) Male

10. Age: _____years

11. What is your highest level of education? (Check the appropriate response.)

❑ 1) Ph.D.

❑ 2) Master

❑ 3) Bachelor

❑ 4) Diploma

❑ 5) High School

❑ 6) Other (Please specify.) _____

12. How long have you been working in the health care field?

❑ 1) Less than 6 months

❑ 2) 6-11 months

❑ 3) 1 – 3 years

❑ 4) 4 – 6 years

❑ 5) More than 6 years

13. How long have you been working in this clinic/office?

❑ 1) Less than 6 months

❑ 2) 6-11 months

❑ 3) 1 – 3 years

❑ 4) 4 – 6 years

❑ 5) More than 6 years

14. What is your designation in health care field?

❑ 1) Doctor

❑ 2) Nurse/Midwife

❑ 3) Lab Technician

❑ 4) Cashier/Receptionist/Accountant

❑ 5) Other (Please specify) _____

15. What is your average percent of time spent in the following activities?

❑ Providing health care _____%

❑ Collecting and entering data _____%

- ❑ Preparing mandatory routine reports _____%
- ❑ Management and administration _____%
- ❑ Other (Please specify.) _____%

16. If Electronic Medical Record install, do you need any training?
    - ❑ 1) Yes
    - ❑ 2) No

17. Do you attend the presentation session?
    - ❑ 1) Yes
    - ❑ 2) No

Section D Computer Usage

18. How long ago did you first start using a computer? _____
    - ❑ 1) Never use
    - ❑ 2) Less than 6 months
    - ❑ 3) 6 – 11 months
    - ❑ 4) 1 – 3 years
    - ❑ 5) 4 – 6 years
    - ❑ 6) More than 6 years

19. How often do you use the computer?
    - ❑ 1) Don't use at all
    - ❑ 2) Use less than once each week
    - ❑ 3) Use once a week
    - ❑ 4) Use several times each week
    - ❑ 5) Use about once a day
    - ❑ 6) Use several times each day

20. To what extent do you personally use a computer for each of the following professional tasks? Please circle the answer.

	Statement (please circle one response for each)	**Never use a computer**	**Sometimes Use a computer**	**Always use a computer**	**Not Performed**
1	Recording patient's information (address, phone number)	1	2	3	0
2	Recording patient information (e.g. clinical diagnosis, history, laboratory, etc.)	1	2	3	0
3	Retrieving patient clinical record (e.g. treatment, family planning)	1	2	3	0
4	Writing official letters	1	2	3	0
5	Preparing presentation slides	1	2	3	0
6	Communicating with colleagues (e.g. E-mail, Skype)	1	2	3	0
7	Searching for information associated with office tasks (e.g. health literatures, government documents, etc.)	1	2	3	0
8	Searching for information associated with personal interest (e.g. news, social network such as facebook)	1	2	3	0
9	Analyzing data using excel	1	2	3	0
10	Generating mandatory report	1	2	3	0

21. Do you have training related to computer?

- ❑ 1) Yes
- ❑ 2) No

22. If yes, what kind of training related to computer skilled have you had and how long? (Answer all that apply)

- ❑ Formal school (University) computer and related field courses training
- ❑ Formal workshop, short courses
- ❑ Self-guided learning about computers
- ❑ Other way of training (Please specify)

APPENDIX D

QUESTIONNAIRE IN BURMESE

အမှတ်စဉ် _____

ICT အသင့်ရရှိနိုင်ခြင်း၊ အသုံးပြုခြင်းနှင့် လက်ခံခြင်း

အပိုင်း (က) ။ အသုံးပြုသူမှ လက်ခံမှု

Electronic Medical Record (EMR): ကုသမှုဆိုင်ရာ အီလက်ထရောနစ်မှတ်တမ်းဆိုသည်မှာ လူနာမှတ်တမ်းများကို ဆေးခန်းတစ်ခုအတွင်း စာရင်းသွင်းခြင်း၊ မှတ်တမ်းတင်ခြင်း၊ မှတ်တမ်းများသိမ်းဆည်းခြင်း၊ အချက်အလက်ရှာယူနိုင်သော စနစ်တစ်ခုဖြစ်သည်။ အောက်ဖော်ပြပါမေးခွန်းများသည် EMR(Electronic Medical Record) စနစ်နှင့်ပါတ်သတ် ၍သင်၏ အသုံးပြုရန်လွယ်ကူသည်ဟုထင်မြင်မှုအသုံးဝင်သည်ဟု ထင်မြင်မှုနှင့် အသုံးပြုရန်ရည်ရွယ်မှု သဘောထားများကိုမေးမြန်းခြင်း ဖြစ်ပါသည်။ သင်၏ သဘောတူညီသည့်အတိုင်းအတာ တစ်ခုကို ရွေး ဖြေဆိုပါ။

		လုံးဝ သဘော မတူပါ။	သဘော မတူပါ။	ကြားနေမှု	သဘော တူပါသည်။	လုံးဝသဘော တူပါသည်။
၁	EMRသည်ရှင်းလင်းနားလည်လွယ်ပြီး အသုံးပြုသူအတွက် လွယ်ကူမည်။	၁	၂	၃	၄	၅
၂	EMRအသုံးပြုခြင်းသည်လူနာကုသပေးခြင်းနှင့် ပါတ်သတ်သည့်ကျွန်ုပ်၏အလုပ်အရည်အသွေးများအား တိုးတက်ကောင်းမွန်လာစေမည်။	၁	၂	၃	၄	၅
၃	EMRစနစ်အသုံးပြုရန်သင်ယူခြင်းသည်ကျွန်ုပ်အတွက် လွယ်ကူမည်။	၁	၂	၃	၄	၅
၄	EMRအသုံးပြုခြင်းသည်ဆောင်ရွက်စရာကိစ္စများကိုပိုမို လျင်မြန်စွာ လုပ်ဆောင်နိုင်စေမည်။	၁	၂	၃	၄	၅
၅	EMR အသုံးပြုရန် ကျွမ်းကျင်သူ ဖြစ်လာမည်ဟု မျှော်လင့်ပါသည်။	၁	၂	၃	၄	၅
၆	EMRအသုံးပြုခြင်းသည်ကျွန်ုပ်၏အလုပ်အပေါ် ပိုမိုထိန်းချုပ်နိုင်လာစေမည်။	၁	၂	၃	၄	၅
၇	အားလုံးခြံငုံသော်EMRသည် ဝန်ထမ်းများအတွက် အသုံးပြုရန် လွယ်ကူမည်ဟုမျှော်လင့်ပါသည်။	၁	၂	၃	၄	၅
၈	EMRအသုံးပြုခြင်းသည်ကျွန်ုပ်အားအလုပ် ပိုမိုပြီးမြောက်စေလိမ့်မည်။	၁	၂	၃	၄	၅
၉	EMRအသုံးပြုခြင်းသည်ကျွန်ုပ်၏အလုပ်အား ပိုမိုအကျိုးရှိစေလာမည်။	၁	၂	၃	၄	၅
၁၀	EMRကိုကျွန်ုပ်၏အလုပ်တွင်အသုံးပြုမည်ဟု ရည်ရွယ်ပါသည်။	၁	၂	၃	၄	၅

၁၁	EMRအသုံးပြုခြင်းသည်ကျွန်ုပ်၏ဆောင်ရွက်စရာ အလုပ်များအား ပိုမိုလွယ်ကူလာစေမည်။	၁	၂	၃	၄	၅
၁၂	EMRကိုကျွန်ုပ်၏အလုပ်တွင်နေ့စဉ်အသုံးပြုရန် ရည်ရွယ်ပါသည်။	၁	၂	၃	၄	၅
၁၃	EMRအသုံးပြုခြင်းသည်ကျွန်ုပ်၏အလုပ်အကိုင်တွင် အသုံးဝင် သောကိရိယာတစ်ခုဖြစ်သင့်သည်။	၁	၂	၃	၄	၅

အပိုင်း (ခ)။ ICT အသိပညာ

အောက်ဖော်ပြပါ မေးခွန်းများသည် အခြေခံ အသိပညာနှင့်ပါတ်သတ်ပါသည်။ မေးခွန်းတစ်ခုစီအတွက် အဖြေတစ်ခုရွေးပေးပါ။

		မှန်	မှား	မသိပါ
၁	Window သည်ကွန်ပြူတာစတင်လည်ပတ် စေသောစနစ်တစ်ခုဖြစ်သည်။	၁	၂	၃
၂	Microsoft Office Software များမှာ Microsoft Excel, Microsoft Powerpoint နှင့် Microsoft Word ဖြစ်ပါသည်။	၁	၂	၃
၃	ဆော့ဖ်ဝဲသည် ကွန်ပြူတာတခုခုလုပ်ဆောင်ရန် ဆက်တိုက်ညွှန်ကြားချက်ပေးသောအရာမဟုတ်ပါ။	၁	၂	၃
၄	ကွန်ပြူတာဗိုင်းရပ်စ်ဆိုသည်မှာ ကွန်ပြူတာကို ကာကွယ်ပေးသော ဆော့ဖ်ဝဲ အမျိုးအစားတစ်ခုဖြစ်သည်။	၁	၂	၃
၅	USB ဆိုသည်မှာ University of Sanfranciso Bay ဖြစ်ပါသည်။	၁	၂	၃
၆	ကွန်ပျူတာမော်နီတာသည် အချက်အလက်များကို ပြသပေးသော ဇန်သားဂင်္ဂါဖြစ်သည်။	၁	၂	၃
၇	Printer ဆိုသည်မှာ ကွန်ပြူတာနှင့်ပြင်ပတွင် ရိုက်ဆက်အသုံးပြုသောပစ္စည်း ဖြစ်သည်။	၁	၂	၃
၈	LAN ဆိုသည်မှာ လိုကယ်ဧရိယာနက်ဝပ်(ခ) ဖြစ်ပါသည်။	၁	၂	၃
၉	ကွန်ပြူတာကွန်ယက်ဆိုသည်မှာ Facebook ကဲ့သို့သော လူမှုရေးကွန်ယက်ဖြစ်ပါသည်။	၁	၂	၃
၁၀	အင်တာနက် Browser ဆိုသည်မှာ Google Chrome, Internet Explorer, Firefox တို့ဖြစ်ပါသည်။	၁	၂	၃

အပိုင်း (ဂ)။ လူဦးရေစာရင်းကောက်ခြင်း။

ဆေးခန်း /ရုံးနှင့်ပါတ်သတ်၍

၁. ဆေးခန်း /ရုံးတွင် လက်ရှိလုပ်နေသူအရေအတွက် _____

၂. ဆေးခန်း /ရုံးတွင် လက်ရှိအသုံးပြုနေသော ကွန်ပြူတာစနစ်

- ○ မရှိ (မေးခွန်းအမှတ်စဉ် ၉ သို့)
- ○ ရှိ

၃. ရှိလျှင် မည်သည့်အမျိုးအစားဖြစ်ပါသနည်း။

- ○ လက်ဆွဲကွန်ပြူတာ _____ အရေအတွက် _____
- ○ ဆာဗာ၊ _____ အရေအတွက် _____
- ○ အခြား၊ _____ အရေအတွက် _____

၄. ရုံးတွင်အသုံးပြုနေသော ဆော့ဖ်ဝဲ အမျိုးအစား

- ○ **Word Processor (e.g. Microsoft Word)**
- ○ **Spreadsheet (e.g. MS Excel)**
- ○ **Presentation (e.g. MS Powerpoint)**
- ○ **Database software (e.g. MS Access)**
- ○ ကိန်းဂဏန်းအချက်အလက်တွက်သည့်ဆော့ဖ်ဝဲ **(e.g. SPSS)**
- ○ အင်တာနက်
- ○ အီးမေးလ်
- ○ အခြား _____

၅. ရုံး /ဆေးခန်းတွင် အင်တာနက်ဆက်သွယ်မှု

- ○ မသိပါ (မေးခွန်းအမှတ်စဉ် ၇ သို့)
- ○ မရှိပါ (မေးခွန်းအမှတ်စဉ် ၇ သို့)
- ○ ရှိပါသည် (အဖြေတစ်ခုထက်ပို၍ ဖြေဆိုနိုင်ပါသည်။)
  - ○ တယ်လီဖုန်းဖြင့်ဆက်သွယ်ခြင်း
  - ○ အေဒီအက်စ်အယ်လ်
  - ○ ဝိုင်မက်(စ်)
  - ○ အိုင်ဒီစတား
  - ○ ကြိုးမဲ့အင်တာနက်ဆွဲက်ဆက်စနစ် (၃G သို့မဟုတ် ၄G)
  - ○ အခြား _____

၆. ရုံးအတွက်အင်တာနက် ဝန်ဆောင်မှုပေးသူ

- ○ မသိပါ
- ○ ကျေးဇူးတင်ပေးရသော မြန်မာဝိုင်(စ်) ရုတနာပုံ တယ်လီဝိုး စကိုင်းနက်၊

၇. မည်ကဲ့သို့အင်တာနက်ကို ဆက်သွယ်သုံးပါသလဲ။

- ○ မည်သည့်အခါမျှ အင်တာနက် ဆက်သွယ်မရ
- ○ ဆေးခန်း
- ○ ရုံးခန်း
- ○ အိမ်
- ○ အင်တာနက်ဆိုင်

○ အခြား: _____

၈. ရုံးတွင် ကွန်ပြူတာပုံမှန်အသုံးပြုနေသော သူအရေအတွက် _____

ဖြေဆိုသူနှင့်ပါတ်သတ်သည့် အကြောင်းအရာ

၉. လိင်

☐ အမျိုးသမီး ☐ အမျိုးသား

၁၀. အသက် _____ နှစ်

၁၁. အမြင့်ဆုံး ပညာအရည်အချင်း

○ ပါရဂူဘွဲ့.
○ မဟာဘွဲ့.
○ ဝိစာဘွဲ့.
○ ဒီပလိုမာ
○ အထက်တန်းပညာ
○ အခြား: _____

၁၂. ကျန်းမာရေးနှင့်ပါတ်သတ်သော နယ်ပယ်တွင်အလုပ်လုပ်တသောကာလ

○ ၆ လအောက်
○ ၆–၁၁ လ
○ ၁–၃ နှစ်
○ ၄–၆ နှစ်
○ ၆နှစ်အထက်

၁၃. ဆေးခန်း /ရုံးတွင်အလုပ်လုပ်သည့်ကာလ

○ ၆ လအောက်
○ ၆–၁၁ လ
○ ၁–၃ နှစ်
○ ၄–၆ နှစ်
○ ၆နှစ်အထက်

၁၄. ကျန်းမာရေးနယ်ပယ်တွင်သင်၏ရာထူး

○ ဆရာဝန်
○ သူနာပြု ။ သားဖွားဆရာမ
○ ဓါတ်ခွဲခန်းပညာရှင်
○ ဓရိုးဦးကြီးပြုသူ
○ အခြား: _____

၁၅. အောက်ပါအလုပ်ကိစ္စပိုများတွင် ယုံမှုံမှုအချိန်ကုန်ဆုံးသော ရာခိုင်နှုန်း

○ ကျန်းမာရေးကုသပေးမှု _____%
○ အချက်အလက်များစာရင်းကောက်ခြင်းနှင့် စာရင်းသွင်းခြင်း _____%

- ပြဌာန်းချက်အရလုံမှုနှံ တိုးတက်မှုမှတ်တန်းဖြင့်ဆင်ခြင်း _____%
- စီမံအုပ်ချုပ်မှုနှင့် စီမံခန့်ခွဲခြင်း _____%
- အခြား _____%

၁၆. ဆေးကုသမှုနှင့်ဆိုင်သော အီလက်ထရောနစ် မှတ်တမ်းစနစ် တပ်ဆင်မည်ဆိုပါက သင်တန်းတက်ဖို့ရန်လိုအပ်ပါသလား။

☐ လိုပါသည်။

☐ မလိုအပ်ပါ။

၁၇. **EMR Powerpoint** ဆလိုက် ကိုရှင်းပြချိန်တွင်ရှိပါသလား ။

☐ ရှိပါသည်။

☐ မရှိပါ။

အပိုင်း (ဃ)။ ကွန်ပြူတာအသုံးပြုမှု

၁၈. မည်သည့်အချိန်မှစ၍ ပထမဦးဆုံး ကွန်ပြူတာကို အသုံးပြုခဲ့ပါသလဲ။

- ဘယ်သောအခါမှ အသုံးမပြုခဲ့ပါ။
- ၆ လအောက်
- ၆လ – ၁၁လ
- ၁နှစ် – ၃နှစ်
- ၄နှစ် – ၆နှစ်
- ၆နှစ် နှင့်အထက်

၁၉. ကွန်ပြူတာအသုံးပြုသော အကြိမ်အရေအတွက်

- အသုံးမပြုပါ။
- တစ်ပါတ်တွင်တကြိမ်အောက်
- ပ တစ်ပါတ်တွင်တစ်ကြိမ်
- တစ်ပါတ်တွင်ကြိမ်များစွာ
- တစ်နေ့.တစ်ကြိမ်
- တစ်နေ့.တွင်ကြိမ်များစွာ

၂၀. မည်သည့်ပမာဏမျှ အောက်ဖော်ပြပါလုပ်ငန်းတာဝန်များကို ကွန်ပျူတာအသုံးပြု၍ ဆောင်ရွက်ပါသနည်း။
(အဖြေကိုအဝိုင်းဝိုင်းပေးပါ။)

		ဆောင်ရွက်ပါသည်၊ သို့သော် ကွန်ပြူတာ မသုံးပါ။	တစ်ါတရံ ကွန်ပျူတာ သုံးပါသည်။	အမြဲတမ်း ကွန်ပျူတာ သုံးပါသည်။	မည်သည့်အခါမျှ ဆောင်ရွက်ခြင်း မရှိပါ။
၁	လူနာမှတ်တမ်းများအား မှတ်တမ်း တင်ခြင်း(နေရပ်လိပ်စာ၊ ဓာန်းနံပါတ်)	၁	၂	၃	၀
၂	လူနာမှတ်တမ်းများအား မှတ်တမ်းတင်ခြင်း(ရောဂါစစ်တမ်း၊ ရောဂါဖြစ်စဉ်၊ ဓါတ်ခွဲခန်းအဖြေ)	၁	၂	၃	၀

၃	လူနာမှတ်တမ်းများအားရှာဖွေခြင်း (ကုသမှုမှတ်တမ်း၊ ဓါတ်ခွဲစစ်ဆေးကိန်း)	၁	J	၃	ဝ
၄	ရုံးနှင့်.သက်ဆိုင်သော စာများရေးသားခြင်း	၁	J	၃	ဝ
၅	တင်ပြရန်အချက်အလက်များကို Power point ဆလိုက် တွင်ပြင်ဆင်ခြင်း	၁	J	၃	ဝ
၆	လုပ်ဖော်ကိုင်ဖက်များနှင့်ဆက်သွယ်ခြင်း (ဥပမာ–အီးမေးလ်ဖြင့်)	၁	J	၃	ဝ
၇	ရုံးလုပ်ငန်းနှင့်သက်ဆိုင်သောသီတင်း အချက်အလက်များရှာဖွေခြင်း(ကျန်းမာရေးနှင့်ပါတ်သတ်သောစာပေ၊ အစိုးရမှတ်တမ်းများစသည်ဖြင့်)	၁	J	၃	ဝ
၈	မိမိစိတ်ဝင်စားသည့်သတင်းအချက်အလက်များ ရှာဖွေခြင်း(ဥပမာ။ ကမ္ဘာသတင်းများ၊ အနုပညာသတင်းများ)	၁	J	၃	ဝ
၉	Excel ဖြင့် အချက်အလက်များကို ပြုစုခြင်း	၁	J	၃	ဝ
၁၀	မဖြစ်မနေတင်ရမည့်အစီရင်ခံစာရေးပို့ခြင်း	၁	J	၃	ဝ

၂၁. ကွန်ပြူတာနှင့်ပတ်သတ်i သင်တန်းများကို တတ်ဖူးပါသလား။

- ○ တတ်ဖူးပါသည် ။
- ○ မတတ်ဖူးပါ။

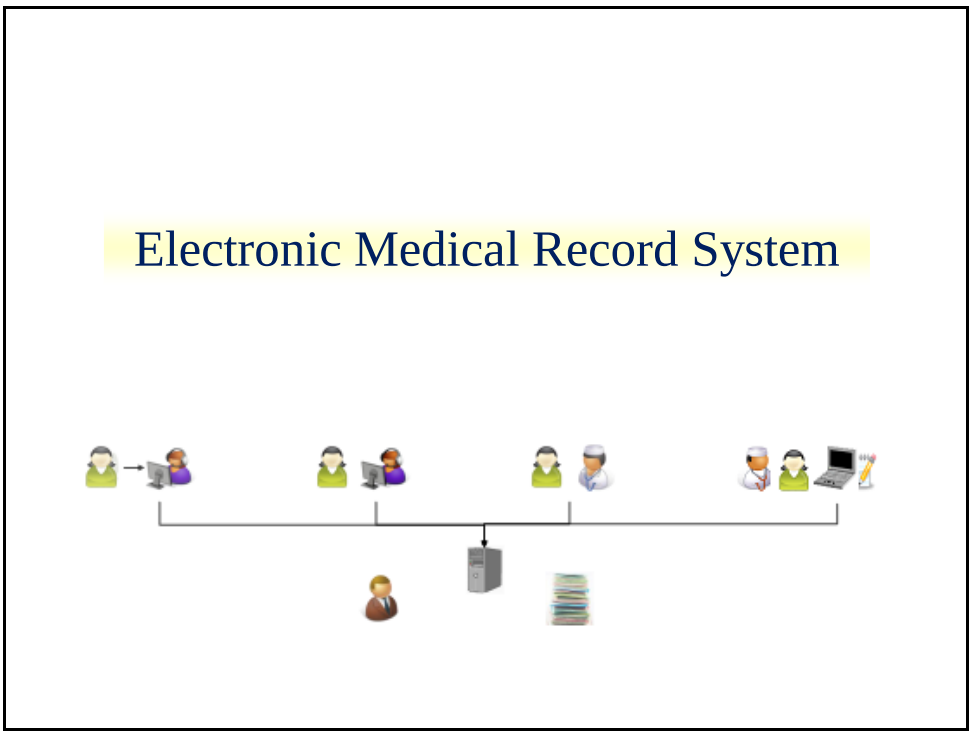
၂၂. အချိန်မည်မျှကြာအောင် တတ်ခဲ့ဖူးပါသလဲ။

- ○ ကွန်ပြူတာတကသိုလ်နှင့် အခြားပါတ်သတ်သောသင်တန်းများ _____
- ○ သင်တန်းတို့များ _____
- ○ ကွန်ပြူတာနှင့်ပါတ်သတ်i ကိုယ်တိုင်လေ့လာခြင်း _____

အခြားနည်းလမ်းဖြင့်လေ့ကျင့်မှ _____

APPENDIX E

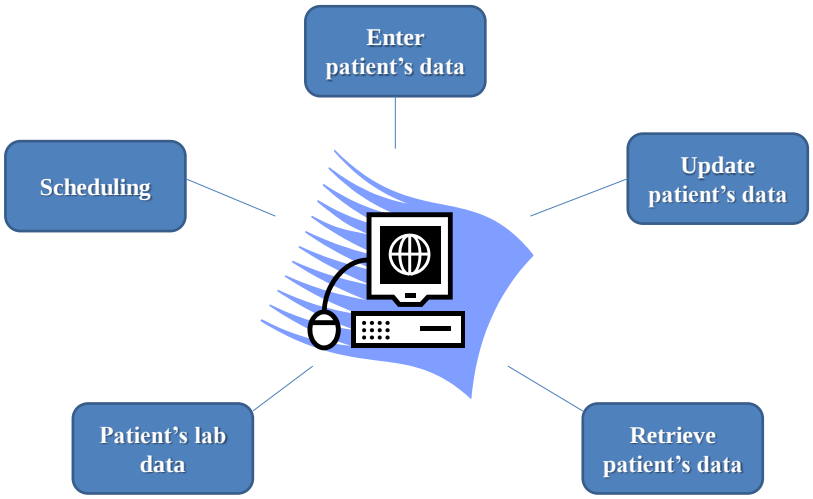
EMR PRESENTATION IN ENGLISH



What is EMR?

Electronic Medical Record (EMR) is a computerized system, in which we can register and record, store, access and retrieve the patient's information and medical history within a clinic.

EMR Usage



Data in EMR

- Demographics
- Medical History
- Medication and Allergies
- Lab Results
- Logistics, etc.

EMR Scenario

Schedule **Register**

Update, Retrieve Patient's Data

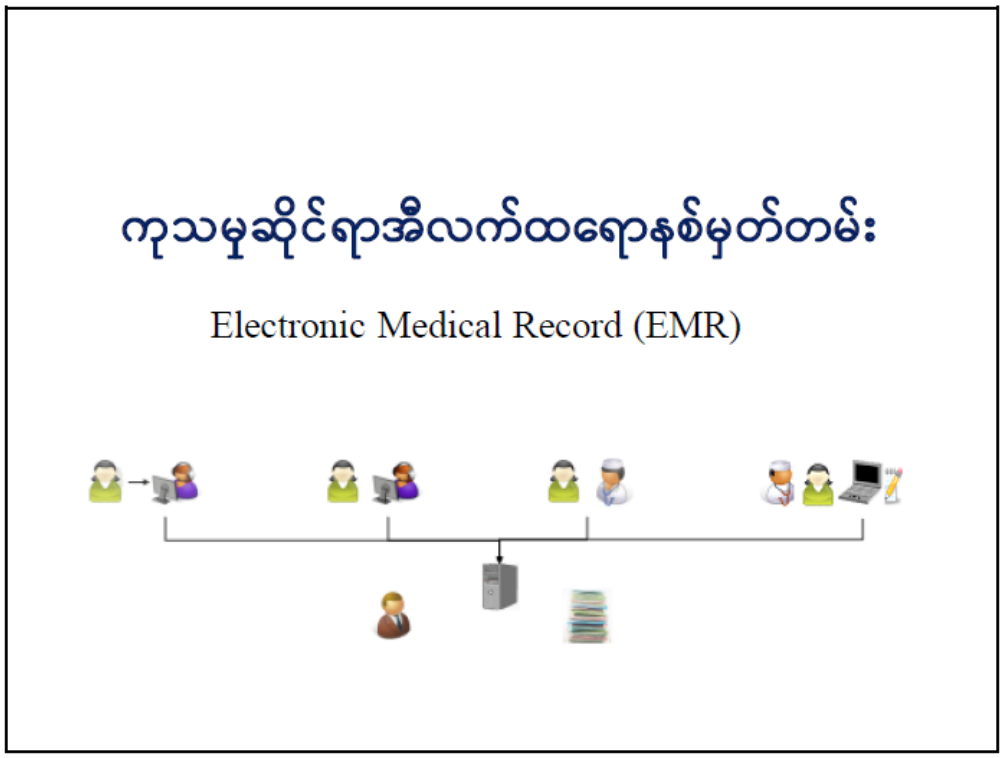
EMR Benefits

- Track patient's data over time
- Immediate access, retrieve, and update patient's information
- Less storage space
- Save time
- Data analysis

THANK YOU

APPENDIX F

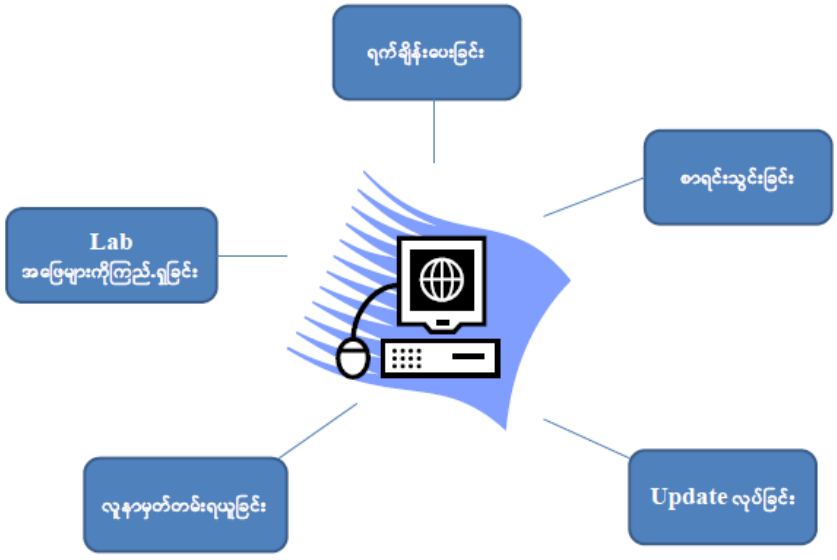
EMR PRESENTATION IN BURMESE



EMR ဆိုသည်မှာ

EMRသည် ကွန်ပြူတာစနစ်ကိုအသုံးပြုပြီး လူနာမှတ်တမ်းများကို ဆေးခန်းတစ်ခုအတွင်း စာရင်းသွင်းခြင်း၊ မှတ်တမ်းတင်ခြင်း၊ မှတ်တမ်းများသိမ်းဆည်းခြင်း၊ အချက်အလက်ရှာယူနိုင်သော စနစ်တစ်ခုဖြစ်သည်။

EMR အသုံးများ



EMR ထည့်သွင်းနိုင်သော အချက်အလက်များ

- လူဦးရေ စာရင်းသွင်းခြင်း၊
- ဆေးကုသမှုနှင့်ဆိုင်သော မှတ်တမ်းများ ၊
- ဆေး နှင့်ဆေးမတည့်ခြင်း ၊
- ဓာတ်ခွဲခန်းအဖြေများ ၊
- ဆေးများစီမံခန့်ခွဲခြင်း အစရှိသည်

EMR ဥပမာ

ရက်ချိန်းပေးခြင်း

စာရင်းသွင်းခြင်း

လူနာမှတ်တမ်းရယူနိုင်ခြင်း

EMR ၏ အကျိုးကျေးဇူးများ

- လူနာ၏ဆေးမှတ်တမ်းများကို ပြန်ရှာဖွေနိုင်ခြင်း၊
- လူနာ၏ ဆေးမှတ်တမ်းများကို ပြန်လည်ရယူအသစ်ထပ်မံဖြည့်စွက်နိုင်ခြင်း၊
- နေရာကုန်သက်သာခြင်း၊
- အချိန်ကုန်သက်သာခြင်း၊
- **Data analysis** လုပ်ရန်လွယ်ကူခြင်း၊

ကျေးဇူးတင်ရှိပါသည်။

APPENDIX G

PERMISSION LETTER FROM MSIM

MARIE STOPES INTERNATIONAL
Myanmar Representative Office

To Whom It May Concern:

Biomedical and Health Informatics
Mahidol University
Bangkok
Thailand

August 29, 2013

Subject: Permission to Conduct Cross-Sectional Study for Master Thematic Paper

This is to confirm that Ms. Win Min Thit, a post-graduate student, major in Biomedical and Health Informatics at Mahidol University, Bangkok, Thailand has requested permission to conduct a survey at Marie Stopes International (MSI) in Myanmar. The study is titled, "Need Assessment and Feasibility of Electronic Medical Record System Implementation in Marie Stopes International Myanmar." The stated purpose of the study is to assess the feasibility for the implementation of EMR system in MSI – Myanmar. The target population will be selected from clinics and head office, which will comprise of key stakeholders such as potential users and potential operators. Potential users include medical doctor, nurse, midwife, lab technician and head office staff from administrative, human resource and logistic section. Potential operators consist of receptionist, accountant, and cashier and head office staff from IT section.

In discussion with the Senior Management of the MSI in Myanmar and the Research and Metrics Manager, I can confirm, as the country representative of the organization, that the permission to conduct the survey at our organization has been granted. She will be allowed to access premises, information systems, staff members, consented clients, and other necessary documents or other data sources of the organization in Myanmar.

MSI is a non-profit international organization established in Myanmar since 1997 to provide or induce services, commodities, information, and conducive environment to improve sexual and reproductive health of communities in Myanmar.

Sincerely yours,

Dr. Sid Naing, MBBS, MPH, MPA
Country Director
Marie Stopes International – Myanmar
Tel: +95-9-501 2478
Email: sidnaing@mariestopes.org.mm;
sidnaing@gmail.com
Skype: sid.naing

Add: (524/10) New University Avenue Road, Saya San Ward, Bahan Township - 11201 Yangon.
Tel: +(95-1) 544-423, 705-657, Fax: +(95-1) 544-423, E-mail: yangon_office@mariestopes.org.mm
Post: GPO Box 1044, Yangon, Myanmar.

APPENDIX H

PARTICIPANT INFORMATION SHEET IN ENGLISH

Participant Information Sheet

In this document, there may be some statements that you do not understand. Please ask the principal investigator or interviewer to give you explanations until they are well understood. To help your decision making in participating the research, you may bring this document home to read and consult your relatives, intimates, personal doctor or other doctor.

Title of Research Project: Need Assessment and Feasibility of Electronic Medical Record System Implementation in Marie Stopes International Myanmar

Name of Researcher: Win Min Thit

Research Sites – Clinics/Office of Marie Stopes International Myanmar

524/10 New University Avenue Road, Sayar San Ward, Bahan Township, Yangon, Myanmar

E-mail: winminthit@gmail.com, Mobile Phone: +95 95068685

Source of Fund: Faculty of Tropical Medicine, Mahidol University, Thailand

This research project aims to assess the current IT usage, basic IT knowledge and user acceptance to proposed EMR system and to describe health IT resources in Marie Stopes International Myanmar (MSIM), which expects that the outcome of this study will be helpful in determining the feasibility of implementing new system.

You are invited to participate in this study, because you have been purposively selected as a staff of MSIM clinic/office. There will be around 100 participants, and the study will last for at end of December 2013. If you decide to participate in the research project, you will go through the following procedures.

- A consent form will be provided to sign to assure your voluntary participation in the study.
- A structured questionnaire will be provided to fill-up.
- It will take about 35 minutes to complete.
- You can skip any question to answer or withdraw yourself form this study at any time, even after signing the consent form.
- You can ask any question at any time to the interviewer/Principle investigator.
- After completing it, Please return the questionnaire to the interviewer/Principle investigator.

If you do not participate in this study, it will not affect your current or future relations with the MSIM. There is no risk associated with participating in this study. However, if you feel uneasy with any of the questions, you can refuse to answer. You may also skip questions you do not want to answer. You can stop the interview at any time. The researcher conducting this study is Win Min Thit. You may ask any questions you have now. If you have questions later, you may contact the investigator at the following address:

Win Min Thit
Biomedical and Health Informatics Program
Faculty of Tropical Medicine, Mahidol University
420/6 Ratchawithi Road, Ratchathewi, Bangkok 10400. Thailand
E-mail: winminthit@gmail.com, Mobile Phone: +66 (0) 855177205

Remuneration: There is no payment or direct benefit for participating in the study. However participant will get a souvenir for participating in this study.

Expense: The participant is not to be responsible for any expense.

If relevant information arises about benefits and risks of the research project, the researcher will inform the participant.

In the survey, you will not be asked to fill in your name or any identifiable information. The records of this study will be securely kept. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be kept in a locked file; only researchers, funding organization, and the ethics committee will have access to the records.

The participant has the right to withdraw from the study at any time without prior notice. And the refusal to participate or the withdrawal from the study will not at all affect the current or future relations with the MSIM. On the condition that you are not treated as indicated in this information sheet, you can contact:

The office of Ethics Committee of the Faculty of Tropical Medicine,
Mahidol University, 4th Floor, The 60th Anniversary of His Majesty the King's Accession to the Throne Building, Faculty of Tropical Medicine, Mahidol University
420/6 Ratchawithi Road, Bangkok 10400, Thailand
Phone: 66 (0) 2354 9100-19 ext. 1349, 1525 or 66 (0) 2306 9126

OR

Marie Stopes International Myanmar
524/10 New University Avenue Road, Sayar San Ward, Bahan Township,
Yangon, Myanmar

APPENDIX I

PARTICIPANT INFORMATION SHEET IN BURMESE

ဤစာရွက်တွင်သင်နားမလည်နိုင်သည့် အကြောင်းအရာများပါဝင်ပါကစာတမ်းပြုစုသူကို မေးမြန်းနိုင်ပါသည်။ ဤစာတမ်းကိုဖြေကြားမည်ဟု ဆုံးဖြတ်ချက်ချနိုင်ရန်အတွက် မိမိကိုယ်ပိုင် ဆုံးဖြတ်ချက် သို့.မဟုတ် ဆွေမျိုး၊ မိဘသို့.မဟုတ် မိမိ၏ ဆေးခန်း ဆရာဝန်အား လည်း အကြံဉာဏ်တောင်းခံနိုင်ပါသည်။

စာတမ်း၏အမည် "Need Assessment and Feasibility of Electronic Medical Record System Implementation in Marie Stopes International Myanmar"

စာတမ်းပြုစုသူ	–	မဝင်းမင်းသစ်
စာတမ်းပြုစုမည့်နေရာ	–	ဆေးခန်း၊ ရုံး Marie Stopes International Myanmar ၅၂၄/၁၀၊တက္ကသိုလ်ရိပ်သာလမ်းသွယ်သစ်၊ ဆရာစံလမ်း၊ ဗဟန်းမြို့နယ်၊ ဂုန်ကုန်၊ မြန်မာ၊
အီးမေး	–	winminthit@gmail.com
ဖုန်းနံပါတ်	–	+၉၅ (၀) ၀၉၅၀၆၈၆၈၅
ငွေကြေးပံ့ပိုးသူ	–	Faculty of Tropical Medicine, Mahidol University, Thailand

ဤစာတမ်း၏အဓိကရည်ရွယ်ချက်မှာ MSIM တွင်လက်ရှိအသုံးပြုနေသော ကွန်ပြူတာ နည်းပညာနှင့် ဆက်စပ်၍ ဝန်ထမ်းများ၏ IT အသိပညာ အရင်းအမြစ်နှင့်အဆိုတင်သွင်း သည့် စနစ်သစ်အပေါ်တွင် လက်ခံမှု၊ လက်မခံမှုကို လေ့လာခြင်းဖြစ်ပါသည်။ ဤစာတမ်း၏ ရလာဒ်များကို စနစ်သစ်တည်ဆောက်ခြင်း မတည်ဆောက်ခြင်း ဆုံးဖြတ်ချက်ချရာတွင် အထောက်အကူအညီပေးပါမည်။

သင်သည် MSIMတွင်အလုပ်လုပ်နေသည့် ဝန်ထမ်းဖြစ်သည့်အတွက် ဤစာတမ်းတွင် ပါဝင်ဖြေကြားရန်အတွက် ဖိတ်ခေါ်အပ်ပါသည်။

ပါဝင်မည့်လူအရေအတွက်မှာ ၁၀၀ ဝန်းကျင်ခန့်.ရှိပြီး အချိန်ကာလမှာ ဒီဇင်ဘာ ၂၀၁၃ ထိကြာမြင့်ပါမည်။ ပါဝင်မည်ဟုဆုံးဖြတ်ပါက အောက်ပါအချက်များအတိုင်း လုပ်ဆောင်ပေးပါရန် မေတာရပ်ခံပါသည်။

၁. သဘောတူညီသည့် စာရွက်ပေါ်တွင် မိမိသဘောအလျောက်ပါဝင်ခြင်း ဖြစ်ပါသည်ဟု လက်မှတ်ရေးထိုးပေးပါရန်ဖြစ်သည်။
၂. ဖြေဆိုရန်မေးခွန်းများ ရရှိပါမည်။
၃. အချိန် ၂၅ မှ ၃၅မိနစ်ခန့်. ကြာမြင့်ပါမည်။

၄. သဘောတူလက်မှတ်ရေးထိုး ပြီးသည့်တိုင်၊ မဖြေချင်သည့် မေးခွန်းများအား ကျော်သွားနိုင်ပြီး အချိန်မရွေးရပ်တန့်နိုင်ပါသည်။
၅. မေးရန်မေးခွန်းရှိပါက စာတမ်းပြုစုသူကို အချိန်မရွေး မေးမြန်းနိုင်ပါသည်။
၆. မေးခွန်းများဖြေဆိုပြီးပါက စာတမ်းပြုစုသူကို ပြန်လည်ပေးအပ်စေလိုပါသည်။

ဤစာတမ်းတွင် မပါဝင်သည့်အတွက်လဲ သင်၏လက်ရှိအလုပ်ကို မထိခိုက်နိုင်ပါ။ ဤစာတမ်းတွင် ပါဝင်သည့်အတွက် မည်သည့်ဆိုးကျိုးများမရရှိနိုင်ပါ။ သင့်အနေဖြင့် မေးခွန်းတချို့ကို ဖြေဆိုရန်မလွယ်ကူပါက မဖြေဘဲနေနိုင်ပါသည်။ မဖြေချင်သည့် မေးခွန်းများရှိပါကလည်း ကျော်သွားနိုင်ပါသည်။ အင်တာဗျူးအချိန်အတွင်း အချိန်မရွေးရပ်စဲနိုင်ပါသည်။ မေးရန်မေးခွန်းများရှိပါကလည်း ပြန်လည်မေးမြန်းနိုင်ပါသည်။ ဖြေဆိုပြီးနောက်မှမေးရန်ရှိပါက စာတမ်းပြုစုသူကို အောက်ပါလိပ်စာအတိုင်း ဆက်သွယ်နိုင်ပါသည်။

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ဤစာတမ်းတွင်ပါဝင်သည့်အတွက် အခကြေးငွေ သို့မဟုတ် တိုက်ရိုက် အကျိုးကျေးဇူးများ မရရှိနိုင်သော်လည်း အမှတ်တရ လက်ဆောင်တခုရပါမည်။

ဤစာတမ်းတွင်ပါဝင်သည့်အတွက် ကုန်ကျစရိတ်မရှိပါ။

ဤစာတမ်းမှ အကျိုးကျေးဇူးသော်၄င်း ဘေးထွက်ဆိုးကျိုးသော်၄င်း၊ ဖြစ်ပေါ်လာပါက စာတမ်းပြုစုသူမှတာဝန်ယူပါမည်။

ဤစာတမ်းတွင် သင်၏နာမည် သို့မဟုတ် သင်မှန်းသိနိုင်သော အချက်အလက်များကိုမပါဝင်စေရပါ။

ဖြေကြားချက်မှတ်တမ်းများကို လုံခြုံစွာသိမ်းဆည်းထားပါမည်။ ဤစာတမ်းအား ပုံနှိပ်ထုတ်ဝေပါက မည်သည့်ကိုယ်ပိုင်အချက်အလက်များမျှ မပါဝင်စေရပါ။ စာရွက်စာတမ်းများကို လုံခြုံစွာသိမ်းဆည်းထားပြီး စာတမ်းပြုစုသူ၊ ငွေကြေးထောက်ပံ့သည့်အဖွဲ့.အစည်း၊ Ethics Committeeတွင်သာ အချက်အလက် ရယူနိုင်ရပါမည်။

ဤစာတမ်းတွင်ပါဝင်သူသည် အချိန်မရွေး နုတ်ထွက်နိုင်ပြီး ပါဝင်ရန်ငြင်းပယ်သည့် အတွက် လက်ရှိအလုပ်တွင်မထိခိုက်နိုင်ပါ။

အထက်တွင်ဖော်ပြထားသည့်အတိုင်း အဆက်ဆံမခံရပါက အောက်ဖော်ပြပါ လိပ်စာသို့ဆက်သွယ်နိုင်ပါသည်။

The office of Ethics Committee of the Faculty of Tropical Medicine, Mahidol University ,4th Floor, The 60th Anniversary of His Majesty the King's Accession to the Throne Building, Faculty of Tropical Medicine, Mahidol University, 420/6 Ratchawithi Road, Bangkok 10400, Thailand, Phone: 66 (0) 2354 9100-19 ext. 1349, 1525 or 66 (0) 2306 9126

သို့မဟုတ်

Marie Stopes International Myanmar

524/10 New University Avenue Road, Sayar San Ward, Bahan Township,

Yangon, Myanmar

APPENDIX J
CONSENT FORM IN ENGLISH

Form of Informed and Voluntary Consent to Participate in Research

Date...../...../ .....

My name is....., aged.....years old, now working at the clinic/office of

.....

Marie Stopes International Myanmar.

I hereby express my consent to participate as a subject in the study entitled "Need Assessment and Feasibility of Electronic Medical Record System Implementation in Marie StopesInternational Myanmar".

In so doing, I am informed of the research project's origin and purposes; its procedural details to carry out or to be carried out; its expected benefits and risks that may occur to the subjects, including methods to prevent and handle harmful consequences; and remuneration, and expense. I thoroughly read the detailed statements in the information sheet given to the research subjects. I was also given explanations and my questions were answered by the head of the research project.

I therefore consent to participate as a subject in this research project. On the condition that I have any questions about the research procedures, or on the condition that I suffer from an undesirable side effect from this research, I can contact with the principle investigator at any time by mobile phone or email as follows:

Win Min Thit
Biomedical and Health Informatics Program
Faculty of Tropical Medicine, Mahidol University
420/6 Ratchawithi Road, Ratchathewi, Bangkok 10400. Thailand
E-mail: winminthit@gmail.com, Mobile Phone: 0855177205

On the condition that I am not treated as indicated in the information sheet distributed to the subjects, I can contact the office of Ethics Committee of the Faculty of Tropical Medicine, Mahidol University, 4th Floor, The 60th Anniversary of His Majesty the King's Accession to the Throne Building, Faculty of Tropical Medicine, Mahidol University. 420/6 Ratchawithi Road, Bangkok 10400, Thailand, Phone: 66 (0) 2354 9100-19 ext. 1349, 1525 or 66 (0) 2306 9126

OR

Marie Stopes International Myanmar , 524/10 New University Avenue Road, Sayar San Ward, Bahan Township, Yangon, Myanmar.

I am aware of my right to further information concerning benefits and risks from the participation in the research project and my right to withdraw or refrain from the participation anytime without any consequence on the service and relationship with the organzation in the future. I consent to the researchers' use of my private information obtained in this research, but do not consent to an individual disclosure of private information. The information must be presented as part of the research results as a whole.

I thoroughly understand the statements in the information sheet for the research subjects and in this consent form. I thereby give my signature.

Signature..... Participants / Date.....
(.....)

Signature..... Person in Charge of Informing and Requesting a Consent/ Head of (.....) Research Project/ Date.....

APPENDIX K

CONSENT FORM IN BURMESE

နေ့စွဲ --/-- /----

ကျွန်တော်/ကျွန်မ----------အသက်-----သည်လက်ရှိတွင် MSIM ဆေးခန်းလုံး----------တွင် အလုပ်လုပ်နေသူဖြစ်ပါသည်။

"Need Assessment and Feasibility of Electronic Medical Record System Implementation in Marie StopesInternational Myanmar" အမည်ရှိစာတမ်းတွင် မိမိ၏ ဆန္ဒအလျောက်ပါဝင်ပါမည်။

ဤစာတမ်း၏ ရည်ရွယ်ချက်၊ လုပ်ဆောင်ပုံနည်းလမ်းများ၊ မျှော်မှန်းထားသည့် အကျိုးကျေးဇူးများ၊ ဘေးထွက်ဆိုးကျိုးများ၊ ဘေးဥပါဒ်ဖြစ်စေသောအကြောင်းများ၊ အခကြေးငွေနှင့်ကုန်ကျ စရိတ်များကိုသိရှိပြီးဖြစ်ပါသည်။ ကျွန်တော်၊ ကျွန်မအား**Participant Information Sheet** မှအချက်အလက်များကို သေချာစွာဖတ်ရှုပြီးဖြစ်ပါသည်။ ထို့အပြင် နားမလည်သည့် အကြောင်းအရာများကို စာတမ်းပြုစုသူမှ ရှင်းပြပြီးဖြစ်ပါသည်။

ထို့ကြောင့် ဤစာတမ်းတွင်ပါဝင်ဖြေကြားရန် သဘောတူပါသည်။ စာတမ်းခန်းလုပ်ဆောင်ပုံနည်းလမ်းများကို မေးရန်ရှိပါသော်ငင်း၊ ဤစာတမ်းမှဖြစ်ပေါ်လာသော မလိုလားအပ်သောဆိုးကျိုးများဖြစ်ပေါ်လာပါက စာတမ်းပြုစုသူကို

Win Min Thit

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ဖုန်းဖြင့်သော်ငင်း အီးမေးလ်ဖြင့်သော်ငင်း အချိန်မရွေး ဆက်သွယ်နိုင်ပါသည်။
ကျွန်တော်၊ ကျွန်မအား PSI တွင်ဖော်ပြထားသည့်အတိုင်း ဆက်ဆံခြင်းမခံရပါက

Office of Ethics Committee of the Faculty of Tropical Medicine, Mahidol University, 4th Floor, The 60th Anniversary of His Majesty the King's Accession to the Throne Building, Faculty of Tropical Medicine, Mahidol University. 420/6 Ratchawithi Road, Bangkok 10400, Thailand, Phone: 66 (0) 2354 9100-19 ext. 1349, 1525 or 66 (0) 2306 9126

သို.

Marie Stopes International Myanmar, 524/10 New University Avenue Road, Sayar San Ward, Bahan Township, Yangon, Myanmar.

ကိုဆက်သွယ်နိုင်ပါသည်။

ကျွန်တော်၊ကျွန်မသည် ဤစာတမ်းကိုပါဝင်ဖြေကြားသည့်အတွက် အကျိုးကျေးဇူးများ၊ ဘေးထွက်ဆိုးကျိုးအချက်အလက်များကို မေးမြန်းနိုင်ပြီး စာတမ်းတွင်ပါဝင်မဖြေကြားပဲ သို.မဟုတ် အချိန်မရွေး ရပ်ဆိုင်းနုတ်ထွက်နိုင်ပါသည်။ ထိုသို.ပြုသည့်အတွက် လက်ရှိအလုပ်ကိုထိခိုက်ခြင်းမရှိပါ။ ကျွန်တော်၊ ကျွန်မဖြည့်စွက်သော အချက်အလက်များကို စာတမ်းပြုစုသူမှသုံးနိုင်သော်လည်း ကိုယ်ပိုင်အချက်အလက်များကို ဖော်ပြရန် သဘောမတူပါ။ အချက်အလက်များကို ဖော်ပြရာတွင် ရလာဒ်ကိုခြုံ၍တင်ပြရပါမည်။

Participant Information Sheet တွင်ပါဝင်သော အချက်အလက်များကို နားလည်ပြီး ဤသဘောတူညီသည့် စာရွက်တွင် လက်မှတ်ရေးထိုးပါမည်။

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ပါဝင်သူ၏လက်မှတ် နေ့စွဲ

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စာတမ်းပြုစုသူ၏လက်မှတ် နေ့စွဲ

APPENDIX L

CERTIFICATE OF ETHICAL APPROVAL

MUTM 2013-073-01

CERTIFICATE OF ETHICAL APPROVAL
Ethics Committee of the Faculty of Tropical Medicine, Mahidol University
420/6 Ratchawithi Rd., Ratchatheewee, Bangkok 10400, Thailand

This Certificate of Ethical Approval (MUTM 2013-073-01) applies to the

Project entitled: Need assessment and feasibility of electronic medical record system implementation in Marie Stopes Internatinal Myanmar

EC Submission No.: TMEC 13-077

with the following relevant documents:

1. Research Proposal (FTM ECF-019-02); English version date 24 September 2013
2. Questionnaire; English version (date not affixed)
3. Questionnaire; Burmese version (date not affixed)
4. E EMR Presentation; English version (date not affixed)
5. E EMR Presentation; Burmese version (date not affixed)
6. Participant Information Sheet; English version (date not affixed)
7. Participant Information Sheet; Burmese version (date not affixed)
8. Consent Form; English version (date not affixed)
9. Consent Form; Burmese version (date not affixed)

Principal Investigator: Mrs. Win Min Thit

Advisor: Dr. Wirichada Pan-ngum

Affiliation: Department of Tropical Hygiene,
Faculty of Tropical Medicine, Mahidol University

This project has been approved for the period
from 11 November 2013 to 10 November 2014

The Ethics Committee of Faculty of Tropical Medicine certify that we are in compliance with Declaration of Helsinki, ICH Guidelines for Good Clinical Practice and other International Guidelines for Human Research Protection.

Signature Porntip Petmitr

(Assoc. Prof. Dr. Porntip Petmitr)

Vice-Chairperson (Panel 2)
Ethics Committee of the
Faculty of Tropical Medicine
Date 15 NOV 2013

Signature Pornpimon Adams

(Mrs. Pornpimon Adams)

Member and Secretary
Ethics Committee of the
Faculty of Tropical Medicine
Date 15 NOV 2013

Page 1 of 1

FTM ECF-013-03

APPENDIX M

ETHICAL APPROVAL (MSIM)

MARIE STOPES INTERNATIONAL
Myanmar Representative Office

Name of Ethics Committee: Marie Stopes International – Myanmar Internal Review Group

Address of Ethics Committee: 524/10, New University Avenue Road, Saya San Ward, Bahan Township, Yangon 11201, Myanmar

Principal Investigator: Win Min Thit, g 5538766, Department of Hygiene, Faculty of Tropical Medicine, Mahidol University, Bangkok, Thailand.

Research Title: Need Assessment and Feasibility of Electronic Medical Record System Implementation in Marie Stopes International Myanmar

Funding: Faculty of Tropical Medicine, Mahidol University, Bangkok, Thailand

Document File:
1) Research Proposal
2) Participant Information Sheet
3) Informed Consent Form
4) Questionnaire
5) EMR PowerPoint Presentation

Opinion of the Ethics Committee/Institutional Board:

✓----------Approval
----------Conditional Approval
Decision: By full committee meeting Date:

Date of Approval: ..7..... November 2013Expiration Date: ..6..... November 2014

This Ethics Committee is organized and operates according to relevant international guidelines, the applicable laws and regulation.

Signed:.....
Dr. Sid Naing
Country Director

Signed:.....
Dr. Okkar Aung
Research and Metrics Manager

Add: (524/10) New University Avenue Road, Saya San Ward, Bahan Township - 11201 Yangon.
Tel: +(95-1) 544-423, 705-657, Fax: +(95-1) 544-423, E-mail: yangon_office@mariestopes.org.mm
Post: GPO Box 1044, Yangon, Myanmar.

APPENDIX N
DATA DICTIONARY

Question No.	Variable Name	Variable Label	Variable Values	Data Type	Recoded Variable Name	Recoded Variables Values	Recoded Data Type
Section A User Acceptance							
1	PEOU_1	Clear and User Friendly.	1= "Strongly Disagree" 2= "Disagree" 3= "Neutral" 4= "Agree" 5= "Strongly Disagree"	Ordinal	N/A	N/A	N/A
3	PEOU_2	Learning will be easy.	1= "Strongly Disagree" 2= "Disagree" 3= "Neutral" 4= "Agree" 5= "Strongly Disagree"	Ordinal	N/A	N/A	N/A
5	PEOU_3	Skilled at EMR.	1= "Strongly Disagree" 2= "Disagree" 3= "Neutral" 4= "Agree" 5= "Strongly Disagree"	Ordinal	N/A	N/A	N/A
7	PEOU_4	Easy for staff to use.	1= "Strongly Disagree" 2= "Disagree" 3= "Neutral" 4= "Agree" 5= "Strongly Disagree"	Ordinal	N/A	N/A	N/A
2	PU_1	Improve quality of work.	1= "Strongly Disagree" 2= "Disagree" 3= "Neutral" 4= "Agree" 5= "Strongly Disagree"	Ordinal	N/A	N/A	N/A

Question No.	Variable Name	Variable Label	Variable Values	Data Type	Recoded Variable Name	Recoded Variables Values	Recoded Data Type
6	PU_2	Greater control over work.	1= "Strongly Disagree" 2= "Disagree" 3= "Neutral" 4= "Agree" 5= "Strongly Disagree"	Ordinal	N/A	N/A	N/A
4	PU_3	Accomplish tasks more easily.	1= "Strongly Disagree" 2= "Disagree" 3= "Neutral" 4= "Agree" 5= "Strongly Disagree"	Ordinal	N/A	N/A	N/A
8	PU_4	Using EMR allows to accomplish more work.	1= "Strongly Disagree" 2= "Disagree" 3= "Neutral" 4= "Agree" 5= "Strongly Disagree"	Ordinal	N/A	N/A	N/A
9	PU_5	Enhance overall effectiveness.	1= "Strongly Disagree" 2= "Disagree" 3= "Neutral" 4= "Agree" 5= "Strongly Disagree"	Ordinal	N/A	N/A	N/A
11	PU_6	Job easier to perform.	1= "Strongly Disagree" 2= "Disagree" 3= "Neutral" 4= "Agree" 5= "Strongly Disagree"	Ordinal	N/A	N/A	N/A

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13	PU_7	EMR is a useful tool.	1= "Strongly Disagree" 2= "Disagree" 3= "Neutral" 4= "Agree" 5= "Strongly Disagree"	Ordinal	N/A	N/A	N/A
10	IU_1	Use EMR at work.	1= "Strongly Disagree" 2= "Disagree" 3= "Neutral" 4= "Agree" 5= "Strongly Disagree"	Ordinal	N/A	N/A	N/A
12	IU_2	Use EMR every day.	1= "Strongly Disagree" 2= "Disagree" 3= "Neutral" 4= "Agree" 5= "Strongly Disagree"	Ordinal	N/A	N/A	N/A
Section B Information and Communication Technology Knowledge							
1	A_Op_Sys	Window is an operating system.	1= "True" 2= "False" 3= "Not Known"	Nominal	A_Op_Sys_1	1= "1" 2= "0" 3= "0"	N/A
2	B_MS	MS office includes MS word, MS excel, etc.	1= "True" 2= "False" 3= "Not Known"	Nominal	B_MS_1	1= "1" 2= "0" 3= "0"	N/A
3	C_Software	Software is not a series of instruction that makes computer to do something.	1= "True" 2= "False" 3= "Not Known"	Nominal	C_Software_1	1= "0" 2= "1" 3= "0"	N/A

Question No.	Variable Name	Variable Label	Variable Values	Data Type	Recoded Variable Name	Recoded Variables Values	Recoded Data Type
4	D_Virus	Virus is some kind of software that can safeguard the computer from malware.	1= "True" 2= "False" 3= "Not Known"	Nominal	D_Virus_1	1= "0" 2= "1" 3= "0"	N/A
5	E_USB	USB stands for University of SanFransisco Bay.	1= "True" 2= "False" 3= "Not Known"	Nominal	E_USB_1	1= "0" 2= "1" 3= "0"	N/A
6	F_Computer	Computer monitor is a screen that displays from computer.	1= "True" 2= "False" 3= "Not Known"	Nominal	F_Computer_1	1= "1" 2= "0" 3= "0"	N/A
7	G_Printer	Printer is an output device.	1= "True" 2= "False" 3= "Not Known"	Nominal	G_Printer_1	1= "1" 2= "0" 3= "0"	N/A
8	H_LAN	LAN stands for Local Area Network.	1= "True" 2= "False" 3= "Not Known"	Nominal	H_LAN_1	1= "1" 2= "0" 3= "0"	N/A
9	I_Network	Computer network is a network like Facebook.	1= "True" 2= "False" 3= "Not Known"	Nominal	I_Network_1	1= "0" 2= "1" 3= "0"	N/A
10	J_Internet	Examples of internet browser are IE, Google chrome, Firefox.."	1= "True" 2= "False" 3= "Not Known"	Nominal	J_Internet_1	1= "1" 2= "0" 3= "0"	N/A

Question No.	Variable Name	Variable Label	Variable Values	Data Type	Recoded Variable Name	Recoded Variables Values	Recoded Data Type
Section C Demographic							
1	Num_p	Number of Person	N/A	Scale	N/A	N/A	N/A
2	Com_Avail	Computer availability at work	1= "None" 2= "Yes"	Nominal	N/A	N/A	N/A
3	Number	Available Number	N/A	Scale	N/A	N/A	N/A
3	Com_System_1	Laptop/Desktop	0= "Doesn't have D/L" 1= "Have D/L"	Nominal	N/A	N/A	N/A
3	Com_System_2	Server	0= "Doesn't have Server" 1= "Have Server"	Nominal	N/A	N/A	N/A
4	Type_Word	Word	1= "Yes" 2= "No"	Nominal	N/A	N/A	N/A
4	Type_Excel	Excel	1= "Yes" 2= "No"	Nominal	N/A	N/A	N/A
4	Type_PPT	PPT	1= "Yes" 2= "No"	Nominal	N/A	N/A	N/A
4	Type_Access	Access	1= "Yes" 2= "No"	Nominal	N/A	N/A	N/A
4	Type_Stats	Stats	1= "Yes" 2= "No"	Nominal	N/A	N/A	N/A
4	Type_Internet	Internet	1= "Yes" 2= "No"	Nominal	N/A	N/A	N/A
4	Type_Email	Email	1= "Yes" 2= "No"	Nominal	N/A	N/A	N/A

Question No.	Variable Name	Variable Label	Variable Values	Data Type	Recoded Variable Name	Recoded Variables Values	Recoded Data Type
5	Int_Con	Internet connection at work	1= "Don't know" 2= "No" 3= "Yes"	Nominal	N/A	N/A	N/A
5	Type_Con	Type of connection at work	1= "Dial up" 2= ADSL" 3= Wimax" 4= "IP Star" 5= "Mobile" 6= "Other"	Nominal	N/A	N/A	N/A
6	ISP	Internet Service Providers	1= "Don't know" 2= "Paid ISP"	Nominal	N/A	N/A	N/A
7	Acc_Int_Nev	Never access	0= "Other Type" 1= "Never"	Nominal	N/A	N/A	N/A
7	Acc_Int_Clinic	Access at clinic	0= "Other Type" 1= "Clinic"	Nominal	N/A	N/A	N/A
7	Acc_Int_Office	Access at Office	0= "Other Type" 1= "Office"	Nominal	N/A	N/A	N/A
7	Acc_Int_Home	Access at home	0= "Other Type" 1= "Home"	Nominal	N/A	N/A	N/A
7	Acc_Int_Cafe	Access at Internet cafe	0= "Other Type" 1= "Internet Cafe"	Nominal	N/A	N/A	N/A
7	Acc_Int_Other	Other	0= "Other Type" 1= "Other"	Nominal	N/A	N/A	N/A
8	Num_P_Use	Number of person who use computer	N/A	scale	N/A	N/A	N/A
9	Gender	Gender	1= "Female" 2= "Male"	Nominal	N/A	N/A	N/A

Question No.	Variable Name	Variable Label	Variable Values	Data Type	Recoded Variable Name	Recoded Variables Values	Recoded Data Type
10	Age	Age	None	Scale	Age_1	1= "<30" 2= "31-40" 3= "41-50" 4= ">50"	Ratio
11	Edu	Education	1=Ph.D. 2=Master 3=Bachelor 4=Diploma 5=High School 6=Other	Nominal	N/A	N/A	N/A
12	Wk_Ex_Yr	Working experience in healthcare	1= "< 6 months" 2= "7-11 months" 3= "1-3 years" 4= "4-6years" 5= "<6 years"	Nominal	N/A	N/A	N/A
13	Wk_Ex_Wk	Working experience in clinic/office	1= "< 6 months" 2= "7-11 months" 3= "1-3 years" 4= "4-6years" 5= "<6 years"	Nominal	N/A	N/A	N/A

Question No.	Variable Name	Variable Label	Variable Values	Data Type	Recoded Variable Name	Recoded Variables Values	Recoded Data Type
14	Desig	Designation at work	1= "Doctor" 2= "Nurse" 3= "Midwife" 4= "Lab Technician" 5= "C.R.A" 6= "S.R.H.P" 7= "Counselor 8= "Supervisor" 9= "Clinic Assistant" 10= "Project officer/manager" 11= "Field Coordinator" 12= "Management" 13= "Public Health Professional" 14= "Program Associate" 15= "Finance" 16= "Accountant" 17= "Human Resource" 18= "Marketing"	Nominal	Desig_1	1= "Doctor, Public Health Professional" 2= "Nurse/ Midwife" 3= "Lab Technician" 4= "C.R.A" 5= "S.R.H.P" 6= "Counselor" 7= "Supervisor/ Clinical Assistant/ Field Coordinator 8= "Project officer/ Management/ Program Associate" 9= "Administrative"	Nominal

Question No.	Variable Name	Variable Label	Variable Values	Data Type	Recoded Variable Name	Recoded Variables Values	Recoded Data Type
15	Pro_health	Providing health care %	N/A	Scale	N/A	N/A	N/A
15	Col_data	Collecting and entering data	N/A	Scale	N/A	N/A	N/A
15	Mgt_Admin	Management and administration	N/A	Scale	N/A	N/A	N/A
15	Prep_report	Preparing mandatory routine report	N/A	Scale	N/A	N/A	N/A
15	Oth_Job	Other Job	N/A	Scale	N/A	N/A	N/A
16	Need_Train	Need Training for EMR	1= "Yes" 2= "No"	Nominal	N/A	N/A	
17	PPT	Present at PPT	1= "Yes" 2= "No"	Nominal	N/A	N/A	
18	Use_Com	Time using computer	1= "Never" 2= "<6 months" 3= "6-11 months" 4= "1-3 years" 5= "4-6 years" 6= ">6 years"	Nominal	N/A	N/A	
19	Time_Use_Com	How often use computer	1= " Don't use at all" 2= "Less than a week" 3= "Once a week" 4= "Use several times each week" 5= "Use once a day" 6= "Use several times each day"	Nominal	N/A	N/A	

Question No.	Variable Name	Variable Label	Variable Values	Data Type	Recoded Variable Name	Recoded Variables Values	Recoded Data Type
20	A_Rec_Data	Recording patient address, phone number	0=Never perform this task 1=Perform but don't use computer 2=Sometimes use computer 3=Always use computer	Nominal	N/A	N/A	N/A
20	B_Rec_Cli_Data	Recording patient clinical data	0=Never perform this task 1=Perform but don't use computer 2=Sometimes use computer 3=Always use computer	Nominal	N/A	N/A	N/A
20	C_Retr_Cli	Retrieving patient clinical record	0=Never perform this task 1=Perform but don't use computer 2=Sometimes use computer 3=Always use computer	Nominal	N/A	N/A	N/A
20	D_Writing	Writing official letter	0=Never perform this task 1=Perform but don't use computer 2=Sometimes use computer 3=Always use computer	Nominal	N/A	N/A	N/A
20	E_Slides	Preparing presentation	0=Never perform this task 1=Perform but don't use computer 2=Sometimes use computer 3=Always use computer	Nominal	N/A	N/A	N/A

Question No.	Variable Name	Variable Label	Variable Values	Data Type	Recoded Variable Name	Recoded Variables Values	Recoded Data Type
20	F_Com	Communication with friends	0=Never perform this task 1=Perform but don't use computer 2=Sometimes use computer 3=Always use computer	Nominal	N/A	N/A	N/A
20	G_Info_Office	Searching information (office)	0=Never perform this task 1=Perform but don't use computer 2=Sometimes use computer 3=Always use computer	Nominal	N/A	N/A	N/A
20	H_Info_Interest	Searching information (Self)	0=Never perform this task 1=Perform but don't use computer 2=Sometimes use computer 3=Always use computer	Nominal	N/A	N/A	N/A
20	I_Analyse	Analyzing data	0=Never perform this task 1=Perform but don't use computer 2=Sometimes use computer 3=Always use computer	Nominal	N/A	N/A	N/A
20	J_Report	Generating mandatory report	0=Never perform this task 1=Perform but don't use computer 2=Sometimes use computer 3=Always use computer	Nominal	N/A	N/A	N/A
21	Training	Training related to computer	1= "Yes" 2= "None"	Nominal	N/A	N/A	N/A

Question No.	Variable Name	Variable Label	Variable Values	Data Type	Recoded Variable Name	Recoded Variables Values	Recoded Data Type
22	Training_Uni	University	0= “Other” 1= “Yes”	Nominal	N/A	N/A	N.A
22	Training_Short	Short Couse	0= “Other” 1= “Yes”	Nominal	N/A	N/A	N/A
22	Training_Self	Self Guided	0= “Other” 1= “Yes”	Nominal	N/A	N/A	N/A
22	Training_Other	Other kind	0= “Other 1= “Yes”	Nominal	N/A	N/A	N/A

BIOGRAPHY

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