

**UNIVERSITY OF GHANA**

**COLLEGE OF HEALTH SCIENCES**

**SCHOOL OF PUBLIC HEALTH**



**ASSESSMENT OF NURSES AND MIDWIVES RECORDS MANAGEMENT SYSTEM**

**AT THE LIBERIA BOARD FOR NURSING AND MIDWIFERY**

**BY**

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## **DEDICATION**

I'm so delighted to dedicate this project to my loving mother, Mom Dorothy L. Mehn, for her moral support to have me successful on this endeavour for higher education.

Most importantly, I'm also dedicating this work to my darling wife Mrs. Dorkor N. Mehn for being my backbone while on this journey; your contribution is highly appreciated.

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## **ABSTRACT**

Adequate human resources for health remain a major challenge to the world especially in the wake of increased burden of diseases as well as worst situation of maternal child mortality in Sub Sahara Africa and some part of Asia. Recently, most international organizations including WHO, UNFPA, etc. have recognized nurses and midwives as the most affordable and available healthcare providers that reached almost every aspect of society be it rural or urban communities. In some instances, adequate numbers of nurses and midwives have been referred to as the major element to meeting the health component of the Sustainable Development Goal (SDG) such as the Universal Health Coverage. In fact, nurses and midwives constitute more than 50% of health workforce across the globe as such need to be properly documented to ascertain the numbers and categories for adequate decision making and placement.

The aim of this study was to assess the current records management system at the Liberia Board for Nursing and Midwifery (LBNM), to ascertain challenges faced in utilizing the current system and subsequently develop a requirement specification for a new records management system. Stages one and two of the system development life cycle were employed to conduct this study.

A census was done since there were fewer staff (13 persons) who are directly involved with services provision at the office. On the other hand, 43 nurses and midwives who visited the board office during the period of the study were interviewed to get their views on the services received. Almost 92% of staff participants pointed out poor handwriting and 84% cited incomplete forms as challenges faced in collecting data. Additionally, more than 92% of staff named lack of storage space as a challenge, while shortage of forms accounted for 85% of challenges faced with data storage. Moreover, 92% of staff also highlighted misplaced folders as major challenge with information retrieval. Most importantly, all staff participants cited inaccurate data as the

major challenge in reporting. More than 69% of staff cited manual data collection method as the means for collecting information at the board. Nurses and midwives on the other hand highlighted difficulty understanding forms, long distances travel, high cost of transportation and delay in processing documents as challenges faced in utilizing services. These results indicate that the manual system at the board is associated with challenges including inaccurate data, inadequate information, etc. on nurses and midwives at the board. Therefore, the Liberia Board for Nursing and Midwifery needs to adopt a web based electronic records management system to ease the current challenges faced by staff as well as nurses and midwives in utilizing the system.

## TABLE OF CONTENTS

DECLARATION .....	i
DEDICATION .....	ii
ACKNOWLEDGEMENT .....	iii
ABSTRACT .....	iv
TABLE OF CONTENTS .....	vi
LIST OF TABLES .....	ix
LIST OF FIGURES .....	x
CHAPTER ONE .....	1
INTRODUCTION .....	1
1.1 Background information .....	1
1.2 Problem Statement .....	6
1.3 Justification of the Study .....	8
1.4 Objectives of the Study .....	9
1.4.1 General Objective .....	9
1.5 Scope of the Project .....	9
CHAPTER TWO .....	10
LITERATURE REVIEW .....	10
2.1 INTRODUCTION .....	10
2.2 Overview of Nursing Midwifery professions .....	10
2.3 Availability of nurses and midwives .....	12
2.4 The vital roles of nurses and midwives in health systems .....	13
2.5 Health Workforce Records Management .....	14
2.6 Information Management and Information Technology .....	15
2.7 Electronic Information Management system .....	17
2.8 Challenges in adopting electronic information Management .....	18
2.8.1 Financing electronic information systems .....	18
2.8.2 Skills Staff and Availability .....	19
2.8.3 User Training .....	19

2.8.4 Maintenance and Sustainment Costs .....	20
2.9 Benefits of electronic information management system .....	20
2.9.1 Communication .....	21
2.9.2 Globalization and cultural gap.....	21
2.9.3 Availability .....	21
2.9.4 Creation of new types of jobs .....	21
CHAPTER THREE .....	23
METHODOLOGY .....	23
3.1 INTRODUCTION.....	23
3.2 Study Setting .....	24
3.3 Investigation/Information gathering.....	24
3.4 Review of the current system .....	25
3.4.1 Functionality of the current system .....	25
3.4.2 Workflow of current system .....	26
3.4.3 Security of current system .....	29
3.5 Challenges faced in utilizing the current system.....	29
3.6 Sampling Techniques and sample size.....	30
3.7 Data Collection Procedures .....	30
3.8 Data Analysis .....	31
CHAPTER FOUR.....	32
RESULTS .....	32
4.1 INTRODUCTION.....	32
4.2 DEMOGRAPHIC CHARACTERISTICS .....	33
4.3 ANALYSIS OF EXISTING SYSTEM.....	35
4.3.1 Information Collection .....	35
4.3.2 Information Processing.....	36
4.3.3 Challenges faced in utilizing system .....	38
4.3.4 Challenges faced by nurses and midwives in utilizing services.....	39
CHAPTER FIVE .....	40
SYSTEM REQUIREMENT SPECIFICATION DOCUMENTS.....	40
5.1 INTRODUCTION.....	40

5.2 System Perspectives .....	40
5.3 Functional Requirements.....	41
5.3.1 Authentication and Authorization .....	41
5.3.2 Administrator.....	42
5.3.3 Finance.....	42
5.3.4 Records .....	43
5.3.5 Nurses and Midwives .....	43
5.4 Non Functional requirements .....	43
5.4.1 Constraints and assumptions .....	44
5.5 Hardware Requirements.....	44
5.6 Software Requirements .....	44
5.7 Entities and Attributes.....	46
CHAPTER SIX.....	50
CONCLUSION AND RECOMMENDATION.....	50
6.1 CONCLUSION .....	50
6.2 RECOMMENDATION .....	51
REFERENCES .....	52
Appendix I: QUESTIONNAIRE FOR LBNM STAFF .....	61
Appendix II: QUESTIONNAIRE FOR CLIENTS.....	66

**LIST OF TABLES**

Table 1: Demographic Characteristics .....	33
Table 2: Information Collection.....	35
Table 3: Information processing .....	36
Table 4 Challenges faced in utilizing the system.....	38
Table 5: Challenges faced in utilizing services.....	39
Table 6: Entities and Attributes .....	46

## LIST OF FIGURES

Figure 1: System Development Life Cycle.....	23
Figure 2: Workflow of Clients registration, testing, and licensing/certificating .....	27
Figure 3: Regular workflow for processing document .....	28
Figure 4: Diagram of system interfaces .....	41
Figure 5: workflow for processing document in proposed system .....	45

## **ABBREVIATIONS**

ANA	American Nurses Association
CHT	County Health Team
DBMS	Database management System
EHR	Electronic Health Records
ISO	International Organization for Standardization
IT	Information Technology
JLI	Joint Learning Initiatives
LBNE	Liberia Board for Nurses Examiners
LBNM	Liberia Board for Nursing and Midwifery
LISGIS	Liberia Institute for Statistics and Geographical
MDG	Millennium Development goal
SDLC	System Development Life Cycle
UNFPA	United Nation Fund for Population Activities
USAID	United States Agency for International Development
	Information Services
WHO	World Health Organization

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background information

Robust and systematic records management system is critical to institutional strengthening since adequate information are generated timely for proper planning; monitoring and evaluating (Smith, 2007). Electronic information system such as human resource management system for health has contributed tremendously in the appropriate deployment of staff based on needs specialty and qualification (Kabene, Orchard, Howard, Soriano, & Leduc, 2006). However, in developing countries especially in Sub-Sahara Africa, documentation in majority of health institutions are mostly paper-based data collection and storage system which tend to generate inaccurate report on type and number of providers, (Joint Learning Initiative, 2006). It is evidence that the persistent used of paper-based record system contributes to poor data quality in terms of reliability, availability, timeliness, completeness, and compromises smooth delivery of services.

The World Health Organization, (2017) indicated that accurate and up-to-date information on health worker stocks and movements is very difficult to obtain from Sub-Sahara African countries as a result of inadequate human resources record keeping systems and as such could only summarized the quantitative situation of nurses and midwives in some regions using data from the World Health Report to build a picture of the shortage of healthcare providers. The result from said data shows wide variation in the availability of care providers which are generally low level compared to levels in other parts of the world.

The report also indicated that information on healthcare providers especially nurses and midwives derived from nurses and midwifery boards may have been inaccurate. Until recently some countries only require registration at initial entry into the health profession. The absence of adequate record systems to monitor the trends of movement among nurses and midwives is prevalent and therefore limits the efficiency and accuracy of policies and decisions (Chen et al., 2004). Inadequate and missing records on healthcare providers result into numerous challenges globally and nationally, (Hongoro, Mcpake, Ssenooba, & Oliveira-Cruz, 2004). Additionally, a recent review of the worldwide nursing shortage revealed that the precondition for effective placement of health workers is a well-organized record management system that supports administration and health professionals to review the trends of activity and differences in amount of work to ensure informed decisions about the daily manpower needs of institutions (Ansah, Koh, Bayer, Harper, & Matchar, 2018).

Accessing data on the numbers and capabilities of healthcare providers in developing countries remained serious challenge to national and international institutions and workforce analysts due to a shortage of complete employee data (Joint Learning Initiative, 2006). Adopting an adequate electronic records management system will make available more reliable data on demographics of nurses and midwives, movement trends and capability. The establishment of a national nurse's database in Kenya greatly improved the capability of the Nursing Council and the Ministry of Health to assess its nursing and midwifery workforce and documented important workforce trends, such as out-migration (Riley, Vindigni, Arudo, Waudu, Kamenju, Ngoya, Oywer, Rakuom, Salmon, Kelley, Rogers, St. Louis, et al., 2007). The current nurses' database in Kenya recognized the United States as the primary recipient of Kenyans' nurses.

Many organizations including the WHO, UNFPA etc. have not only stressed the need for adequate documentation on nurses and midwives but emphasized that the health of the world's population is indivisibly connected to the health and relocation of its health workforce. (United Nations Population Fund, 2005). This mean that developing countries need to pay keen attention to the establishment of an efficient records management system that is capable of tracking healthcare providers' capacities and movements to enable sound decision making on deployment since quality service is dependent on the availability and quality of providers.

The health system of Liberia is faced with huge gap or shortage of skills healthcare worker especially nurses and midwives. According to the Liberia reproductive Health Report (2011), the ratio of nurses and midwives to 1000 population in Liberia is 0.52 in 2010 and 2011. Most of these shortages are believed to be due to the fourteen years of civil unrest in Liberian which have serious damaging effect on Liberia's health system. Liberia health system came to total collapse with only 402 nurses, 297 midwives and 40 nurse anesthetists in the whole country (Tornorlah Varpilah et al., 2011). Majority of Liberia medical professionals fled the country as a result of the war and in search of better life to developed countries while training institutions closed with no replacement for the outgoing professionals. The ministry of health of Liberia and partners has employed many strategies to fill the existing gap of trained health professionals by providing support for training of health workers with special emphasis on increasing the number of nurses and midwives.

Although there have been some improvement made with the supports from USAID and other international donors to train nurses and midwives to help reduce the burdens of maternal child death in the country, there are still health facilities with inadequate and unqualified healthcare providers during the time of this survey (Lee et al., 2011).

Additionally, in 2014 and 2015, Liberia health sector was highly hit again by the worst Ebola outbreak ever in the history of mankind, which took many lives with health worker highly affected by the crises (Cooper, Fisher, Gupta, MaCauley, & Pessoa-Silva, 2016). Up to date, Liberia is still struggling to recover from the effects of the devastating civil war follow by the Ebola crises and at the same time trying to replace some of it health workforce that lost their lives as well as those who left the country by training more nurses and midwives to bridge the gap of skilled providers.

Liberia like many countries in Sub-Sahara Africa is experiencing similar challenges in tracking health professionals' movements especially nurses and midwives as a result of inadequate records managements system. The adoption and use of electronic records management system is at a very slow pace in Liberia (Kofi Mangesi, 2007). Perhaps the usages of electronic information technology in most governmental organizations and services agencies are limited to creating, storing and printing of hard copies of documents with limited interest or knowledge about various opportunities presented by electronic information management system including easy analysis, fast reports generation, querying, and sorting etc.

The Liberia Board for Nursing and Midwifery (LBNM) is the name of the regulatory council for nurses and midwives in Liberia established in 1948 under the Nurse Practice Act of 1948 and named Liberia Board for Nurse Examiners (LBNE). In 1949, it was in acted in to law by the Legislature of Liberia. The Board began actual activities from 1952 when it started licensing practical nurses and midwives who were admitted to the Board as auxiliary.

In 1958 the Liberian Council of Midwives was established to assist with the implementation of the Board's functions. In 1975, the Nursing Board and the Midwifery Council emerged to form the Liberia Board for Nursing and Midwifery (LBNM).

In 2016, LBNM gained its status as an autonomous agency under government, LBNM Act of 2016 passed through by Legislation. The mission: "to protect the Republic's health and safety by regulating nurses and midwifery in order to promote and support safe, competent, ethical nursing and midwifery through leadership that encourage professional excellence".

The vision: "Excellence in nursing and midwifery regulation and practice for the health of all.

Up to date, LBNM has accredited seventeen nursing and midwifery training schools as well as licensed over 7000 nurses and midwives in Liberia according to the administrator. The role of the Board among other things are to advocate with government and national authorities for the endorsement of appropriate regulations for nursing and midwifery practices and utilization to ensure gender equity in all health training programs and ensuring conducive working and learning environment at all health training institutions as well as the regulation of nursing and midwifery practices in Liberia..

The Liberia Board for Nursing and Midwifery which is the regulatory agency for the largest health workforce (nurses and midwives) in Liberia do not have a functional electronic information management system to adequately conduct the affairs of over seven thousands (7000) nurses and midwives in the country. The manual system remains the preferable system for managing records of nurses and midwives at the board.

Even though some office staff claim there is an electronic system, the system mentioned is a stand-alone computer based system that is only use to enter clients information, but do not have the capability to generate any kind of report needed for use by the institution which is the reason the manual system remained the preferred for decision support information.

## **1.2 Problem Statement**

Nurses and midwives account for more than 50% of the total healthcare providers in most developing nations especially in Sub-Sahara Africa (Gerein, Green, & Pearson, 2006). Assessing information about nurses and midwives as the largest workforce in most developing countries have baffled international organizations and workforce experts alike mainly due to shortage of accurate workforce data (Gerein et al., 2006). The lack of reliable systems to monitor key workforce information and trends is widespread, thereby limiting the effectiveness and accuracy of policy-making and decisions. Inaccurate and missing workforce information poses enormous challenges at global and national levels (Nyoni & Gedik, 2012). Inaccurate workforce information also weakens human resource management and development, and eventually hampers growth with global health interventions and breaches evidence based decision making.

As indicated above, some information on the categories and numbers of healthcare providers especially nurses and midwives collected from nursing and midwifery councils in Sub Sahara Africa are most often inaccurate which pose serious challenges to many health institutions for adequate decision making in African countries.

Liberia is by no means different from the rest of the countries in Africa with respects to inadequate information on human resource for health.

Most of Liberia healthcare institutions including the nursing board, the pharmacy board as well as the Ministry of Health that controlled the healthcare system are faced with similar challenges such as inadequate data on healthcare professionals currently practicing for proper decision making and adequate distribution of professionals to facilities in the country.

According to a report from a survey on availability of health data in electronic system in 24 USAID priorities countries including Liberia, health data from various health facilities and districts lacks standards and difficult to derived for globally recommended indicators. Facilities staff input data into forms distributed to them by the county data officers for submission at the end of every month to the County Health Team (CHT) for onwards compilation and submission to the Ministry of Health.

Liberia Board for Nursing and Midwifery is the regulatory body for nurses and midwives in Liberia. The responsibilities of the board are to examine, monitor, evaluate and license the largest health workforce in Liberia including nurses and midwives and also regulating of training institutions for nurses and midwives. The Liberia nursing board does not have adequate information on the amount and categories of providers licensed and currently practicing in the country due to inadequate records management system in use. The board is currently using a hybrid system comprising of both manual and electronic system.

The manual system is used to store hard copy of nurses and midwives' records, while the electronic component of the information management system is only use for entering data even though it cannot produce any kind of reports on the data entered which is one factor influencing the constant use of the manual system.

The manual system is inadequate because vital information about nurses and midwives could be left out, destroyed, or misplaced which contribute to inaccurate data on nurses and midwives in Liberia and therefore hinders adequate decisions support, policy making and planning.

There is also difficulty in tracking expired licenses of practicing nurses and midwives at various health institutions which violets the nursing and midwifery practice Act of the board for practicing nursing and midwifery in Liberia.

Most importantly, the magnitude of the shortage of nurses and midwives in Liberia cannot be fully established with the use of the manual or paper based system at the board for nursing and midwifery.

This study will provide information about the current status of the records management system at the LBNM and develop appropriate requirements for a new system that will provide accurate information on the numbers and specialty of nurses and midwives in Liberia.

### **1.3 Justification of the Study**

The manual or paper-based documentation system is associated with many challenges including the lack of storage space, misplacement of folders, delayed reporting, difficulty in retrieving and sharing information, damage folders, duplication of folders, incompleteness of information, etc. which are difficult to manage or use for analysis or research with the current demand of accurate information. An efficient electronic information system has proven over the years to be the best tools possible in resolving most of the challenges faced by several institutions using a paper based record systems (Megill, 2005). The LBNM as the nursing workforce regulatory body is faced with similar challenges as a result of using paper based record system to manage records of

nurses and midwives and therefore has inadequate information on nurses and midwives in Liberia.

Moreover, the adoption of electronic information management system will increase the capacity of the Liberia Board for Nursing and Midwifery in storing huge quantity of information and generating adequate and accurate reports on the numbers and categories of health nurses and midwives as well as their education and competence thereby resolving issues associated with the use of paper based records systems.

## **1.4 Objectives of the Study**

### **1.4.1 General Objective**

The general objective of this study is to assess the current nurses and midwives records management system at the Liberia Board for Nursing and Midwifery

Specific objectives

1. To analyze the current system in use at the LBNM
2. To identify challenges faced in utilization of the system
3. To provide requirement specification for developing a system

## **1.5 Scope of the Project**

This research project will focus on the operations of the Liberia Board for Nursing and Midwifery including information management such as clients' record keeping, data collection, generation of reports, retrieving of information as well as the usage of data generated from various nurses and midwives across the country.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 INTRODUCTION

This chapter will summarize some of the works others have done on the topic, taking into consideration the review of the nursing profession, availability of nurses and midwives, vital roles of nurses, nurse workforce documentation, information management and IT, electronic information management system as well as its benefits and challenges.

#### 2.2 Overview of Nursing Midwifery professions

The International Council of Nursing (2003) defines Nursing as the protection, promotion, and optimization of health and abilities, prevention of illness and injury, alleviation of suffering through the diagnosis and treatment of human response, and advocacy in the care of individuals, families, communities, and populations. The word nursing is often associated with terms such as registered nurse, License Practical nurse geriatric nurse etc.,(Covell, 2008). Registered Nurse as a person who has graduated from a nursing training program and met the requirements outlined by a country, state, province or similar licensing body to obtain a nursing license to practice in the borders of that country (Phillips, Piza, & Ingham, 2012)

Although the origin of nursing is predated to the mid-19th century, the history of professional nursing traditionally begins with Florence Nightingale. Nightingale, the well-educated daughter of wealthy British parents, challenged social conventions and decided to become a nurse(Godden & Osburn, 2006).

The nursing of strangers, either in hospitals or in their homes, was not then seen as a respectable career for well-bred ladies, who, if they wished to nurse, were expected to do so only for sick

family and intimate friends. In a radical departure from these views, Nightingale believed that well-educated women, using scientific principles and informed education about healthy lifestyles, could dramatically improve the care of sick patients. Today, nursing is a well-defined profession with various specializations and qualification focused on not only the sick rather on preventions and overall wellbeing of communities and its people (Macegan et al., 2015.).

According to the World Health Organization (2005), nurses and midwives account for nearly fifty percent of the healthcare workforce worldwide. Additionally, of the 43.5 million health workers in the world, it is estimated that over twenty (20.7) million are nurses and midwives, yet fifty percent of WHO Member States report to have less than 3 nursing and midwifery personnel per 1000 population about 25% report to have less than 1 per 1000. Nursing careers offer a wide variety of roles and a broad scope of responsibility. There are many different categories of nurses including nurse midwife, mental health nurse, geriatric nurse, pediatric nurse etc., and several different ways to obtain nursing careers. Nurses work closely with physicians as an integral part of the patient health care team. The doctor makes some key decisions about the diagnosis, treatment, and medication, and it is the nurse's role to administer that care on an ongoing basis to ensure successful recuperation of the patient (Clarke & Donaldson, 2008). Nurses spend considerably more face-to-face time with a patient than doctors and particularly skillful at relating to patients, placing them at ease, and assisting them in their regaining their health status according to Clarke and Donaldson (2008).

Over the past several decades it has been astonishing to observe the nursing career progress from being an oppressed group to becoming an influential force in healthcare reform made others in the healthcare industry take notice that nurses play a vital role in improving health outcomes of

the world's population and as such need adequate documentations on numbers and categories for better placement and decision making.

The lack of reliable nursing workforce information seriously impaired the country's ability to develop effective workforce policy decisions and allocate resources appropriately (Riley, Vindigni, Arudo, Waudu, Kamenju, Ngoya, Oywer, Rakuom, Salmon, Kelley, Rogers, St. Louis, et al., 2007).

### **2.3 Availability of nurses and midwives**

Across the globe, the issue of human resource for health has been emphasized by many international organizations as the key factor in the attainment of the Universal Health Coverage (Jimba, Cometto, Yamamoto, Shiao, & Huicho, 2010). Studies have proven that efficient healthcare services are dependent on the quality and the availability of skilled medical professionals to provide needed services. However, most developing countries are still lagging behind with available health worker stock far below the minimum health worker density threshold of 22.8 physician, nurses, and midwives per 10,000 populations according to the World Health Organization, (2006). According to the World Health Organization, 57 out of the total of 193 members' states have serious shortage of healthcare workers especially nurses and midwives with greatest numbers being Sub-Sahara Countries.

Nurses and midwives remain the major element of most healthcare system, accounting for over 50% of total workforce in many nations across the globe (Guilbert, 2006).

The adequate deployments of nurse and midwives in any healthcare institution have been linked to positive outcomes of care (Xu, 2006). However, the decrease in the availability of nurses and

midwives in developing countries is worsened by the inadequate deployment of available nurses in distant or remote locations with insufficient salary and benefits.

In 2011, it was estimated that Thailand needed over twelve thousands (12,000) additional healthcare providers with nurses and midwives accounting for about fifty (50) percent of the total gap to adequately care for the ill population including, mental, neurological, and reproductive health (Bruckner et al., 2011).

In an effort to increase the number of nurses and midwives to fill in the identified gap of 10,000 health workers in Kenya, the assistance minister of health (Enoch Kibunguchy) despite posting to hire additional professionals, many placement in rural areas were unfilled (Vujcic, Ohiri, & Sparkes, 2009). The shortage of nurses and midwives have become so alarming such that the 2015 health related Millennium Development Goals (MDGs) of improving reproductive health in 75 countries with increased percentage (95%) of maternal and child deaths have now evolved into a 2030 goal, making those 75 countries mainly in Sub-Sahara Africa and south Asia highly relevant in the post-2015 era referred to as high burdens countries(Cohen et al., 2014).

#### **2.4 The vital roles of nurses and midwives in health systems**

Nurses and midwives remain the backbone of every health system and interact with almost every healthcare service consumers across the world. Nkowane & Ferguson, (2016) cited nursing and midwifery labor force as the core for meeting the universal health coverage.

The two categories of providers mentioned are the most economically affordable and available healthcare provider that reached almost every sector of society and communities,(Com, 2008a).

Nurses and midwives remained very important in the delivery of critical healthcare services at the communities and individual levels, acting in dual capacities such as individual and as inter-

professionals team members bringing needed healthcare services closer to where they are needed most thereby helping to improve health outcomes and the overall cost effectiveness of basic health care services.

Nurses played advocacies roles in the hospital sitting to ensure that needed healthcare services are provided to needed patients right at the point of care

## **2.5 Health Workforce Records Management**

Adequate documentation of major health workforce is very important for timely and strategic decision making and deployment to facilities in needed. According to the Global strategic directions for strengthening nursing and midwifery (2016-2020), the achievement of the health related Millennium Development Goals are highly depended on the availability and adequate distribution of skilled healthcare providers most especially nurse and midwives. This statement has been followed by call by international organizations to strengthen healthcare institutions to adopt efficient systems that will document and update numbers and categories of health workers to enable the development of evidence based policies on human resources for health (Dovlo, 2007). The establishment of a nursing database in Kenya has made available a national health policy for decision making on adequate deployment of nurses according to Kenya Health Sector Strategic and Investment Plan (2012). This database also established that nurses represent 45.3% of the total public sector workforce in Kenya.

It is now evident that having adequate number of nurses and midwives in any health systems reduces the burden of diseases and sufferings to a largest extend. Unfortunately, it is estimated that the shortage of nurses and midwives may triple especially in Africa and Eastern

Mediterranean Regions in the wake of the increased in live span of the world population as a result of new inventions in health and safety products according to the (Com, 2008b).

According to the WHO 2016-2020 Global Health Strategy, there is an urgent call for every nation to invest in the training of more healthcare providers especially nurses and midwives as a strategy to meet the huge wave of health worker shortage that is being forecasted by health workforce experts.

However, the above mentioned strategies cannot be actualized without an efficient and effective information management system that will produce accurate data on the numbers and types of healthcare workforce in any country (Brush & Sochalski, 2016). Therefore, developing countries need to take advantage of various opportunities unveiled by the used of information technology to efficiently manage important health professionals numbers and trend for adequate decision making and placement.

## **2.6 Information Management and Information Technology**

Most businesses and healthcare institutions in developed countries have adopted the use of electronic information management system to provide services to customers, patients and human resources for efficient deliveries of services.

Information management is an administrative duty devoted to the managing of information in an institution throughout its lifetime ranging from the time of creation to the time of deposition (Karim, 2011).

This includes identification, classification, storage and retrieval, security, tracking until destruction or permanent preservation of records. The International Organization for Standardization (2004) defined management information system as “the field of management

responsible for the proficient and organized control of the creation, receipt, maintenance, use and deposition of records, including the processes for capturing and preserving evidence of and information regarding routine activities and transactions in the form of records”(ISO,2014-4-2).. Examples of management information systems include; human resource information management system, nursing management information system, surveillance management information management, electronic health records (EHR), etc. A study by (Marler & Parry, 2015) suggest that the adoption and use of information technology lead to more efficient information management.

This include timely processing of documents, effective communication, adequate analysis of information for decision support, speedy provision of services to customers or clients in an efficient manner that maximized profits as well as customer satisfaction (Lotfi, Mukhtar, Sahran, & Zadeh, 2013).

Therefore, the Liberia board for nursing needs to adopt and use electronic information management system to adequately manage records of clients in the country to ascertain shortage of needed healthcare professionals for better decision making with focus on statistically proven needs of health system.

## **2.7 Electronic Information Management system**

Electronic information management system is a computer based system used for the collection, organization, storage, easy retrieval and communication of information in and among organizational for evidence based decision(Yang & Maxwell, 2011). Electronic information management systems collects data from all relevant sectors of organization, analyzed the data and ensure their overall quality, relevance and timeliness, and converts data into information for organization related decision-making.

Sound and reliable information is the foundation of decision-making across all health system building blocks, and is essential for health system policy development and implementation, governance and regulation, health research, human resources development, health education and training, service delivery and financing. (Nowduri, 2010; Puissant et al., 2005). While calls for the use of information technology (IT) in healthcare has long been embraced in many countries, the Ministry of Health and many healthcare organizations in Liberia are yet to envisage the adoption or initiation of the use of information technology in the health sector.

According to a report on the review of the database system that was developed in Kenya, it was observed that the database system help in the collection, computerization, and linkage of supply and worksite-level nursing data and offers a descriptive analysis of nursing workforce and represents the first-ever opportunity for decision makers to develop HRH policies based on evidence (Riley, Vindigni, Arudo, Waudu, Kamenju, Ngoya, Oywer, Rakuom, Salmon, Kelley, Rogers, St Louis, et al., 2007).

In the clinical setting, electronic health record (EHR) is now widespread especially in developed countries as the best method of managing patients' health information.

The adoption and use of electronic health record is associated with numerous benefits including adequate data storage, retrieval, prevention of medication errors, easy sharing of data and generation of reports thereby improving the overall quality of health data (Lim, S.Y. Jarvenpaa, S.L., and Lanham, H.J., 2015). The adoption of electronic health records is not only beneficial to providers but also to consumer of healthcare services. For example, online appointment system saves patients from unnecessary cost of transportation and longer time stay at health facilities and provides effective and efficient healthcare data to providers at the point of care.

## **2.8 Challenges in adopting electronic information Management**

Despite the numerous benefits of electronic information systems, there are still some challenges faced by several organizations in adopting electronic information systems to manage information organization. The following summarize some of the challenges faced by organization in adopting electronic record management systems;

### **2.8.1 Financing electronic information systems**

Most organization face significant challenges relating to the short and long-term costs of investing in electronic information system. Funding for initiating electronic information system is one major challenge facing many organizations. Purchasing hardware materials like computers, server, and the demand of huge sum of money for software stands tall among other issues (Khalifa, 2016). Administrators of most organizations feel reluctant investing into the use of ICT in organization since it doesn't seem to be direct money generating asset in most organizations.

### **2.8.2 Skills Staff and Availability**

One of the most common challenges faced by most organizations is the limited staff expertise and availability. Most staffs tend to disrupt the existence of electronic information system as a way of delaying them in doing their work but the truth is most of them lack basic knowledge in using computers (Puissant et al., 2005). The effectiveness of electronic information system depends on the human resource to produce the results expected from system. Recruiting and retaining full-time IT staff with experience completing large-scale implementations is difficult. Additionally, IT staff has multiple responsibilities, preventing them from fully engaging on the implementation of project, an important factor for a successful implementation (Karim, 2011, Nagafeeson, M. 2014).

In Liberia, there are limited numbers of trained personnel and few or no consultancy firm equipped with such necessary skills to provide those services even if the finances were available (Kofi Mangesi, 2007).

### **2.8.3 User Training**

Depending on the staff capacity, organization may require extensive training on the selected information system, computer skills, and management approaches to support a successful implementation. Vendors often provide one to three days of training in a variety of forms and may include in person, one-on-one training sessions, “train-the-trainer” sessions where a few organization staff learn many system processes and then train their colleagues, and web-based presentations that present basic demonstrations of common system processes to large groups of users.

Training may not be sufficient to meet organization needs or may not align with organization specific workflows, necessitating the development of internal training programs and documents.

Training new staff and addressing workflow issues are ongoing challenges for smaller organizations, as they may likely have no funding for such training or knowledge of how to rework processes to fit its IT use (Ejiaku & Ejiaku, 2014).

#### **2.8.4 Maintenance and Sustainment Costs**

Beyond the initial cost of implementation of information system, maintenance continues to be a financial burden on organization especially with no direct benefits from IT system implantation. There are significant yearly maintenance costs, including software, hardware, training, and hiring additional IT staffing. Furthermore, as organization upgrade software, capital must be continually invested to maintain, upgrade and build necessary interfaces for the systems.

The cost of interfaces is often an unanticipated cost at the onset of implementation and can become a significant burden to some implementing organization (Wang & Biedermann, 2012)

#### **2.9 Benefits of electronic information management system**

Despite challenges in adopting and implementing electronic information system, the benefits outweigh those challenges in several ways. The following discussion highlights some of the benefits associated with the use of IT in records management.

### **2.9.1 Communication**

With the help of information technologies the instant messaging, emails, voice and video calls becomes quicker, cheaper and much efficient. Additionally, it helps organizations meet its goals of reporting, analyzing data, and transfer of information from one person to another with ease and without cost better decision making based on information (Douglas et al., 2010).

### **2.9.2 Globalization and cultural gap**

As the result of using information systems in an enterprise or organization, we can bridge the language, geographical and some cultural gaps. Sharing information, knowledge, communication and relationships between different countries, languages and cultures becomes much easier. Information technology can easily translate information in different or another language that the reader can understand and implement (Sunarno, 2001).

### **2.9.3 Availability**

Information systems have made it possible for companies and businesses to be open twenty four hours across the globe. This means that services can be rendered to clients and businesses can be open anytime anywhere, making purchases from different countries easier and more convenient. It also means that you can have your goods delivered right to your doorstep without moving a single muscle. Healthcare providers with the help of information technology can be able to render healthcare services through e-prescription and telemedicine with the availability of internet (Katawetawaraks & Wang, 2011).

### **2.9.4 Creation of new types of jobs**

One of the major benefits of electronic information management systems is the creation of new and interesting jobs. Computer programmers, Systems analysts, Hardware and Software

developers and Web designers, database managers are just few of the many new employment opportunities created with the help of information technology. These opportunities will continue to increase with the increase demand for fast and efficient services that is expected to create over millions jobs in the next decades (Ragowsky, Ahituv, & Neumann, 2000).

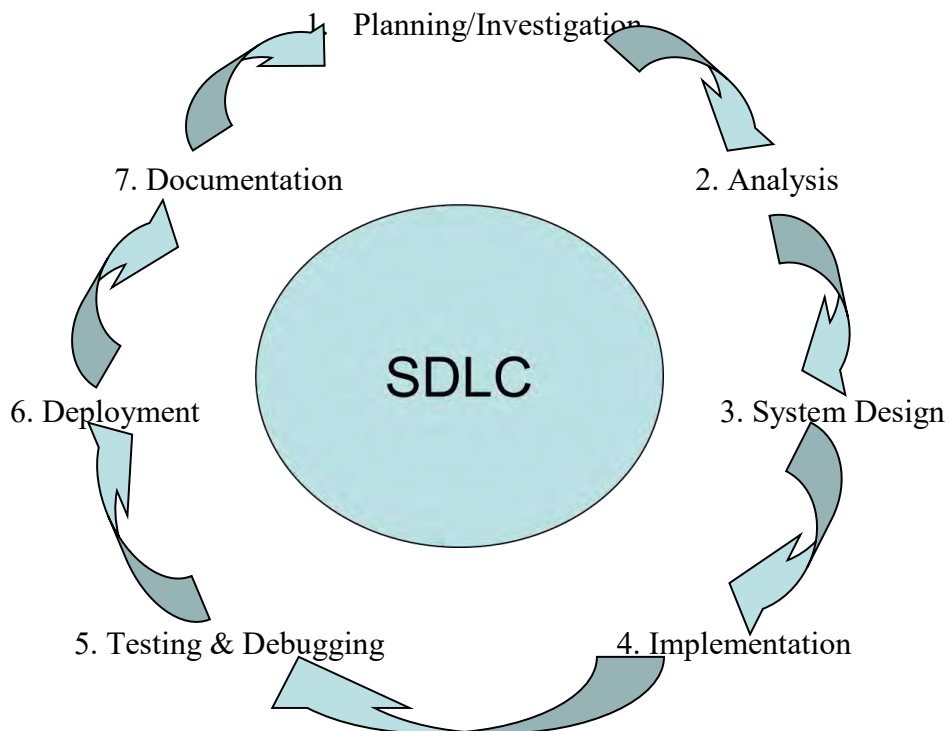
## CHAPTER THREE

### METHODOLOGY

#### 3.1 INTRODUCTION

The chapter summarizes procedures that were used in conducting the research. In this study, the system development life cycle was used to conduct this study. System development life cycle (SDLC) is a structural iterative process or procedures that are used in developing and maintaining a system. It provides the overall list of process and sub-processes required for developing management information system (Beynon-Davies, Galliers, & Sauer, 2009). The SDLC has seven stages including planning, analysis and requirements, systems design, development, integration & Testing, implement, and operation & maintenance.

**Figure 1: System Development Life Cycle**



The above diagram describes the process of the system development life cycle beginning with the investigation, analysis, design, implementation, testing as well as deployment stages.

### **3.2 Study Setting**

The Liberia Board for Nursing and Midwifery (LBNM) is the name of the regulatory council for nurses and midwives in Liberia. Liberia is a country located on the west coast of Africa and bordered by three countries including Sierra Leone, Guinea and the Ivory Coast. The total area of Liberia is 43,000 square miles with a total population of 4.85 million, (Liberty, 2010). Liberia has fifteen subdivisions referred to as counties and sixteen tribes with the Kpelle tribe having the largest population in the country and its political capital is Monrovia. The office of the Liberian Board for Nursing and Midwifery is located in Monrovia the capital city of Liberia. The board is closed with the mandate to regulate the practices of nursing and midwifery as well as the evaluation and accreditation of nursing and midwifery training institutions throughout the borders of Liberia.

The central office of the board is located in the James A. A. Pearl building on Carey Street, between Newport and Johnson streets in central Monrovia, Liberia.

### **3.3 Investigation/Information gathering**

The investigation stage is the initial stage of the SDLC that identifies the task or problem that need to be solved through an interaction with the users of the system to ascertain needs of users. The system analyst initially visited and interacted with selected employees with the use of a check list to collect information about the functionality of the system while at the same time

observing the work processes and flow of staff. A semi structured questionnaires were used with consent of the administration to gather further detail information about the current system. The questionnaires were explained to participants to avoid any ambiguity in answering the questions. Pretests of the questionnaires were carried out initially to ensure necessary modification to suit the understanding of the respondents.

### **3.4 Review of the current system**

The current information management system at the Liberia board for managing clients information is a paper based system. A folder is open for each client and copies of all other documents are place in it for future references. Although there is a computer based system that was developed by a relative of one the heads of the office about four years ago, but since the installation of the system they didn't benefit anything from the system because it does not function as expected. The data clerks employed at the time didn't know about how this system should operate and so didn't bother using it. They were only taught to enter information into the system but issues regarding functionality were never tested.

#### **3.4.1 Functionality of the current system**

The functionality of a system includes all the tasks the system is capable of performing to support and improves the effectiveness of services render to clients.

From all indications the only functions that the existing system performs is the storing and displaying of a client records if click on. Functions such as generating of reports or running of queries such as the number and categories of clients currently licensed and working including work locations cannot be generated in the mentioned electronic system.

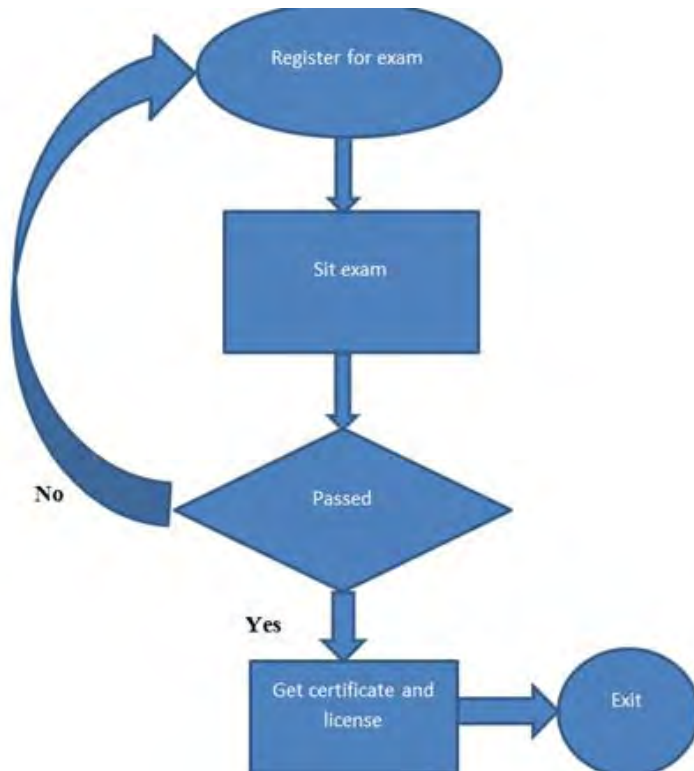
As a result reports needed by management for critical decisions are processed manually by the database staff which is prone to errors.

The manual records management system is the only system use for managing records of nurses and midwives at the board. After clients have written the board examination and passed, a folder is open for nurses and midwives; two copies of each document are printed, a set is issue to clients, while the other set is kept in separate folders for references. Clients are asked to provide additional information including demographic and educational information to be stored at the office for references.

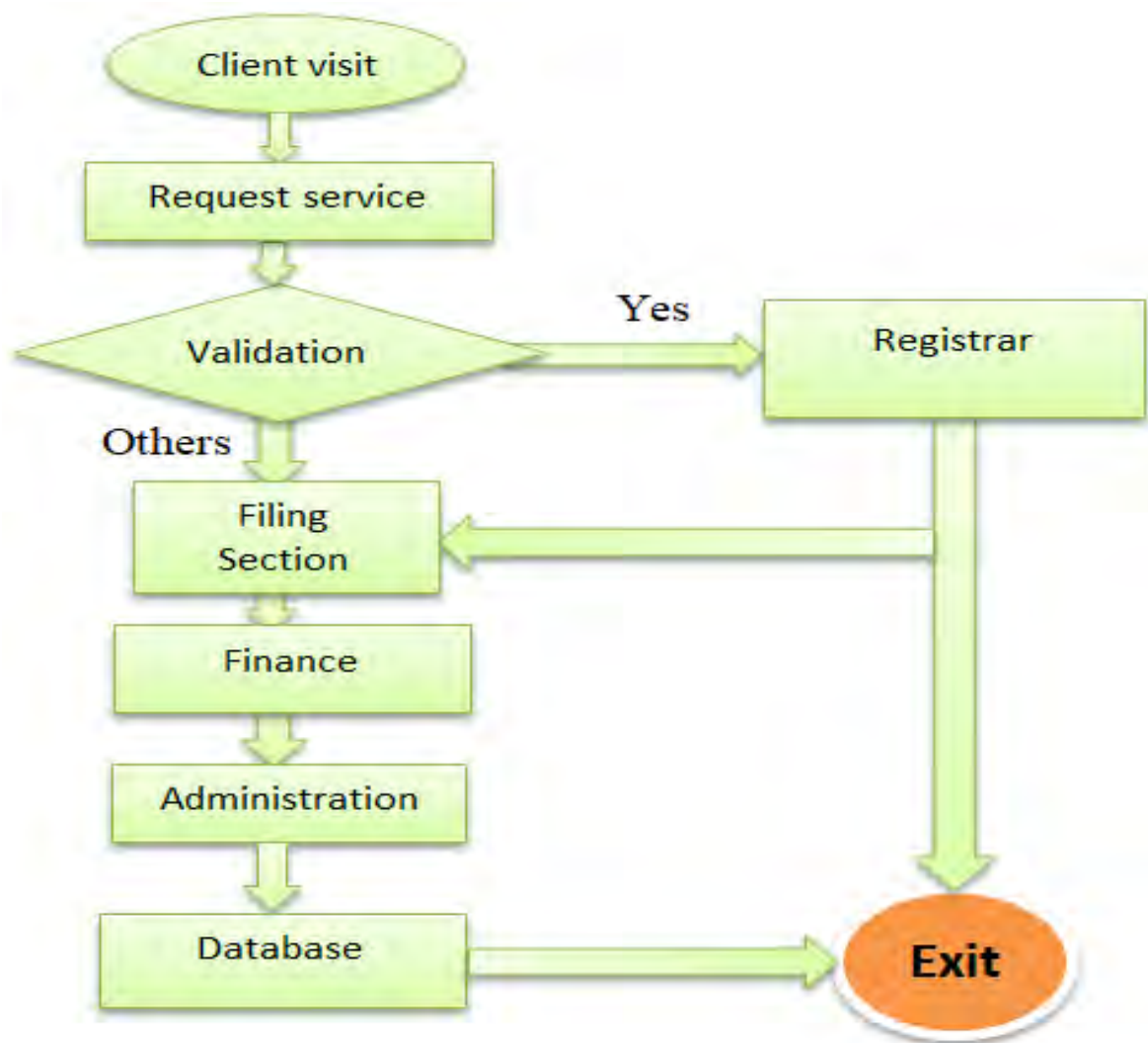
### **3.4.2 Workflow of current system**

The workflow is a sequence of processes or steps that one goes through to complete a task. It is commonly used for documentation and implementation purposes since it provides a general overview of business processes.

**Figure 2: Workflow of Clients registration, testing, and licensing/certificating**



The above flow diagram describes the processes or procedures leading to certification and licensing of new clients at the board. Clients document are verified after which they are allow to register for examination. If clients made a passed in the exam, he or she is issue certificate and a license. Copies of documents issues to clients are placed in folders and kept on shelf or in cabinets for references or feature use.

**Figure 3: Regular workflow for processing document**

The above figure describes the normal workflow for processing clients' information or documents. Upon visit, client request service(s) including renewal of license, printing certificates etc. start with pulling of folders from filing section to verify documents and bill for service requested. The bill is paid at the finance section after which receipt is submitted to administration for verification and printing. A visiting nurse or midwife is finally send to database section and filing section to update records, there the process ends.

### **3.4.3 Security of current system**

The current information management at the board has no security measures put in place. Security measure such as backup and recovery, security policy on release of information as well as business continuity plan are yet to be developed and adopted for use at the board office.

### **3.5 Challenges faced in utilizing the current system**

As stated earlier, the manual system is the only functional system at the board for managing clients' information as such both staff and clients are faced with numerous challenges in utilizing the system and services rendered.

#### **3.5.1 Challenges faced by staff in utilizing the system**

Challenges faced by staff at the board in utilization of the current system are as follow;

- Poor handwriting,
- Incomplete form,
- Misspelled words,
- Shortage of forms
- Lack of storage space,
- Damage files,
- Misplaced files,
- Recurrent cost of buying stationery etc.
- Editing problem,
- Incorrect data,
- Loose forms,
- Manual compilation,
- Delay and

Difficulty in validation

### 3.5.2 Challenges faced by nurses and midwives in utilizing services

Problem filling in forms

Cost of transport to head office

Delay processing documents

Long distances travel from work locations

### **3.6 Sampling Techniques and sample size**

The system analyst did a census of the participants since the employees at the LBNM office were not many. On the other hand, 34 nurses and 9 midwives who came to the office to request some services from the board were also interviewed after utilizing the services to find out challenges faced in utilization of the services at the LBNM.

### **3.7 Data Collection Procedures**

The analyst initially interacted with selected employees with the use of a check list to gather some information about the functionality of the system while observing the normal work processes and flows. A semi structured questionnaires were issued to respondents in consultation with the administration to gather further details about the system. The questionnaires were explained to participants to avoid any ambiguity in answering the questions. Pretesting of the questionnaires was carried out to ensure necessary modification to suit the understanding of the respondents.

### **3.8 Data Analysis**

Data analysis was carried out using Stata version 15.0 and excel. Data collected were first entered into excel and imported into Stata for analysis. Percentages were derived for each variable based on available data and entered into tables for presentation.

## **CHAPTER FOUR**

### **RESULTS**

#### **4.1 INTRODUCTION**

Chapter four of the study deals with the analysis and interpretation of the findings of the research. Findings from the administered questionnaires were presented in tabular form and analyzed. Analysis took in to consideration various responses from participants concerning the system including the workflow, functionalities as well as challenges faced in storing, retrieving, reporting and processing of nurses and midwives documents.

## 4.2 DEMOGRAPHIC CHARACTERISTICS

**Table 1: Demographic Characteristics**

Demographic Characteristics of Respondents				
Variables	Frequencies	Percentages	Frequencies	Percentages
	(N=13)	(%)	(N=43)	(%)
<b>Gender</b>				
Male	6	46.15	10	23.26
Female	7	53.85	33	76.76
<b>Age in years</b>				
20-29	-	-	2	4.65
30-39	7	53.85	25	58.14
40-49	3	23.08	13	30.23
50 & above	3	23.08	3	6.98
<b>Educational Status</b>				
Diploma (nurses & midwives)	-	-	9	20.93
Vocational Education	3	23.08	-	-
University Education	10	76.92	34	79.07
<b>Department</b>				
Administration	2	15.38	-	-
Finance	3	23.08	-	-
Monitoring Evaluation	3	23.08	-	-
Database	3	23.08	-	-
Filling	2	15.38	-	-

<b>Period of Work</b>				
1-3 years	3	23.08	4	9.3
4-6 years	6	46.15	11	25.58
7-9 years	4	30.77	10	23.26
10 & above	-	-	18	41.86

### 4.3 ANALYSIS OF EXISTING SYSTEM

#### 4.3.1 Information Collection

**Table 2: Information Collection**

How information are collected from nurses and midwives at the board		
Variables	Frequencies (N=13)	Percentages (%)
<b>Information Collection</b>		
Manually	9	69.23
Electronic means	1	7.69
Both paper & Electronic	3	23.08
<b>Shortage of Forms</b>		
No response	1	7.69
Not sure	3	23.08
Sometimes	8	61.54
Most often	1	7.69
<b>Tools Capture all Clients data</b>		
Yes	9	69.23
No	4	30.77

### 4.3.2 Information Processing

**Table 3: Information processing**

How Information are processed at the office		
Variables	Frequencies (N=13)	Percentages (%)
<b>How are data processed</b>		
Electronic	1	7.69
Both paper & Electronic	12	92.31
<b>How often are data processed</b>		
Daily	10	76.92
Weekly	1	7.69
Monthly	2	15.38
<b>Document Processing Duration</b>		
No Response	1	7.69
Daily	7	53.85
Two to four days	3	23.08
A week	2	15.38
<b>How are data stored at LBNM</b>		
Electronically	1	7.69
Both manual & electronic	12	92.31
<b>Backup System Available</b>		
No	2	100
<b>How easy/difficult to generate Report</b>		
Very difficult	2	15.38

Difficult	8	61.54
Easy	2	15.38
Very easy	1	7.69
<b>Information security policy</b>		
No	3	100
<b>Current system web based</b>		
No	2	100

### 4.3.3 Challenges faced in utilizing system

**Table 4 Challenges faced in utilizing the system**

What are the challenges faced by staff in utilizing the system		
Variables	Frequencies (N=13)	Percentages (%)
<b>Challenges with Data collection</b>		
Poor handwriting	12	92.31
Incomplete forms	11	84.61
Misspelled words	9	69.23
<b>Challenges with data storing</b>		
Lack of storage space	12	92.31
Cost of stationery	1	7.69
Shortage of folders	2	15.30
<b>Challenges with data retrieval</b>		
Misplaced folders	12	92.31
Incomplete information	9	69.23
Damage folders	11	84.62
<b>Challenges with reporting</b>		
Delay in validation	4	30.77
Editing difficulty	2	15.38
Inaccurate data	13	100
Loose forms	4	30.77

#### 4.3.4 Challenges faced by nurses and midwives in utilizing services

**Table 5: Challenges faced in utilizing services**

What are the challenges faced in utilizing services at the board		
Variables	Frequencies (N=43)	Percentages (%)
<b>Challenges</b>		
Problems filling forms	25	58
Cost of transports	22	51
Delay processing documents	13	30
Absence from duty	6	14
Long distance traveled	24	56
Unclear print on forms	8	18.6
Too many forms to fill	6	14

The above table describes challenges faced by clients in utilizing services at the board. Long distances travel, difficulties filling forms as well as high cost of transports are among the most frequent challenges faced by nurses and midwives in utilizing services at the board.

## **CHAPTER FIVE**

### **SYSTEM REQUIREMENT SPECIFICATION DOCUMENTS**

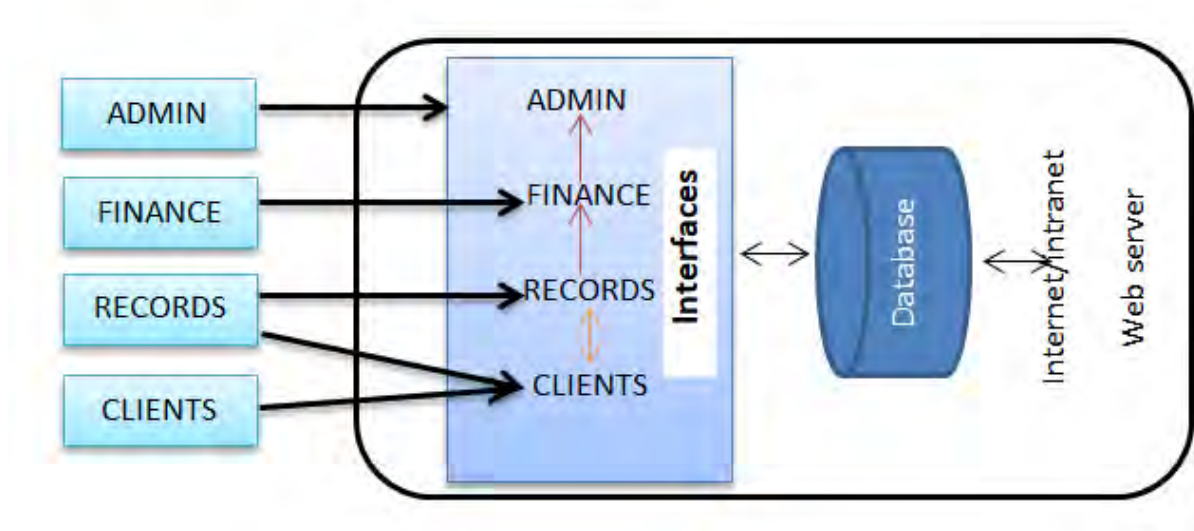
#### **5.1 INTRODUCTION**

System requirement specification is a document or set of documentation that describes the features and behavior of a system or software application (Ribeiro et al., 2018). It includes different elements that attempts to describe the intended features and functionality required by the client to satisfy diverse users. The system requirement specification document describes requirements for the design and development of a system including the functional requirements, user requirements, technical requirements, non-technical requirement etc.

This document describe in detail features and functionality for the development of a propose robust clients (nurses & midwives) information managements system to be used by the Liberia Board for Nursing and Midwifery for documentation of nurses and midwives for adequate decision making and maintenance of high standards of nurses and midwifery practices in Liberia

#### **5.2 System Perspectives**

The proposed new system will be an online system and will be used by four groups of users who have different roles namely, the administrator, finance, records and clients. Each group of users will enter on the main page and after being authorized, will access page according to their role(s) or department.

**Figure 4: Diagram of system interfaces**

The above diagram shows how different groups of users have access to the components of the system. With the help of internet connectivity, administrator will have access to view all interfaces including the administrative, finance, records and clients; finance section will only have access to finance components, while records section will have access to records as well as the clients' component of the system to enable monitoring of clients activities.

### 5.3 Functional Requirements

The nurses and midwives records management system will carry on several major functions in order to accomplish required tasks. The functions formed the foundation for the whole system.

#### 5.3.1 Authentication and Authorization

With internet connectivity, users will be able to access the system through a login page after authorization of user account and the authentication of his/her user name and password provided. Access will be granted based on role perform in the institution and all staff will see the same user login page to enter their user names and password.

### **5.3.2 Administrator**

The administrator will have the right to view records from all roles and departments including the following functions

Add new users

Edit users' data

Edit user properties

Add new roles

Search users

View progresses of users

Generate reports from all users and activities

Update nurses and midwives licenses

Print licenses, certificates, results etc.

### **5.3.3 Finance**

Activities of the finance section will include the following;

Financial transactions

Authenticate payments through electronic alert from the bank

Enter payment amount and information into system

Search nurses and midwives by license number and name

Authorized services requested

Generate report on daily, weekly and monthly transactions

#### **5.3.4 Records**

Activities of records section will include and not only limited to the following;

Manage nurses and midwives records by carrying on different responsibilities

Register clients (nurses & midwives, students, schools etc.)

Updates nurses and midwives records

Prompt payments for services requested

Validate new nurses and midwives who registered through online service

Validate new nurses and midwives registration and authorized appropriately

Validate nurses and midwives online service request and prompt payment

Backup data on a daily basis

#### **5.3.5 Nurses and Midwives**

Nurses and midwives will be able to do self-registration using online platform

Update personal information including, current work, position, location, private or public, institution, upload current photo, institution graduated, year etc.

Nurses and midwives will be able to request service through the online services

Upload scanned copy of payment slip, do mobile money deposit etc.

Print out updated license only

#### **5.4 Non Functional requirements**

The non-functional requirements describes how the system should behave and what limits there are on its functionality including constraints and assumptions

#### **5.4.1 Constraints and assumptions**

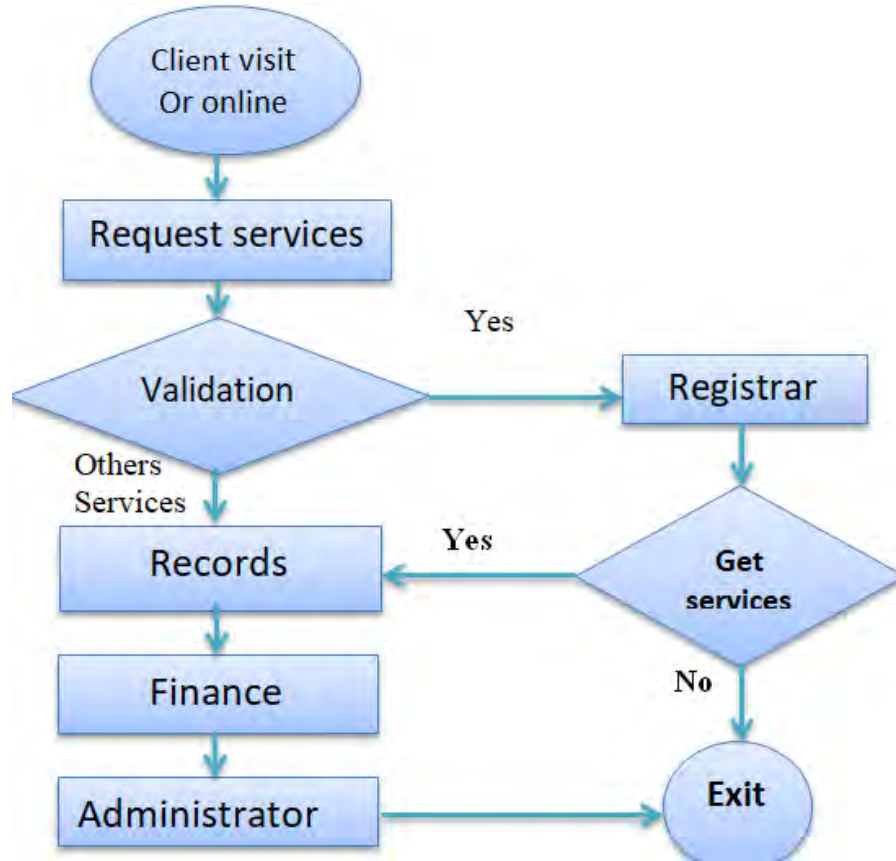
- The number of staff allows to access the system is limited to those who have authorized activated accounts. There is no limit to the number of nurses and midwives allow accessing the systems.
- There is no restriction on the number of users' accounts to be added but only restricted to LBNM staff and clients who either nurses or midwives.

#### **5.5 Hardware Requirements**

- The clients' information management system will store over ten thousands clients' information, so there should be adequate storage capacity to accommodate the number of persons.
- Access to system will be through a wireless local area network (WLAN)
- System will be accessible on through ISO acceptable browsers including internet explorer, Firefox, Google chrome etc.

#### **5.6 Software Requirements**

- To run a web based application, internet connectivity must be established to facilitate the use of the system.
- The new system or software will be used on window operating system
- Interface of this system will be developed using java script at the front end, html for design etc.
- The DBMS should be built on MYSQL environment,
- This system should run on any platform that support java script

**Figure 5: workflow for processing document in proposed system**

The above diagram describes processes or procedures through which clients' documents will be processed using the proposed new system at the board for nursing. During a visit, the client will go directly to records to put in a service request and update their profile or records at the board.

Records staff will enter the client request and submit; upon submission, the system will automatically generate an amount to be paid depending on the service requested and the staff responsible for said request will be alerted through a signal on the dashboard about the client request. With the exception of validation and some particular cases that can only be completed and authorized by the Registrar, all other services rendered by the board, the client will move directly to the finance office to make payment for services.

After receiving of payment and posting, an alert will appear on the dashboard of administrator to render service (s) (printing of license, certification etc.) requested. Service such as validation will only be authorized by Registrar before payment is made and the same process continues from finance to Administrator.

On the other hand, online processes including registration, services request will go through similar procedures. Online request will required update of records by clients themselves as well as upload of scanned payment slip. Records staff will verify legitimacy of clients through records at the office after which finance will be alerted to validate payment, and them administrator will update clients license online and print a hard copy for pick up at convenience. The system will allow client to print a scanned copy of updated license through the online service.

### 5.7 Entities and Attributes

In object oriental programming, an entity is real world object, either living or nonliving, that can be easily identifiable. Entities are represented by means of their properties, called attributes. Attributes are what describes the different characteristics of and entity. The table below outlines the entities and attributes of the proposed new system.

**Table 6: Entities and Attributes**

No.	Entities	Attributes
1	Staff	Full name, ID number, user name, password Qualification, Position, department,

		Internal telephone number Addressed: town/comm. City, county
2	Clients	Full name (first name, middle name Surname) sex Date of Birth city, county of origin nationality contact number email id Addressed, gender marital status status (active, none active) Next-of-Kin: name, address, contact #, email id
3	License	License number, issue data, status, renewal date, type, expiration data, issue by,
4	Department	Department name Department number
5	Examination	Exam no.,

		<p>date, exam type,</p> <p>exam scores</p>
6	school	<p>Full name,</p> <p>address,</p> <p>county, country,</p> <p>name of contact person,</p> <p>contact email,</p> <p>contact number,</p> <p>Date started,</p> <p>date ended,</p> <p>accreditation date,</p> <p>Accreditation score.</p> <p>School category</p>
7	Student	<p>First name,</p> <p>Middle name</p> <p>last name,</p> <p>email no</p> <p>contact number,</p> <p>county of origin,</p> <p>date started</p> <p>proposed ending date,</p> <p>name of supervisor</p> <p>name of school</p>

		contact person, category, status
8	Renewal	Date, type, renewal id, renewal date, expiration date

## CHAPTER SIX

### CONCLUSION AND RECOMMENDATION

#### 6.1 CONCLUSION

The aim of this study was to assess the current clients' information management system at the LBNM. Stage one and two of the system development life cycle (SDLC) was adopted using a range of complementary methods. The study has provided insights on the types of records management system currently in use at the board, identified various challenges faced by both staff and clients in utilizing the system and explored the readiness of the LBNM to adopt efficient electronic information management system.

Manual or paper based records management system is currently the functional information management in use at the board for managing clients' data. Although some respondents reported using both methods, the electronic system mentioned in the survey lacks all credibility to be called an information management because of inability to generate any report on clients' data; as such needed reports are manually compiled using the paper files for decision making.

The study also identified poor handwriting, shortage of forms, inaccurate data, damage files, editing among others as challenges faced by staff in utilizing system while delay in processing, centralized office, long distance travel, cost of transportation etc. as challenges affecting clients in accessing or utilizing services at the LBNM. Moreover, both staff and clients said they will appreciate electronic information management system at the board.

Finally, a requirement specification document was developed to support the development of a robust web based records management system at the Board for Nursing and Midwifery.

An electronic client's records management system will improve the quality of data at the board thereby enhancing efficient in regulation of nursing and midwifery practices in Liberia.

## **6.2 RECOMMENDATION**

The investigation revealed that manual or paper based information system is the most active information management system currently in used at the Liberia Board for Nursing and Midwifery. Paper based or manual records management system is associated with numerous challenges ranging from inaccurate data, delay in processing of information, shortage of forms, shortage of storage space, damaged and misplaced files etc.

In order to improve the quality of data and eliminate challenges faced by LBNM staff in providing services to clients, I wish to recommend the following to the Liberia Board for Nursing Midwifery:

LBNM should adopt a web based electronic records management system to improve the accuracy and adequacy of information on nurses and midwives in Liberia

LBNM should consider providing services through an online platform that will allow clients to request and received services using the online platform to reduce high cost of transport and long distances travel by clients to get services from the board

Set up a backup and recovery system that will help recover data in case of disaster

Develop a security policy to guide employees and clients on the usage of the system to avoid actions that may risk the security of the new system.

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## Appendix I: QUESTIONNAIRE FOR LBNM STAFF

My name is Kahmaa Elisha S. Mehn, a student reading Health Informatics at the school of Public Health, University of Ghana. As a requirement for the completion of the above mentioned program, I'm doing an assessment of the current records Management System at the Liberia Board for Nursing and Midwifery. This questionnaire was designed to enable me solicit your views on the current systems in used at the Board for managing clients' information to form the bases for a new system. Please know that any information provided by you to support this work will be treated confidential and use only for its intended purpose.

Date: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

Name of Institution: \_\_\_\_\_

### Respondents Demographics

1. Gender (a) Male [ ] (b) Female [ ]
2. What is your age range? (a) 20 - 29 [ ] (b) 30 - 39 [ ] (c) 40 – 49 [ ] (d) 50 and above [ ]
3. What is your highest level of Education completed? (a) Secondary [ ] (b) vocational Education [ ] (c) University [ ] (d) others, please specify:  
\_\_\_\_\_
4. How long have you worked at the Nursing Board? \_\_\_\_\_year(s)
5. Which department do you work? \_\_\_\_\_

### Collection of Clients Information

6. How are clients information collected at the board? (a) using paper form  (b) using electronic device  (c) others, please specify: \_\_\_\_\_
7. If question 6 is (a) do you sometimes go short of forms? (a) Not sure  (b) sometimes  (c) most often  (d) other, please specify: \_\_\_\_\_
- Please skip questions 8, if question 6 is (a)
8. What device is used to collect information on clients? \_\_\_\_\_
9. What are the problems faced during collection of clients' information? [ Select all that applied ] (a) Poor handwriting  (b) incomplete form  (c) misspelled words  (d) others, please specify: \_\_\_\_\_
10. Do the current data collection tool(s) capture all necessary information about clients? (a) Yes  (b) No  (c) others, please specify: \_\_\_\_\_

### Information Processing

11. How are clients information processed? [ please select all that applied ] (a) Manually  (b) Electronically  others, please specify: \_\_\_\_\_
12. How often are data processed? [ Select all that applied ] (a) Daily  (b) weekly  (c) Monthly  (d) others, please specify: \_\_\_\_\_
13. How long does it take to process client document using the current system? (a) a day  (b) two to four days  (c) a week  others, please specify: \_\_\_\_\_
14. What are the problems faced in processing information? [ Select all that applied ] (a) Delay in validation  (b) difficult making changes  (c) incorrect information  (d) loose forms  (e) others, please specify: \_\_\_\_\_

### Information Retrieval and Storage

15. How is clients' information stored? (a) manually using paper folders [  ]  
(b) electronically [  ] (c) others, please specify: \_\_\_\_\_
16. What are the problems faced in storing clients information? [ Please select all that applied ]  
(a) lack of storage space [  ] (b) cost of stationery [  ] (b) shortage of folders [  ] (c) others, please specify: \_\_\_\_\_
17. What do you do if a client record is not found? \_\_\_\_\_
18. What are the challenges faced with information retrieval? [ Please Select all that applied ]  
(a) misplace folder [  ] (b) incomplete clients information [  ] (c) damage file [  ] (d) others, please specify: \_\_\_\_\_
19. Are you aware of any backup system for data collected at the board? (a) yes [  ] (b) No [  ]  
(c) Others, please specify: \_\_\_\_\_
20. What are the problems faced during data entry? [ Please select all that applied ]  
(a) Poor handwriting [  ] (b) incomplete form [  ] (c) misspelled words [  ]  
(d) Others please specify: \_\_\_\_\_

### Information Sharing and Reporting

21. What format is used for sharing information or report? [ Please select all that applied ]  
(a) Hard copy [  ] (b) soft copy [  ] (c) others, please specify: \_\_\_\_\_
22. How easy or difficult is it to generate report using the current system? (a) Very difficult [  ]  
(b) Difficult [  ] (c) easy [  ] (d) very easy [  ] (e) others, please specify \_\_\_\_\_

23. Does the current system generate report on the number of nurses in Liberia? (a) yes  (b) No  (c) others, please specify: \_\_\_\_\_
24. What are the problems faced in compiling report?  please select all that applied (a) incomplete clients information  (b) editing problem  (c) difficult validating information  others, please specify: \_\_\_\_\_
25. Are you aware of any policy regarding how clients' information is released to outsiders? (a) Yes  (b) No  (c)  others, please specify: \_\_\_\_\_

### Software Requirements

26. What types of information do you collect from clients?  Please select all that applied (a) demographic information  (b) academic information  (c) employment information  (d) others, please specify: \_\_\_\_\_
27. What do you used clients' information for? (a) research  (b) validation  (c) decision support  (d) others please specify: \_\_\_\_\_
28. What are the various services render to clients by the board? [Please select all options that applied] (a) Testing  (b) Licensing  (c) (d) Renewal  Validation  (e) accreditation  (f) others, please specify: \_\_\_\_\_
29. Is clients' information available to every staff at the same time to perform assigned task? (a) yes  (b) No  (c) others, please specify: \_\_\_\_\_
30. What features do you like about the current system? \_\_\_\_\_  
\_\_\_\_\_
31. What features you don't like about the current system?  
\_\_\_\_\_

32. What other features or functions will you like the new system to have? [ please select all that applied ] (a) Send reminder messages about expired license [ ] (b) group clients by categorized (e.g. number of nurses employed in a county, private or public institution etc.) [ ] others please specify: \_\_\_\_\_
33. Will you appreciate a secure system that will allow clients to process documents online? (a) yes [ ] (b) No [ ] (c) others, please specify: \_\_\_\_\_
34. What is the flow (order of movement from one department to another) in processing clients' document? \_\_\_\_\_
- \_\_\_\_\_

#### **LBNM Readiness to adopt electronic information management system**

35. Are you computer literate? (a) yes [ ] (b) No [ ] (c) Others please specify: \_\_\_\_\_
36. Do you have computer available for the purpose of your work (a) Yes [ ] (b) No [ ]
37. Do you need an electronic system that can help you generate accurate report? (a) Yes [ ] (b) No [ ] others, please specify: \_\_\_\_\_
38. Is there a standby power to use in the absence of city power? (a) Yes [ ] (b) No [ ]
39. Do you have a stable internet access? (a) Yes [ ] (b) No [ ] (c) others, please specify: \_\_\_\_\_
- \_\_\_\_\_
40. Will you appreciate an electronic system for managing client's information at the nursing board? (a) Yes [ ] (b) No [ ] (c) others, please specify: \_\_\_\_\_

## Appendix II: QUESTIONNAIRE FOR CLIENTS

My name is Kahmaa Elisha S. Mehn, a student reading Health Informatics at the school of Public Health, University of Ghana. As a requirement for the completion of the above mentioned program, I'm doing an assessment of the current records Management System at the Liberia Board for Nursing and Midwifery. This questionnaire was designed to enable me solicit your views on the current systems in used at the Board for managing clients' information to form the bases for a new system. Please know that any information provided by you to support this work will be treated confidential and use only for its intended purpose.

Date: \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

### Demographic Information

41. Gender (a) Male  (b) Female
42. What is your age range? (a) 20 - 29  (b) 30 - 39  (c) 40 – 49  (d) 50 and above
43. What is your highest level of Education completed? (a) certificate  (b) vocational Education  (c) University  (d) others, please specify: \_\_\_\_\_
44. Which category of provider are you? (e.g.(a) Nurse  (b) certified midwife  (c) registered midwife  (d) nurse midwife  (e) others, please specify: \_\_\_\_\_
45. How long have you worked in this profession? \_\_\_\_\_year(s)

### Collection of Clients Information

46. How is information collected from you at the nursing board? (a) manually with paper form  (b) electronically  (c) others, please specify: \_\_\_\_\_
-

47. Do you think the current tool(s) capture all necessary information about you? (a) Yes  (a) No  (c) others, please specify: \_\_\_\_\_
48. Are there problems faced in filling the form? (a) Not at all  (b) sometimes  (c) most often  (d) other, please specify: \_\_\_\_\_
49. If yes, what are the problems faced in filling the forms? [ please select all that applied ]  
(a) Print is not clear  (b) Question not understandable  (c) too much writing  (d) others, please specify: \_\_\_\_\_

### **Information Processing**

12. How often do you renew your license? (a) yearly  (b) every 2 years  (c) every 3 years  (d) others, please specify: \_\_\_\_\_
13. What are some challenges faced in getting your documents or license (a) long distance travel  (b) cost of transportation  (c) delay in processing  (d) others please specify: \_\_\_\_\_
14. How long can it take to receive your document from LBNM when requested? (a) one to two days  (b) three to six days  (c) a week or more  (d) others, please specify: \_\_\_\_\_
15. Are there other sub offices to get your documents other than LBNM head office? (a) yes  (b) No  (c) others, please specify: \_\_\_\_\_
16. Will you appreciate an electronic system for managing your records at the board? (a) Yes  (b) No  (c) others, please specify: \_\_\_\_\_

17. Will you appreciate an electronic system that will allow you online access to your records? (a) Yes [ ] (b) No [ ] (c) others, please specify: \_\_\_\_\_

18. Will you recommend a system that will enable you request services online?  
a) Yes [ ] (b) No [ ] (c) others, please specify: \_\_\_\_\_

19. Will you appreciate a system that will send you message about your license expiration?  
(a) Yes [ ] (b) No [ ] (c) others, please specify: \_\_\_\_\_

20. Will you recommend collection of your information using electronic means? (a) yes [ ]  
(b) No [ ] (c) others, please specify: \_\_\_\_\_