Modelling an Information Management System for the National Health Insurance Scheme in Ghana

by

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Abstract

The National Health Insurance Scheme (NHIS) in Ghana was introduced to alleviate the problem of citizens having to pay for healthcare at the point of delivery, given that many did not have the financial resources needed to do so, and as such were unable to adequately access healthcare services. The scheme is managed from the national headquarters in the capital Accra, through satellite offices located in districts right across the length and breadth of the country. It is the job of these offices to oversee the operations of the scheme within that particular district. Current literature however shows us that there is a digital divide that exists between the rural and urban areas of the country which has led to differences in the management of information within urban-based and rural-based districts. This thesis reviews the variables affecting the management of information within the scheme, and proposes an information management model to eliminate identified bottlenecks in the current information management model.

The thesis begins by reviewing the theory of health insurance, information management and then finally the rural-urban digital divide. In addition to semi-structured interviews with key personnel within the scheme and observation, a survey questionnaire was also handed out to staff in nine different district schemes to obtain the raw data for this study. In identifying any issues with the current information management system, a comparative analysis was made between the current information management model and the real-world system in place to determine the changes needed to improve the current information management system in the NHIS. The changes discovered formed an input into developing the proposed information management system with the assistance of Natural Conceptual Modelling Language (NCML).

The use of a mixed methodology in conducting the study, in addition to the employment of NCML was an innovation, and is the first of its kind in studying the NHIS in Ghana. This study is also the first to look at the differences in information management within the NHIS given the rural-urban digital divide.

Keywords: Health Insurance, National Health Insurance Scheme (NHIS), Ghana, Information management, Natural Conceptual Modelling Language (NCML) and Mixed Methods Research.

Dedication

I dedicate this thesis to my parents Kwasi and Gladys. Dad and Mum thank you. I am forever grateful.

This is also dedicated to my wife Josie for her patience, prayers and support; to my son Jude, who brings me much joy; to my brother Yaw, what would I do without you; and to my sisters Akosua and Afia, thank you for your support.

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Table of Contents

Chapter Three – CONTEXT OF STUDY

Chapter Four - RESEARCH METHODOLOGY

Chapter Five – SURVEY RESULTS

Title	List of Tables	Page No.
3.1	The different health administrative levels and their associated functions	38
4.1	Versions of paradigms, moving from the most general to the most specific version.	66
4.2	Contrast between positivist and anti-positivist paradigms of research	68
4.3	New, renewing and total active members of the NHIS distributed by region	81
4.4	Population and size of sub-metropolitan districts in Kumasi	91
4.5	Criteria for inclusion of district in field survey	91
4.6	Total number of questionnaires distributed and returned	97
4.7	Distribution of questionnaires by position	98
4.8	List of interviewees	98
5.1	Staff and external agencies	114
5.2	Purpose of the computer	118

List of Figures

GLOSSARY OF THE ACRONYM

CBHI	**Community Based Health Insurance**
CML	**Conceptual Modelling Language**
DDoHS	**District Director of Health Services**
DFD	**Data Flow Diagramming**
DHA	**District Health Administration**
DHMT	**District Health Management Team**
ER	**Entity Relationship diagramming**
GDP	**Gross Domestic Product**
GHS	**Ghana Health Service**
GMA	**Ghana Medical Association**
GPRS	**General Packet Radio Service**
GSM	**Global System for Mobile Communications**
HI	**Health Insurance**
HMIS	**Health Management Information Systems**
ICT	**Information and Communication Technology**
ILM	**Information Lifecycle Management**
IM	**Information Management**
ID	**Identification**
IT	**Information Technology**
JISC	**Joint Information System Committee**
MIS	**Management Information System**
MOH	**Ministry of Health**
MOTECH	**Mobile Technology for Community Health**
NCML	**Natural Conceptual Modelling Language**
NHIA	**National Health Insurance Authority**
NHIC	**National Health Insurance Council**
NHIS	**National Health Insurance Service**
NI	**National Insurance**
ORM	**Object Role Modelling**

PDA	**Personal Digital Assistant**
PHI	**Private Health Insurance**
PR	**Public Relations**
RHA	**Regional Heath Administration**
SHI	**Social Health Insurance**
SIM	**Subscriber Identity Module**
SMS	**Short Message Service**
SNIA	**Storage Networking Industry Association**
ST	**State Transition diagramming**
UML	**Unified Modelling Language**
UNDP	**United Nations Development Programme**
WHO	**World Health Organisation**
WiFi	**Wireless Fidelity**

Chapter One - INTRODUCTION

1.1 Background

This research is based on the Ghanaian Health Insurance Scheme, which became law in 2003, and was introduced into the country in 2005. It was introduced to replace the full cost recovery method of health financing, in which patients had to pay for health care services each time they had to access these services.

Health insurance (HI) schemes have in the recent past emerged as an alternative means of financing healthcare in developing countries. In theory by spreading the costs amongst a group of individuals, usually through the payment of a premium to gain membership of a scheme, the cost of healthcare to each individual member is reduced (Hsiao & Shaw, 2007: p. 14), with the added bonus of not having to pay at the point of service. This is particularly attractive to residents of low income areas, who by joining such schemes have access to treatment at healthcare facilities during periods of illness, even though they may not have had the resources to pay for their treatment had they been required to do so.

Depending on the structure it takes, a HI scheme combines the efforts of different organizations including hospitals, pharmacies, non-governmental organizations and local authorities in providing the service.

To function efficiently, most organizations are dependent on the fast, accurate and efficient movement of information between different organizational levels (Andersson, Hallberg & Timpka, 2003: p. 47), and partner organizations. This also applies to the partner organizations in a HI scheme. For a HI scheme to operate efficiently therefore, there is the need for the development of an appropriate information system to manage the efficient collection, storage, manipulation and transfer of information by the insurance scheme managers, and also between the scheme management, healthcare centres, pharmacies, local authorities and any other relevant bodies.

Chandresekhar & Ghosh (2001) identified three potential improvements that the employment of information and communication technology (ICT) systems in healthcare delivery can bring about. “As an instrument for continuing education they enable health workers to be informed of, and trained in advances in knowledge; they can improve the delivery of health and disaster management services to poor and remote areas; and they can increase the transparency and efficiency of governance, which should in turn improve the availability and delivery of publicly provided health services” (p. 850).

The development and implementation of these systems in developing countries is however made up of successes and failures (Heeks, 2002: p. 102), with others (Avgerou, 2000; Corea, 2000; Jayasuriya, 1999) having identified culture, infrastructure and the context within which the information system exists, as being important determinants of the success or otherwise of information systems development projects in developing countries.

Much of the literature on the development and implementation of information systems in developing countries is dominated by issues relating to the health sector, with various systems models being put forward for employing ICT in healthcare delivery and management (Bakker, 2002; Braa et al, 2001; Braa & Blobel, 2003; Chandresekhar & Ghosh, 2001; Sahay, 2001; Seror, 2001; Seror, 2004). Specifically, issues relating to the management of clinical data and the application of the appropriate technology in healthcare management given the peculiar context of ICT systems in developing countries are increasingly being addressed.

Absent from the literature however are issues relating to the development of integrated information management system models to manage the operations of HI schemes in developing countries. By studying the introduction and operation of HI schemes in Ghana, it is the aim of this research to contribute to the available literature and knowledge with regards to this subject, and it is anticipated that the model

developed through this research, will be applicable to similar schemes in other developing countries, to improve efficiency in information management.

This study is based on the premise that the management of information within the district health insurance schemes is not being done efficiently, and that given the absence of a uniform integrated system to manage information within the health insurance scheme, there are differences in the levels of satisfaction of users of the current information systems within health insurance schemes in the rural and urban areas. Indicators of system inefficiency includes frequent down times, slow response and processing times, data loss, high maintenance costs, user dissatisfaction and unreliable system outputs.

Rural areas in developing countries generally lack basic information and communication technology (ICT) infrastructure such as telephones and wireless networks (Avgerou, 2002; Gichoya, 2005), and given the situation where systems being used to manage information are having to be developed in house by the district health insurance schemes, there are bound to be differences in the efficiency of these systems given the available technology.

At the time of this study (between October and November 2011), the development of ICT based systems to manage information within the scheme was in its initial stages. The only modules developed that were being uniformly used across all district health insurance schemes in the country were membership registration and an element of the claims management system. It is anticipated that through this study, a graphical conceptual model addressing all aspects of the operations of the health insurance scheme will be developed to better manage the flow of information within the HI schemes in Ghana.

1.2 Research questions

In conducting this research the following questions are considered to be central to this study:

- How is information managed within and between the rural and urban based Health Insurance schemes, given the technological constraints?
- What model of information management will be best suited to the management of health insurance in Ghana given the technological constraints?

1.3 Aims

The aims of the study are to investigate and analyze the information management systems within the district-based HI scheme in Ghana, and to develop a graphical conceptual information management system model to more efficiently support the strategic and functional objectives of the health insurance scheme. In developing the model the research aims to take cognizance of the limitations in technology available to some of the areas in Ghana.

1.4 Objectives

The main objectives of the research include the following:

- Review and analyze the concept of the HI scheme.
- Identify information management systems being employed in HI schemes.
- Mapping the types of information involved in HI in Ghana.
- Identify the barriers to information management in HI schemes in rural areas.
- Review various models of developing information management (IM) models and developing appropriate IM models.
- Examine and integrate the information shared, managed and stored within the existing HI scheme into an appropriate model for rural Ghana.

1.5 Justification of the study

The reasons why this study is considered to be significant are as follows. Firstly there is not an all encompassing information system for managing all of the information in the district offices of the HI scheme in Ghana. Various departments in the scheme have their own information systems, which do not “talk” to each other and this

increases the occurrence of errors and redundancy during data transfer. The model developed as a result of this study is intended to provide an all encompassing information system that will potentially reduce errors in data management.

Secondly the development of in-house modules by various departments poses a potential problem in the situation where some of the schemes have access to resources and infrastructure that other schemes do not have access to. It is commonly accepted that ICT infrastructure in rural and urban areas in developing countries are very different. There is therefore the potential for systems to be developed in areas that are far more efficient than others, and as a result potentially create an imbalance in the quality of services delivered. Since there has not been a previous study conducted in this area, it could potentially be of great value to the scheme and other similar schemes.

1.6 Organisation of the thesis

The thesis is made up of 7 chapters. Chapter One introduced a general outline to the study, and highlighted the aims, research questions, objectives and the justification for conducting the study.

Chapter Two reviews the literature that is considered to be relevant to the study. Firstly, the concept of health insurance in healthcare delivery is discussed. This is followed by a review of the literature on information management and the information lifecycle, information and communication technology, and their use in healthcare delivery. The chapter also looks health information systems in developing countries, the rural-urban digital divide and how mobile phone technology could be used to bridge the digital divide.

In Chapter Three, the background of the study is presented. The chapter also provides an overview of Ghana, the former health system, the reasons for the introduction of the National health insurance scheme, and finally presents an in depth examination of the current information system in place, with the aid of data flow

diagrams. The processes undertaken by the various departments in the health insurance scheme, and how they are managed by the current information system is presented utilising information responses from the questionnaire, from analysing the interview responses and from observation. From this, the movement of data, as well as problem areas in the current information system is identified with the aid of flow charts and data flow diagrams.

In Chapter Four, an appropriate research design for the study is put forward. The questionnaire, Interview and Observation techniques of data acquisition are also examined. The suitability and use of mixed method research and the adoption of the Natural Conceptual Modelling Language (NCML) in the study are also discussed.

Chapter Five presents' descriptive statistics on the results of the data obtained from the questionnaire survey, as well as an analysis of the results from the interviews. The chapter concludes with the findings of the observations made about the scheme, its operations and the context within which the scheme exists.

In Chapter Six a comparative analysis is made between the current information management model, and real world situation as was ascertained during the field work. The resulting disparities observe, will be presented as recommendations for change which will be employed later on in the chapter to develop the proposed IM model, which will be graphically illustrated with the aid of NCML. The chapter also contains a discussion about how the proposed information management model answers the research questions, as well as gaps in the literature observed during the review.

In the final chapter (Chapter Seven) a brief review of the study is initially presented. The contributions, recommendations and the suggestions derived from the study are finally presented to conclude the study.

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Chapter Two – LITERATURE REVIEW

This chapter provides a review of the literature on the concepts that are thought to be relevant to this study. Amongst the concepts that are thought to be relevant to this study include health insurance, information management, information and communication technology, and the digital divide. The chapter is divided into four sections. The first section discusses the concept of health insurance and its application within the Ghanaian context. The second section discusses information management. In this section information management is defined, as well as the lifecycle of information, the advantages and the barriers to successful information management. The third section talks about information and communication technology and its attendant issues. The final section discusses the literature on the concepts that define the digital divide.

2.1 Introduction

Good health is required for well being, economic and social development (WHO, 2000; Drechsler & Jutting, 2005). Any economic development requires a healthy workforce, and in the case of social development amongst others, healthy children to attend school and to partake in social activities.

In most developing countries however the population tends to suffer poorer health when compared to that of developed countries, this is mainly because healthcare is largely under funded in these countries. According to Hsiao & Shaw (2007: p. 8) the narrow tax base due to “their small industrial bases and large shadow economies characterized by labour working in the informal sector” is a major cause of under funding for healthcare. The World Health Organisation (WHO) report (2000) on improving the performance of health systems listed the lack of risk pooling and insurance as one of the main causes of health related impoverishment (WHO, 2000).

Many developing countries have been increasingly turning to Health Insurance (HI) schemes to finance healthcare service delivery. HI is a financing approach for mobilizing funds and pooling risks in healthcare service delivery. By spreading the costs amongst a group of individuals, usually through the payment of a premium to gain membership of a scheme, the cost of healthcare to each individual member is reduced, with the added bonus of not having to pay at the point of service.

2.1.1 Definition of health insurance

The concept of insurance is to share the risk amongst a large number of people. “It reduces individual uncertainty concerning the timing and amount of future possible expenses that may be incurred” (Criel, 1998: p. 61). Griffin (1992) defined the principle of insurance as the sharing of risks by the pooling of resources and transforming a low-probability, but immense expected loss into a certain, but very small loss.

Health Insurance (HI) has been defined as a healthcare financing approach for accumulating funds and pooling risks, and works by estimating the overall risk of healthcare expenditure and developing a framework that will ensure funds are available to pay for specified health situations (Hsiao & Shaw, 2007).

Carrin (2002: p. 59) also defined it as a concept that pools the "risks of its members on the one hand, and the contributions of enterprises, households and governments on the other". In developing countries such as Ghana, where incomes are low, their medical issues can lead to large expenses which many people cannot afford. According to Hsiao & Shaw (2007: p. 64) health expenditure in Ghana amounted to around 4.5% of GDP in 2003, with the majority being financed mostly by out-of pocket payments.

It is also referred to as a mechanism whereby households in a community finance the costs associated with a given set of health services (Carrin, Waelkens & Criel, 2005: p. 800). The main source of financing in this type of insurance is the payment of

premiums by members of the scheme out of their own pockets. Contributions are mostly voluntary, with the membership comprising of the contributors and their dependents.

These definitions have a couple of things in common. Firstly they suggest that HI is about pooling the risks and resources of its membership. Second they emphasize the accumulation of finances to pay for health services.

2.1.2 Theory of health insurance schemes

The avoidance of financial risk is the main purpose to purchasing health insurance (Nyman, 1999: p. 141). Arrow (1963), Rothschild & Stiglitz (1976), and Hsiao & Shaw (2007: p. 14) also stated that the uncertainty of illness supported the theory of HI. At any given time there are relatively few sick people within any given society. For example in Ghana the hospital admission rate per 1000 of the population in 2005 was 36.5, with malaria topping the list of diseases managed at health delivery centres with 44%, followed by acute respiratory infection with 7%. The under-five malaria fatality rate in 2005 was 2.1% (Osei, Akazili & Asenah, 2007: p. 8). Faced with deteriorating health most people would seek treatment even if at costs they cannot afford. Most people faced with such a problem would want to be insured. Others would however refuse to be insured, believing illness to be far from them, and as such ignore the potential risk of impoverishing their families.

People are also selfish and were health insurance to be voluntary would not want to pool their health risk with others they perceive to be of a higher risk than them (Hsiao & Shaw, 2007: p. 14). Others fail to see the reason why they should pay before they fall sick (Kamuzora & Gilson, 2007: p. 100). Poor and low income households cannot afford insurance premiums and thus have to be subsidized.

HI pools both low risk and high risk people, avoids people's failure to address risks and creates a forum that allows for members of the scheme to contribute based on their ability to pay. In Ghana the introduction of the HI scheme was to “assure

equitable and universal access to healthcare for all residents of the country" (Sulzbach, Bertha & Gertrude, 2005: p. 3). HI is a modern macroeconomic program that promotes equity and creates solidarity, pools risks and redistributes income between the rich and the poor, the healthy and the less healthy, the old and the young (Hsiao & Shaw, 1997; Wiesmann & Jutting, 2000; Carrin, Waelkens & Criel, 2005).

2.2 Preconditions for successful health insurance

A number of conditions needs to be satisfied before an HI scheme can be successfully implemented. They include the following:

2.2.1 Incentive to pay premiums

There must be an incentive for people to accept to join a HI scheme. If low or no user fees are being paid for existing health services, there is no motivation to contribute to a health insurance scheme, but if existing services at hospitals and health posts are poor, and where people feel they do not get value for their money, they may be more inclined to contribute to an insurance scheme if it promises better conditions of service (Wiesmann & Jutting, 2000; Hsiao & Shaw, 2007). The quality of care offered was one of the main factors identified by the WHO as a precondition for enrollment in HI schemes (Carrin, 2003: p. 4).

2.2.2 Economic growth

Criel et al (2004: p. 1042) questioned the purchasing power of the people to pay their contributions. Ensor (1999: p. 875) stated that the country's income and the growth rate of incomes could be used to determine the ease with which premiums would be paid, and as such a successful implementation of a HI scheme. Carrin (2002: p. 63) also stated that "more income means *ceteris paribus*, better capacity to pay health insurance contributions".

Hsiao & Shaw (2007: p.12) also listed the following effects of increased economic growth on HI scheme development.

- people could pay premiums due to a reduction in poverty.

- formal sector workers would increase the number of people in the scontributory regime.
- government revenue could lead to more poor people being subsidized.
- increased government administrative capacity to collect taxes and insurance premiums.

2.2.3 Administrative management

The management of the scheme should be sufficiently staffed with skilled personnel to build and run the institution (WHO, 2004; Criel et al, 2004). If financial control and proper record keeping (management) were not in place, confidence in the scheme could rapidly be eroded (Wiesmann & Jutting, 2000: p. 13).

Records management is defined as “the systematic control of an organisation's records, throughout their life cycle, in order to meet operational business needs, statutory and fiscal requirements, and community expectations. Effective management of corporate information allows fast, accurate and reliable access to records, ensuring the timely destruction of redundant information and the identification and protection of vital and historically important records” (NAS, 2005)

Carrin (2002: p. 62) also argued that the existence of a sufficient administrative structure was essential for the successful operation of a scheme. This includes the storage, manipulation and transmission of information between the constituent bodies in a HI scheme. A statement that was echoed by McIntyre, Gilson & Mutyambizi (2005: p. 37).

2.3 Advantages and disadvantages of health insurance schemes

The following were some of the arguments put forward as advantages and disadvantages of using HI in developing countries;

2.3.1 Advantages

- HI increases the availability of resources for health care as such freeing up

scarce public resources.

- It reduces the uncertainty involved in relying on meager tax income.
- HI also reduces the incidence of impoverishment as a consequence of illness.
- It can also lead to the provision of higher standards of care from health service providers.

2.3.2 Disadvantages

Tabor (2005: p. 27) stated that the weak management capacity, poor data handling, frequent exclusion of the poor, small size of the risk pool and a limited amount of resources that can be mobilized from low-income communities were some of the main disadvantages of HI in developing countries. McIntyre, Gilson & Mutyambizi (2005: p. 37) concurred, stating amongst others that the weak administrative capacity in developing countries was a major disadvantage in the operation of HI schemes.

2.4 Types of health insurance schemes

Asenso Okyere et al (1997: p. 225) identified 3 different kinds of health insurance in operation in developing countries. Namely Social Health Insurance (SHI) which is compulsory for a given section of the population and is government sponsored, Community Based Health Insurance (CBHI) which is voluntary and organized at the community level, and Private Health Insurance (PHI) which is also voluntary, with the risks based on the assessment of each individual. Hsiao & Shaw (2007: p. 16) also listed 4 different types of health insurance including SHI, CBHI, PHI and National Insurance (NI). NI was stated by Hsiao & Shaw (2007: p. 16) to be financed from general government revenues and other taxes, with membership being open to all citizens.

Depending on the type of HI scheme, the organization has a number of actors who interact to ensure that the required services are provided. These actors include hospitals, health service managers, health personnel, donors, communities and the state (Criel, 1998; Cripps et al, 2000). Within a given structure persons competent in

“business planning, general management, accounting and financial management, and community liaison and marketing” are essential for its operation (Cripps et al, 2000: p. 17).

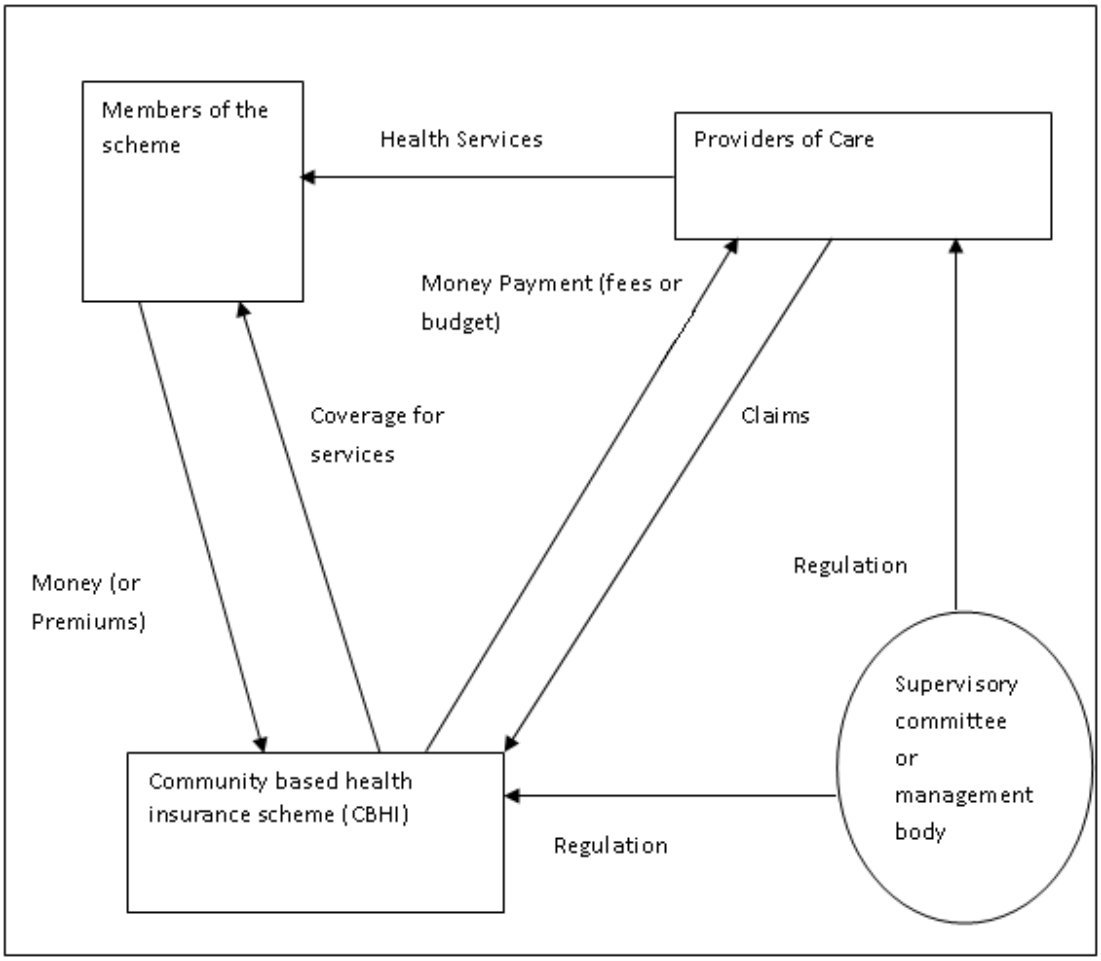


Figure 2.1: Basic organizational structure of a typical health insurance scheme

Figure 2.1 shows a basic model of the organizational structure of a typical HI scheme. Typically a supervisory committee or management body regulates the activities of the scheme and health care providers. Providers of care services make claims to the HI scheme for services provided to scheme members, whereas scheme members pay premiums and receive cover for services received from care provided from the HI scheme. Figure 2.1 is similar to the model employed in Ghana.

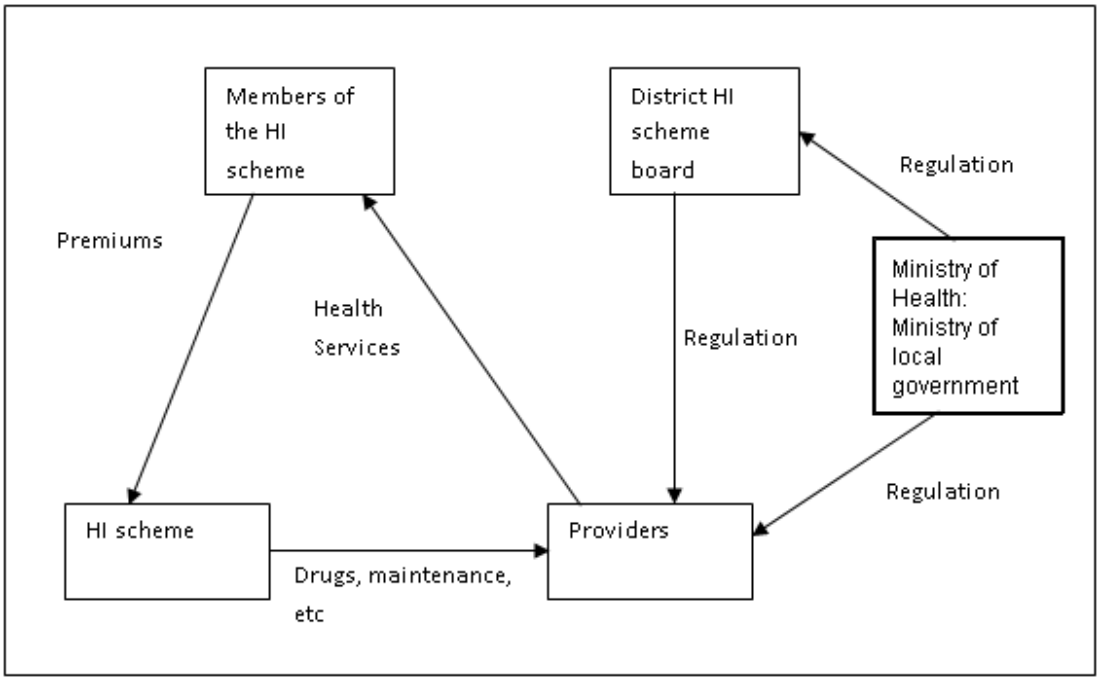


Figure 2.2: Movement of information and resources (Cripps et al, 2000: p. 17).

Figure 2.2 shows the movement of information and services between the actors in a typical HI scheme. Members of a HI scheme typically pay a premium to the scheme, and in turn receive health services from health service providers affiliated to the scheme. Other significant exchanges of information occur between the government or ministry responsible for the health sector, HI schemes and healthcare providers. Information shared between these bodies includes regulation and finances. The successful management of HI schemes like any other modern organisation therefore depends to a very large extent on the effective management of its information resources.

2.4.1 Health insurance in Africa

As mentioned previously, many developing countries are increasingly turning to the concept of health insurance to enable them finance health care provision for their citizens. Outside of sub-Saharan African countries, various forms of health insurance schemes are available in countries such as Thailand, India, Colombia and the Philippines. Within the African context, different types of HI schemes are operational

in various countries such as Kenya, Ivory Coast, Ghana, Nigeria, Tanzania, Senegal, Rwanda, Uganda and South Africa (Carapinha et al, 2011; Hsiao & Shaw, 2007; Abebe, 2010; Basaza et al, 2009; Gottret & Schieber, 2006; Baltussen et al, 2006). Gottret & Schieber (2006) list social, private, community-based and national health insurance schemes as the types of HI schemes that are becoming operational in Sub-Saharan Africa. After surveying the types of schemes generally operational in Africa and Asia, O'Connell (2012: p. 5) concluded that "no African or Asian country has a 'pure' form of health insurance model; all national insurance plans are mixed, or 'hybrid' schemes combining elements of Social Health and Publically-financed National Health Insurance".

With the increase in the types of schemes, there has also been a corresponding increase in the number of schemes available to national populations. In the Ivory Coast for instance, the number of community-based health insurance schemes increased from 9 to 47 between 1997 and 2006 (Ndiaye et al, 2007). Baltussen et al (2006) similarly wrote about the number of community-based schemes in Ghana increasing from 2 in 1995 to 78 in 2004.

Within Uganda, Kenya and Tanzania (all located in East Africa), Basaza et al (2009) reported that social health insurance coverage remained minimal, and was mainly being utilised by citizens employed within the formal sector of the economy. Social health insurance coverage was 30% of the entire Kenyan population and only 5% of the population of Tanzania, even though the country had the highest number of operating schemes amongst the three aforementioned countries. In Uganda, "private health insurance is also very limited and largely confined to health maintenance organizations and commercial insurance firms and covers less than 1%" (Basaza et al, 2009: p. 48). There is also a high drop-out rate of about 10% of membership per annum in Uganda (Basaza et al, 2009: p. 48). The HI schemes in Uganda and Kenya were all located in rural areas, whereas Tanzania had some schemes located in urban areas.

According to Huber, Hohmann & Reinhard (2002) access to healthcare for scheme members is usually good, but in the context of the low coverage rate of health insurance schemes, there is not much of an impact on the target population. Within the West African sub region for example, Nigeria introduced a national health insurance scheme in 2005, but as at September 2012 had only managed to cover 3% (5 million) of the entire population (Obalum & Fiberesima, 2012). Other reasons given for the low coverage rate includes poor scheme design, weak financial and managerial oversight, the lack of technical competence to manage complex financial systems, and the weak resource mobilization capacity of the schemes (Huber, Hohmann & Reinhard, 2002). Viable HI scheme systems in Sub-Saharan African countries in financing and providing healthcare delivery will require measures to be put in place to adequately address the above mentioned issues.

2.5 Information management (IM)

Information is said to be the lifeblood of organisations (Zeffane & Cheek, 1994: p. 1), and is a prerequisite for the production and delivery of products and services for many organisations (Hicks, Culley & McMahon, 2006: p. 267). Information takes both electronic and physical forms, and can be received, stored and shared in a variety of ways including written, verbal and computer based. Information management systems may either be manual, electronic or a combination of both. According to AIIM (2012) "the organizational structure must be capable of managing information throughout the information lifecycle regardless of source or format (data, paper documents, electronic documents, audio, video, etc.) for delivery through multiple channels that may include cell phones and web interfaces."

Ward & Peppard (2005: p. 475) explain the main objective of IM to be the satisfaction of demand for information, and thus to deliver value or competitive advantage to the organisation.

Hicks, Culley & McMahon (2006: p. 268) defined IM to include the "creation, representation, organisation, maintenance, visualisation, reusing, manipulation,

sharing, communication and disposal of information using a variety of tools, techniques, standards, languages, processes, methods and hardware". Lee et al (2005: p. 201) state that IM was concerned with communication, and covered the "acquisition, generation, preparation, organisation, dissemination and analysis of information, and the design, implementation, evaluation and management of information resources".

Within an organisational context Taylor & Farrell (1992: p. 319) also defined IM as identifying, coordinating and exploiting information entities within an organisation for the purpose of using the characteristics of that information to achieve greater value, and to gain advantage over competitors.

Beynon-Davies (1993) similarly defines IM as the discipline of managing data for administrative, strategic and tactical advantage. Black & Brunt (1999: p. 361) commented on IM as the ordering, analysis and channelling of non-publicly available information within organisations.

IM also addresses the lifecycle of information. Information Lifecycle Management (ILM) involves the management of information through its lifecycle from the time it is created to the moment it is disposed, while taking into consideration how the information is accessed and stored. According to the Storage Networking Industry Association (SNIA), "ILM is comprised of the policies, processes, practices, and tools used to align the business value of information with the most appropriate and cost-effective IT infrastructure from the time information is conceived through its final disposition."

The JISC (2007: p. 8) in the UK defines ILM as comprising the following four main phases, even though there are other versions of the lifecycle phases in existence:

1. The Creation phase, where information is produced in various forms with the intention of it being fit for purpose and actually capturing appropriate and reliable content. Data quality, data currency, status and version control, and the

appropriate format have a bearing in this phase of the lifecycle.

2. The Active Use phase can be defined as the period during which the information is in constant or regular use, primarily as part of the purpose for which it was originally created. Addressing the following questions will help ensure that your information is managed appropriately whilst in active use:

- Have you defined the purpose(s) for which your information can be used?
- Can your information be easily located and accessed?
- Do you know who needs access to your information?
- Is access to your information controlled?
- Is your information safe?

3. In the Semi-Active use phase the active use of the information declines, but may still be required though not as frequently as it was before. Information may still have residual value and be referred to on occasions for reference purposes. The value in keeping the information, the risk, storage and security of the data are some of the pertinent issues that need to be addressed in this phase.

4. The Final Outcome phase is the last phase of the lifecycle, and is concerned with either the long term preservation of the data or its deletion.

Ward & Peppard (2005: p. 475) outlined the advantages of IM as follows:

- It enables the organisation to make the right decisions.
- It improves the effectiveness of processes and their outcomes.
- It provides timely and focused performance information.
- It preserves organisational memory.
- It improves the productivity and effectiveness of managers and staff.

2.5.1 Barriers to effective information management in developing countries

According to Ferris, Burns & Liatsopoulos (2007), the following are the major reasons why information management in African countries generally lags behind that of the developed world. The reasons include:

- The lack of funding. Low incomes and austerity budgets have made governments restrict the level of funding available to records and information management projects. The priority given to this by organisations and governmental agencies is reduced due to the lack of available funding. According to Heeks (2002: p. 101), “many information systems in developing countries can be categorized as failing either totally or partially”, due to the lack of funding.
- Old and failing infrastructure. The lack of funding leads to the problem of old and failing infrastructure. The lack of resources to invest in the provision of modern infrastructure and to maintain existing ones, as well as the increase in the volume of records and information produced, impedes the development of information management systems.
- The lack of staff and appropriate training. Also linked to the lack of funding, there is no funding to train staff members to manage modern information management systems. Another reason is the digital divide between the developed and developing countries.

The discussion above has sought to detail the necessity of having appropriate structures in place to manage the information resources of an organisation. If properly managed the management of information within an organisation can yield great dividends for the organisation. Within the Ghanaian context the Ministry of Health (MOH) stated in its Information management strategy report for 2007 that modern “health systems need accurate and instantly accessible information. It is vital for improving care for patients, improving the performance of the healthcare system and the health of Ghanaians” (MOH, 2007: p. 3). Where it is not properly managed, there is the potential for the organisation as a whole to suffer in its effectiveness and efficiency. Modern information management employs the use of information and communication technology as opposed to manual systems to achieve their goals.

According to MOH (2007: p. 3) “Advancements in technology and the increasing value of integrated health data, as well as the management of that data also represent a vital thrust underpinning information management in the health sector. It is about improving the very nature of care itself through enhanced knowledge and understanding by means of supportive information systems. It is also about providing decision-makers with accurate information so that they can make informed decisions. Most important, it is about increasing value for all users of the health care system”. The following section will seek to highlight how this is broadly applied in the health industry of which the insurance scheme is a subset of.

2.5.2 Information and communication technology (ICT)

Chetley (2006: p. 9), referred to ICT as “tools that facilitate communication and the processing and transmission of information and the sharing of knowledge by electronic means”. Ward & Peppard (2005: p. 3) also defined ICT to be technology specific hardware, software and telecommunication networks, employed in the acquisition, processing, storage, delivery and sharing of information and other digital content.

Adam & Wood (1999) analysed the impact of ICT in sub-Saharan Africa and reported on the actual and potential impact within government, organisational, educational and business settings. In many instances it was observed that the introduction of ICT had not yet moved beyond substitution. Adoption of ICT involved a substantial learning cycle and a level of investment that were difficult to achieve in sub-Saharan Africa. In a study on information technology (IT) performance, Delone & MacLean (1992) measured the success of (IT) projects by identifying a number of factors including: systems quality, information quality, use, user satisfaction, individual impact and organisational impact (Delone & MacLean, 1992: p. 60). In their research Adam & Wood (1999: p. 311) showed that the actual impacts included the improvement of communications and delivery of service, cost saving and increased numbers of outlets for access to information. Potential impacts include improved coordination amongst organisations, changes to organisational structure to adapt to ICT, the improvement of

communication within government institutions and a greater and continuous empowerment of individuals.

In an attempt to manage their information resources, many organisations expend considerable resources in acquiring ICT to support this (Hicks, Culley & McMahon, 2006: p. 269). It must however be noted that ICT in itself does not offer any benefits to an organisation. The benefits or advantages are derived depending on how they are employed within the organisational setup.

2.5.3 Information and communication technology (ICT) systems in health services

The Project Auditors Project Management Dictionary (2013) defines an information system as “a structured, interacting, complex of persons, machines (ICT), and procedures designed to produce information which is collected from both internal and external sources for use as a basis for decision-making” in an organization.

A health information system may also be defined as “a system that integrates data collection, processing, reporting and the use of information necessary for improving health service effectiveness and efficiency, through better management at all levels of health services” (Lippeveld, Bodart & Sauerborn, 2000: p. 3). Health information is used in many aspects of the healthcare system and amongst others provides reliable and relevant information to health care managers to enable them effectively and efficiently allocate resources as well as to deal with epidemics and improve the quality of healthcare delivery.

The increasingly multifaceted nature of modern healthcare delivery, and the large amounts information generated and shared (Bose, 2002; Fieschi, 2002; Bakker, 2002), has therefore led to the employment of information technology (ICT) to assist healthcare managers in exploring means of making use of such information to assist in management and also to help in medical research. ICT systems can be used to

acquire process, store and disseminate information in relevant forms that will enable others to make better use of such information.

The sources of health information are many, and include patient records, drug prescriptions, laboratory tests and results, patient scheduling and intake, accounting and finance. These must all be coordinated to help in the delivery of efficient health services.

According to Kissinger & Borchardt (1996) the usual flow of health information is from individual health centres up to national decision making bodies (usually the Health Ministry), stopping at several sectors along the way, most of which make use of the information coming their way in one way or the other. In Ghana for instance, information generated by individual health centres is sent to the district health authority (responsible for all health centres in the district) where they are aggregated, analysed and sent further upwards to the regional health authority. The regional health authority also collects information from the various districts within its domain and sends them up to the health ministry where health policy and resource allocations are made for the country based on perceived need as ascertained from the information received. At the national level the health ministry is able to analyse the effectiveness of policy and resource distribution by studying data received from the various regions. Regional health authorities serve as a link between the national and district health administrations and use information received to monitor the allocation of resources to regional health centres and also to effectively administer healthcare delivery. Information is also used at the district level to plan and monitor health campaigns, epidemics, and for staffing and financing of health services in their area. At the hospital level information on patients (i.e. patient records), bed occupancy, waiting and delays, workload, resource utilization, evaluation of the efficiency of service provision, profitability and the cost of service provision are amongst the information needs that must be satisfied. Patients are also consumers of health from the health sector. They access information to better understand their conditions, access treatment, and to act to prevent disease. Relevant and available information

about patients may also help doctors and health providers in providing a more efficient service to patients. Allergies to drugs and treatment history are some of the information which will enable health providers to give consumers/patients a more efficient service.

2.5.4 Effects of employing information technology

The use of information technology to help in accessing and providing information to the various interested parties may affect the nature of work and have an impact on the organization. Kissinger & Borchardt (1996) listed the following as some of the effects on the nature of work and the organization as a result of applying IT systems:

2.5.4.1 Effects on the nature of work

- It may change the amount of routine work (in a health delivery service it may reduce the amount time used in locating patient files/records).
- It may change the number of people needed to carry out a particular task, say at the clerical or administrative level.
- It may change the level of skills and expertise needed by employees.
- It may provide more detailed and analysed information on the medical systems, thereby possibly increasing the amount of information to health care personnel.

2.5.4.2 Effects on the organization

- There may be changes in the decision-making process and where decisions are made.
- Rules and procedures for controlling people behaviour may be changed.
- Finally, there exists the possibility of changes in the organizational structure. This may be due to the reduction in layers of management, or the merging of previously individual departments.

2.5.5 Health information systems in developing countries

Bhalla & James (1988) argued that in most developing countries, traditional technologies were still of strategic value in solving the basic problems of the

population. Seror (2001: p. 3) also stated that within developing countries "technological innovations are being integrated to the extent that they are coherent with the scale and culture of local economic activities". The reasons for this are not very hard to find given the high costs of computing, equipment and software and the general lack of the technological infrastructure to fully harness the benefits of IT in healthcare service delivery. The use of computer-based technologies like Computerised Patient Records and Health Information Networks are as such virtually non-existent in most developing countries, and in cases where computers are employed, are done so mostly for data processing.

Sahay (2001: p. 2) listed the lack of an appropriate infrastructure, the lack of focus, and the organizational contexts including the upward reporting structures and "overdose of bureaucracy" as the main problems that beset the introduction of ICT in health delivery in developing countries.

The implementation of HIS's also tended to be skewed towards health facilities in the urban areas, where the infrastructure and expertise required for the successful deployment of such technology was usually based. Paper based systems were mostly used in rural areas in data collection and reporting (Braa & Blobel, 2003) with a lack of integration and the poor use of information being recognized as problems that could be potentially encountered in using such systems.

Whereas high technology systems have not fully permeated the health sector in these countries, relatively low technology systems such as the telephone, fax and the internet are increasingly being used to relatively good effect. Telephones and faxes have made it possible for medical information to be relayed almost instantaneously. Healthcare service personnel are therefore able to find out the status of laboratory test results, a patient's treatment history and other relevant information from outside sources to help in diagnosis and treatment in a quick and efficient manner.

Internet facilities also enable service providers to research relevant information, browse online medical journals and also provide a means of transmitting and receiving information in an efficient and cost effective manner. In introducing the national health insurance scheme, there are several areas namely in membership registration and management, provider contracts management, and healthcare and financial management in which ICT can be used to improve performance and efficiency. Using the basic models as shown in Figures 3.1 and 3.2, opportunities for employing ICT exist in the management of scheme membership, premium payments, complaints, claims and the settlement of claims, and in the provision of services to the scheme members by service providers. ICT has the potential to speed the accessibility and coordination of information amongst the participating organisations, within the scheme, hopefully leading to a more efficient delivery of service.

Like most developing countries however, Ghana has a relatively low level of ICT development. This is in spite of the priority given to the sector by the government, which seeks to use the sector as a springboard for accelerated national development. For example, the Human Development Report of 2004 by the United Nations Development Programme (UNDP) listed 13 and 7.8 as the number per thousand of the population that had access to telephone mainlines and internet use respectively. The numbers listed above also differ when they are examined within rural and urban settings. Most of the technology available in developing countries tends to be concentrated in the urban areas. These figures also compare unfavorably with the average amongst low income countries (28 and 13 respectively) and world average (175 and 99.5 respectively). According to a National Communication Authority (NCA) report (2011) on the penetration of mobile phones in Ghana however, it came to light that as at 31st December 2011 the mobile phone penetration rate was 88.2%, whereas that of land lines was 1.2%. The report also stated that over 70% of the entire country was covered by one or more of the mobile networks operating within the country. The above-quoted statistics indicates that mobile phone technology is available in the majority of areas within the country. According to Fosu (2011), Ghana also has a very limited national fiber optic capacity, which is non-existent in the rural areas where

majority of the population resides. “This situation is compounded by the fact that any attempt to expand the fixed-line network is confronted with topographic challenges and associated high costs” (p. 495). Chetty, Blake & Tucker (2004) and Fosu (2011) also argue that as a result of the harsh topographic conditions and poor access roads, fixed-line telecommunication infrastructure may not be the right solution for rural areas in Africa; wireless telecommunication offers a more appropriate method to overcome these challenges.

The upsurge in the use of mobile phones in developing countries, as well as their impact for development is well documented in the literature (Donner, 2008; Sullivan, 2007). According to Chib et al (2012), and Kimaro & Sahay (2007) low level ICTs including mobile phone technology are increasingly being adopted by policy makers even in the remotest areas in developing countries to bridge barriers and improve access to healthcare information and medical services. According to Boland (2007) and McCann et al (2009) mobile phone technology can potentially increase outreach, save resources and improve health outcomes. This is particularly important in developing countries where as previously stated most of the available technology tends to be concentrated in the urban areas, creating a digital divide.

2.6 The rural-urban digital divide

The digital divide may be defined as the gap between the areas, peoples, and organisations that have access to ICTs and those that do not. On a global scale it is usually used to describe this situation existing between the developed and developing nations. Within nations however, and more so within developing nations, the digital divide refers to the gap existing between urban and rural ICT users. Rao (2005) defined the digital divide as existing in three main dimensions; globally, regionally and nationally. So for example within nations there may be a rural-urban divide; within urban areas, an educated-uneducated divide; amongst the educated, a wealthy-poor digital divide. According to Furuholt & Christiansen (2007: p. 6) ICTs tends to flow towards and is concentrated in urban and central areas within Africa; “Very limited diffusion of the telecommunications networks into rural areas (often over 75 percent of

the country's telephone lines are concentrated in the capital city) and irregular or non-existent electricity supplies are a common feature and a major barrier to the use of ICT, especially outside the major towns".

If not addressed, the digital divide within any of the three dimensions mentioned above has the potential to create the following implications (Rao, 2005);

- Computer literacy: Those who can operate ICT equipment have more opportunities for employment than those who do not.
- Use of electronic data interchange: Organisations that are unable to conduct business over digital networks stand the risk of being left behind by those with the ability to do so. The inability to speedily and efficiently communicate and transfer information may go against it.
- Tech savvy operations: Those with the ability to operate ICT systems can work faster than those who do the same operations manually.
- Use of information: Those who are privy to certain information, have the potential to use it either scrupulously or unscrupulously to their advantage; leaving their competitors and partners behind.

According to Daudi (2004: p. 195) "many developing countries have embarked on strategies to utilize Information Communication and Technology (ICT) in generating and communication of data from one level to another. However, many of these countries have managed to modernize the Health Management Information System (HMIS) only at the higher levels (national and provincial) because they do not posses technological, political and legal infrastructure to adequately respond to and manage ICT revolution for their benefit. The poor communication infrastructure in these countries has undermined efforts to spread the technology to the rural areas where majority of the people resides." Rao (2005) also identified infrastructure as the main bottleneck discouraging the spread of ICT to the rural areas, and lists parameters such as electricity, IT penetration, teledensity and the internet industry as the reason for the digital divide. Other writers including Mosse & Sahay (2003), in addition to

infrastructure, have also identified manpower and the culture of the people as other determinants in the gap of the digital divide.

To aid in the development of an appropriate system to manage information within the HI scheme, any model that is produced would have to take into consideration the level of technology that is operable and generally available in the area.

2.7 Mobile phone technology

In its basic form, mobile phone technology facilitates two-way communication of voice and data in real-time or near real-time. With an increasing percentage of the population (including those in the lowest levels of society) in developing countries relying on mobile phones to manage various activities in their lives, "there exists the potential to develop an ICT solution that can take advantage of this relative simple and easy to use communication device" (Thomas, Christian & Narayan, 2012: p. 71).

According to Vital Wave Consulting (2009) mobile phone technology is a very effective means of bringing healthcare services to citizens in developing countries. "With low-cost handsets and the penetration of mobile phone networks globally, tens of millions of citizens that never had regular access to a fixed-line telephone or computer now use mobile devices as daily tools for communication and data transfer. A full 64% of all mobile phone users can now be found in the developing world. Furthermore, estimates show that by 2012, half of all individuals in remote areas of the world will have mobile phones" (Vital Wave Consulting, 2009: p. 7).

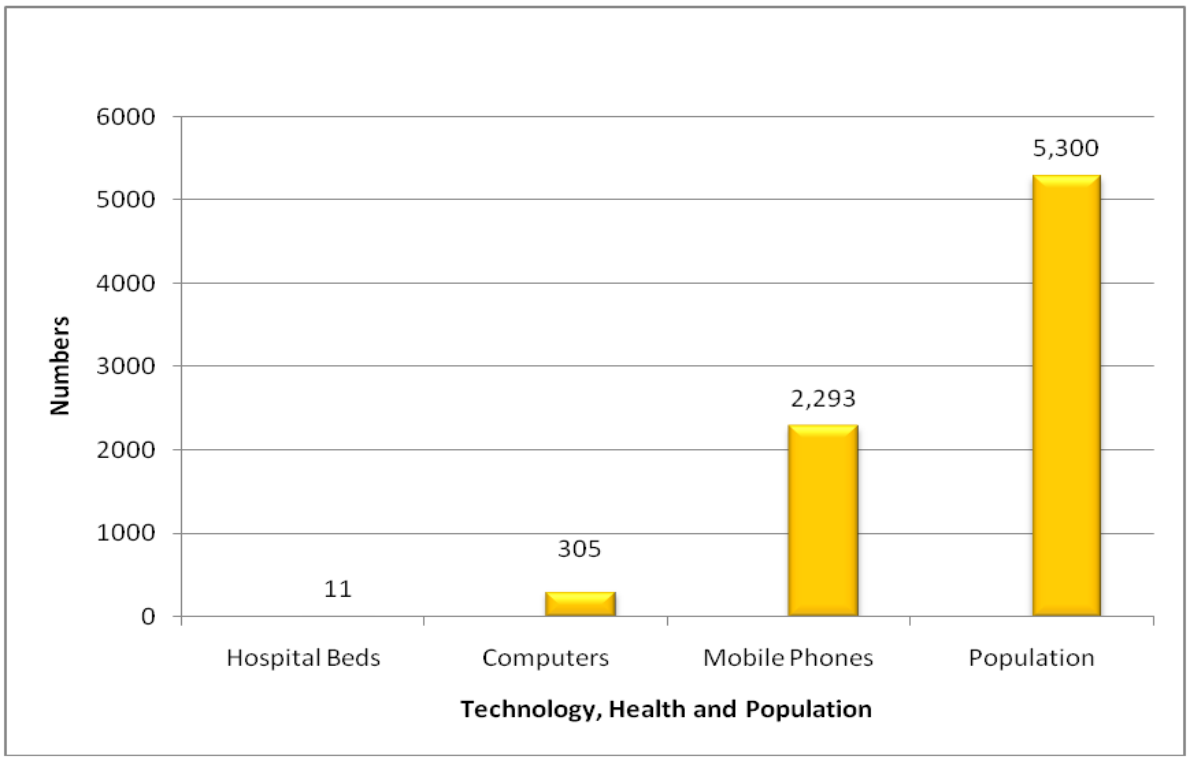


Figure 2.3: Technology and health related statistics for developing countries (millions). Source: Vital Wave Consulting (2009: p. 7)

Figure 2.3 illustrates that residents in developing countries have much more access to mobile phones than other technologies and health infrastructure.

Many mobile phones have the ability to capture pictures and make short videos that can either be viewed on the phone, shared with others or saved on a computer (Patrick et al, 2008). “Data processing and storage capabilities resident on mobile phones increase each year and, via connections through a client-server architecture to a larger and more powerful network of servers, supports the transmission and analysis of data in a variety of forms, including text, numerical, graphic, audio, and video files. While many mobile phones remain primarily communication devices, “smart phones” mimic what a personal computer can do but with adaptations to the mobile phone’s small screen, keypad, or other user interface. All current phones can access wireless data networks whenever the phone has a signal, and new phones often have additional radios (e.g., WiFi [wireless fidelity]) that enable fast data

exchange via the Internet in some locations. Some mobile phones can communicate with other electronic devices through the use of Bluetooth, a wireless technology supporting data exchange over short distances (e.g., 5–10 meters)" (Patrick et al, 2008: p. 2). Within the arena of health care delivery mobile phones can be applied in the management of health and patient data, access to information for health workers, telemedicine and health promotion, as well as in communication during emergencies (Crespo, 2008).

In comparing the use of mobile phone technology to the traditional use of paper based systems in managing health information in developing countries, the benefits found in the literature include the following:

- Improved accuracy (Anantraman et al, 2002; Blaya et al, 2009; Forster et al, 1991; Galliher et al, 2008; Mechael et al, 2010)
- Reduction in time (Blaya & Fraser, 2006; Blaya et al, 2009; Buck et al, 2005; Anantraman et al, 2002; Escandon et al, 2008; Safaie et al, 2008; Mechael et al, 2010)
- Human resource improvement (Anantraman et al, 2002; in Mechael et al, 2010)
- Reduction in cost (Blaya et al, 2009; Yu et al, 2009; Mechael et al, 2010)
- Improved data quality (Anantraman et al, 2002; Galliher et al, 2008; Mechael et al, 2010) and
- The potential for real time authentication and receipt of data (Tegang et al, 2009; Mechael et al, 2010)

According to Mechael et al (2010: p. 29) a prerequisite for the implementation of mobile phone technology in information management is the need for enhanced mobile coverage if they are to be implemented at the "district, regional and national" levels. Wireless networks they argue, have been vastly extended in many developing countries, thus areas lacking mobile phone coverage have been greatly reduced. With an 88.2% penetration rate in Ghana(NCA, 2011), an argument can be made for the implementation of mobile phone based information systems, to enable the above benefits to be enjoyed in the health sector.

Crespo (2008) listed the following as examples of the employment of mobile telephony in rural areas in healthcare management. They include the Satellife Project, which uses GSM coverage to download and transmit the information to PDAs through a jacket (Keysha & Genevieve, 2003); the sending of SMS in Kenya for free with VIH/AIDS information for health promotion, including a free and anonymous service of questions/answers (Jones, 2005; Katz, 2006); and the Jiva Teledoc project, using Java-enabled mobile phones and GPRS coverage to support telemedicine in rural areas in India (Bhattacharyya, 2004). The technology has also been employed in enrolling and paying premiums for clients of personal accident insurance in Kenya (ILO, 2008).

2.7.1 Mobile phone technology in healthcare delivery in Ghana

In Ghana, mobile phone technology has been employed to capture, transmit and treat health data collected by community health workers during client encounters in the Upper East region and the Ewutu-Senya district of the Central region of the country (Grameen Foundation, 2011). Using low-cost GSM phones, the system (called mobile technology for community health (MOTECH)) uses “a Java 2 Platform Micro Edition (J2ME) application to capture client data and store it on a mobile phone. GPRS is then used to transfer this data from the phone to a central patient electronic medical records system that is stored on the MOTECH server”. (Grameen Foundation, 2011: p. 8). Before employing this technology the current registration forms had to be condensed and simplified to enable the forms to be put on a mobile phone. Check boxes, radio buttons, lists and number fields were also included to speed up documentation and increase accuracy. “MOTECH also enables nurses to query the database whenever they like by using a form in the mobile application. Nurses can use this function to request lists of defaulters in their catchment area, those due or overdue for delivery, or those who recently gave birth. They can also request information about individual clients, such as the care they are due for soon, their contact details, address and estimated due date for pregnant women” (Grameen Foundation, 2011: p. 11).

Another example of mobile technology being used in Ghana in the field of healthcare management is the Medicare Line program, which offers free calls and text messages between any registered physician and / or surgeon within Ghana. Its current focus has been on the reduction of logistical and economic barriers to mobile phone use instead of technological innovation. After submitting the required paperwork, a doctor registered with the Ghana Medical Association (GMA) receives a GSM SIM (subscriber identity module) which can be used with a privately-purchased mobile phone. Using this SIM, the physician can now call other program participants free of personal charge. For example, a physician can call a specialist in the capital or a friend in a rural town to ask or provide medical consultation. This can be a significant cost saving, especially given that airtime in Ghana is relatively expensive compared to many developed countries. (Luk et al, 2009)

2.7.2 Advantages of mobile phone technology

Crespo (2008: p. 2) identified 6 features of mobile phone technology that made it appropriate for adoption in developing countries. They are:

- Low infrastructure investment,
- Ease of use,
- Low energy consumption,
- Affordability of services and devices,
- The ability to surpass unfavourable geographic structures, and
- Less vulnerability to vandalism and natural disasters than other technologies.

The above mentioned features, together with the examples of mobile phone technology being employed in managing information and in enrolling and paying premiums, make it a very appropriate vehicle to facilitate the management of information within the Health Insurance Scheme. For example, mobile phone technology can be employed in the registration of new scheme members, in quickly relaying personal and payment information about scheme members from even the remotest of rural settlements to the scheme offices, and in communicating insurance

claims information between health service providers and the health insurance scheme offices.

2.8 Summary

This chapter reviewed the literatures that were relevant to this study. It began by discussing health insurance schemes, and then went on to define Information management and the Information Management lifecycle. Information and Communication Technology and specifically their use in health service delivery was then reviewed. This was followed by a review of health information systems in developing countries, the rural-urban digital divide and finally at how mobile phone technology could be used to bridge the digital divide.

From the literature review that has been undertaken, there was an absence of evidence about any research having being carried out on the differences between managing information in the rural and urban district health insurance schemes in Ghana. This study aims to fill that gap.

The next chapter will examine the context within which the study was undertaken.

Chapter Three – CONTEXT OF STUDY

3.1 Introduction

This chapter presents contextual information relevant to understanding the country, its healthcare delivery system, the district health insurance scheme and an overview of the existing system.

3.2 Geography, population and administration

Ghana is located on the western coast of Africa and is bordered to the north by Burkina Faso, to the south by the Atlantic Ocean, to the west by La Cote D'Ivoire and to the east by Togo. Ghana was formed by a merger of the former British colony of the Gold Coast and the Togoland trust, and in 1957 became the first sub-Saharan country in colonial Africa to gain its independence.

“The coastline consists mostly of a low sandy shore behind which stretches the coastal plain, except in the west, where the forest comes down to the sea. The forest belt, which extends northward from the western coast about 320 km (200 mi) and eastward for a maximum of about 270 km (170 mi), is broken up into heavily wooded hills and steep ridges. North of the forest is undulating savanna drained by the Black Volta and White Volta rivers, which join and flow south to the sea through a narrow gap in the hills. Ghana's highest point is Mount Afadjato at 880 m (2,887 ft) in a range of hills on the eastern border. Apart from the Volta, only the Pra and the Ankobra rivers permanently pierce the sand dunes, most of the other rivers terminating in brackish lagoons. There are no natural harbors. Lake Volta, formed by the impoundment of the Volta behind Akosombo Dam, is measured at 8,485 sq km/3,276 sq mi and is the world's largest manmade lake” (Encyclopaedia of the Nations, 2013).

The country covers a total area of 239,460 sq km with a total coastline of 539 km. In July 2008 the population was estimated at 23,382,848 (Central Intelligence Agency, 2008), with 96% of the population, below the age of 64. The population growth rate was measured in 2007 to be 2.2%, with 49% of the population living in urban areas

(World Bank, 2008). Administratively the country is divided into ten regions, each of which is further divided into a number of districts. The Akan ethnic group is the largest, with about 45% of the population, with Asante the most commonly spoken language. Accra is the capital of the country, with Kumasi being the second city. English is the official language of Ghana.

3.3 Political context

Ghana is a constitutional democracy, with a legal system based on English common law and customary law. The executive branch of government comprises the president, assisted by his vice president, and a cabinet (council of ministers) who are nominated for their positions by the president, but vetted by parliament. The president and his vice president are elected by popular vote for a four year term. The legislative branch of government is made up of a 230 member parliament also elected by popular vote to serve a four year term.

3.4 Economy

Ghana is well endowed with natural resources including gold and cocoa, which are major sources of foreign exchange for the country. With roughly twice the per capita output of the poorest countries in West Africa, the country still remains heavily dependent on international financial and technical assistance (Central Intelligence Agency, 2008). The recent discovery of vast reserves of oil in the country is expected to give a major boost to the economy in the next couple of years. Unemployment rates are about 11%, with 55% of the workforce engaged in agricultural activities mainly on a small scale (Central Intelligence Agency, 2008). Agriculture which contributed 50.6% to Gross Domestic Product (GDP) in 1987, contributed 36.3% to the GDP in 2007. The services sector's contribution to GDP however rose from 33.1% to 38.4% within the same period (World Bank, 2008).

Figure 3.1: Map of Ghana. Source:

http://www.un.org/Depts/Cartographic/map/profile/ghana.pdf

3.5 Health management structure in Ghana

Before the establishment of a health service available to the native population in the late 19th century by the then British colonial rulers, the inhabitants relied on local traditional healers and medicine when they were taken ill. The Korle-Bu Hospital, the first major health centre in the country, was built in 1923 and has since remained the country's number one hospital (Govindaraj et al, 1996: p.15).

The present health care system is managed by a three-tiered structure at the National, Regional and District levels. At the head of this structure is the Ministry of Health (MoH) which implements its policies through the Ghana Health Service (GHS). The GHS operates in each region through a Regional Health Administration (RHA), headed by a Regional Director. "In accordance with health sector policy and guidelines in Ghana, the Regional Director of Health Services is the administrative head of the health sector in the region. He is the representative of the Minister for health and the Director General of the Ghana Health Service on the Regional Co-ordinating Council. He is responsible to the Regional Minister for all Health issues in the region" (Ghana Ministry of Health). Beneath the RHA is the District Health Administration (DHA), which is headed by a District Director of Health Services (DDoHS) working in conjunction with a District Health Management Team (DHMT). The country's health management structure is illustrated in the table below:

Administrative Level	Functions
National	• MoH – Policy formulation, monitoring and evaluation of progress in achieving targets • GHS – Allocation of resources and creation of partnership with private sector • GHS – Recommendations to the Minister recommendations for health care delivery policies and programs
Regional	• 10 Regional Health Administrations serve as link between the national and district levels and allocate resources within the region
District	• DHMT – Concerned with operational planning and implementation of service within the district. • Health facilities; Hospital, Health centres, posts and clinic

Table 3.1: Table showing the different administrative levels and their associated functions (Ofori-Adjei, 2003: p.13).

3.6 Healthcare financing in Ghana

The financing of healthcare in Ghana has undergone many changes in the past 50 years, finally resulting in the introduction of HI as a source of financing healthcare in 2003. Prior to this the Ghanaian population had gone through phases where healthcare was free of charge (at independence in 1957), where nominal fees were charged (1970's) to full cost recovery (also known as Cash and Carry) for drugs (1980's) (Sulzbach, Bertha & Gertrude, 2005: p. 3).

Developing countries with 84% of the world's population (in 1994) accounted for only 11% of all health spending. This shows the differences between developed and developing countries in terms of capacity and types of health services that can be

provided (Sheiber & Meida, 1999: p. 194). Like many developing countries Ghana has a narrow tax base due to its large informal sector and small industrial base, and is also reliant on donor support to augment budgetary allocations to the various sectors of the economy (Hsiao & Shaw, 2007; Carrin, 2002).

With many other programs also competing for these same resources, it is no surprise that budgetary allocations to the health sector are inadequate. To compensate for this the “Cash and Carry” system was introduced in the 1980’s to augment national health expenditure. By 2003, out of pocket payments accounted for 68% of total health expenditure in Ghana (McIntyre, 2010: p. 4). The effect of full cost recovery was to however decrease access to health centers for the poor “resulting in a decline in the utilization of services” (Sulzbach, Bertha & Gertrude, 2005: p. 3). To address this, the Ghanaian government “implemented the National Health Insurance in an effort to provide accessible, affordable, good quality healthcare to all Ghanaians” (Baltussen et al, 2006: p. 654).

HI “is recognized as being one of the powerful methods by which universal coverage is achieved with adequate financial protection for all against healthcare costs” (Carrin, Waelkens & Criel, 2005: p. 799).

3.6.1 The case for health insurance

“The objective of the National Health Insurance Scheme is to ensure equitable universal access for all residents of Ghana to an acceptable quality package of health services. It is based on a fundamental principle that inability to pay at the point of service should not prevent access to essential services” (DFID, 2002: p. 11).

Even though it may be argued that there is no single perfect health financing system, a social health insurance program that can cover all residents, if it is well implemented, is more equitable than the previous system of payment at the point of service. Given the high demand for good quality health care services and the under-

utilization of health services in the country, it is hoped the adoption of social health insurance will improve access to quality health care.

The system of health insurance called for the establishment of mutual health insurance schemes in every district in the country, with membership of the scheme drawn from residents of the district. With headquarters in each district capital, every scheme was expected to become operational with a minimum number of members as may be so determined by the National Health Insurance Council, a body with overall responsibility for the scheme nationwide. Private mutual health and private commercial health insurance schemes were also permitted to be established under this system (Sulzbach, Bertha & Gertrude, 2005; Baltussen et al, 2006). The relationship between the different types of HI schemes is graphically illustrated by Figure 3.2.

To become a beneficiary of the scheme, an individual will need to undergo a registration process with a health insurance provider in his or her district of residence. Included in the registration process is the payment of a premium by the individual, which makes the individual a member for a year. Upon completion of the registration process, the individual is given an insurance number and a photographic form of identification, entitling them to access health services from selected health providers in their district. Individuals are permitted to transfer their registrations to other areas when they relocate (NHI Regulations, 2004; Hsiao & Shaw, 2007).

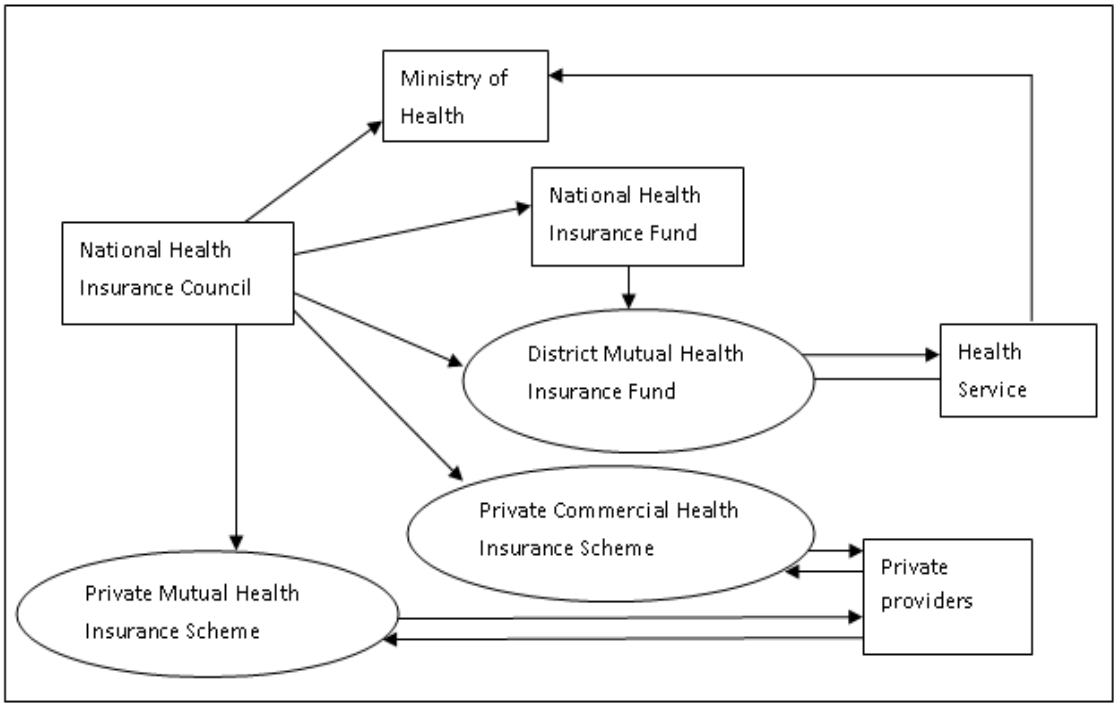


Figure 3.2: Interaction between administrative entities. Source Hsiao & Shaw 2007: p. 72

3.6.2 The national health insurance scheme

The National Health Insurance Scheme (NHIS) was established under Act 650 of 2003 and the National Health Insurance Regulations , 2004 (L.I. 1809) by the Ghanaian government to provide basic healthcare services to persons resident in the country through mutual and private health insurance schemes (Gobah & Liang, 2011). Beginning operations in 2005, it has a vision to be “a model of a sustainable and equitable social health insurance scheme in Africa and beyond” (NHIA, 2010: p. 5). The mission of the health insurance scheme is “to provide financial risk protection against the cost of basic/ standard quality healthcare for all residents in Ghana, and to delight our subscribers and stakeholders with an enthusiastic, motivated, and empathetic professional staff who share the values of honesty and accountability in partnership with all stakeholders” (NHIA, 2010: p. 5). Its core values are:

- Integrity
- Accountability

- Empathy
- Responsiveness
- Innovation

The corporate goals of the NHIS are:

- To attain a financially sustainable health insurance scheme.
- To achieve universal financial access to basic health care.
- To achieve stakeholder satisfaction.

The District Mutual, Private Mutual and Private Commercial Schemes are regulated by the National Health Insurance Council (NHIC), with the objectives of the NHIC being to: Register, license and regulate health insurance schemes; supervise the operations of health insurance schemes; grant accreditation of healthcare providers; and to monitor compliance with the government legislation that establishes and governs the health insurance scheme.

The structure of the NHIS is shown in Figure 3.3. “Act 650 establishes an independent national governing body for the scheme – the National Health Insurance Authority, whose mandate is to secure the implementation of a national health insurance policy that ensures basic healthcare services to all residents (Act 650, Section 2 (1)). Section 3 of the Act establishes the governing body of the Authority, known as the National Health Insurance Council (NHIC), which administers the National Health Insurance Fund. The President of Ghana is given sole power to appoint the chairperson and members of the Council (Act 650, Section 3 (2))” (Alfers, 2009: p. 17). The NHIC operates the scheme through regional offices in each of the 10 regions in the country. Each regional office in turn oversees a number of district insurance scheme offices located in every district within the region. Each district has a health insurance scheme, with some of the larger urban districts having several schemes.

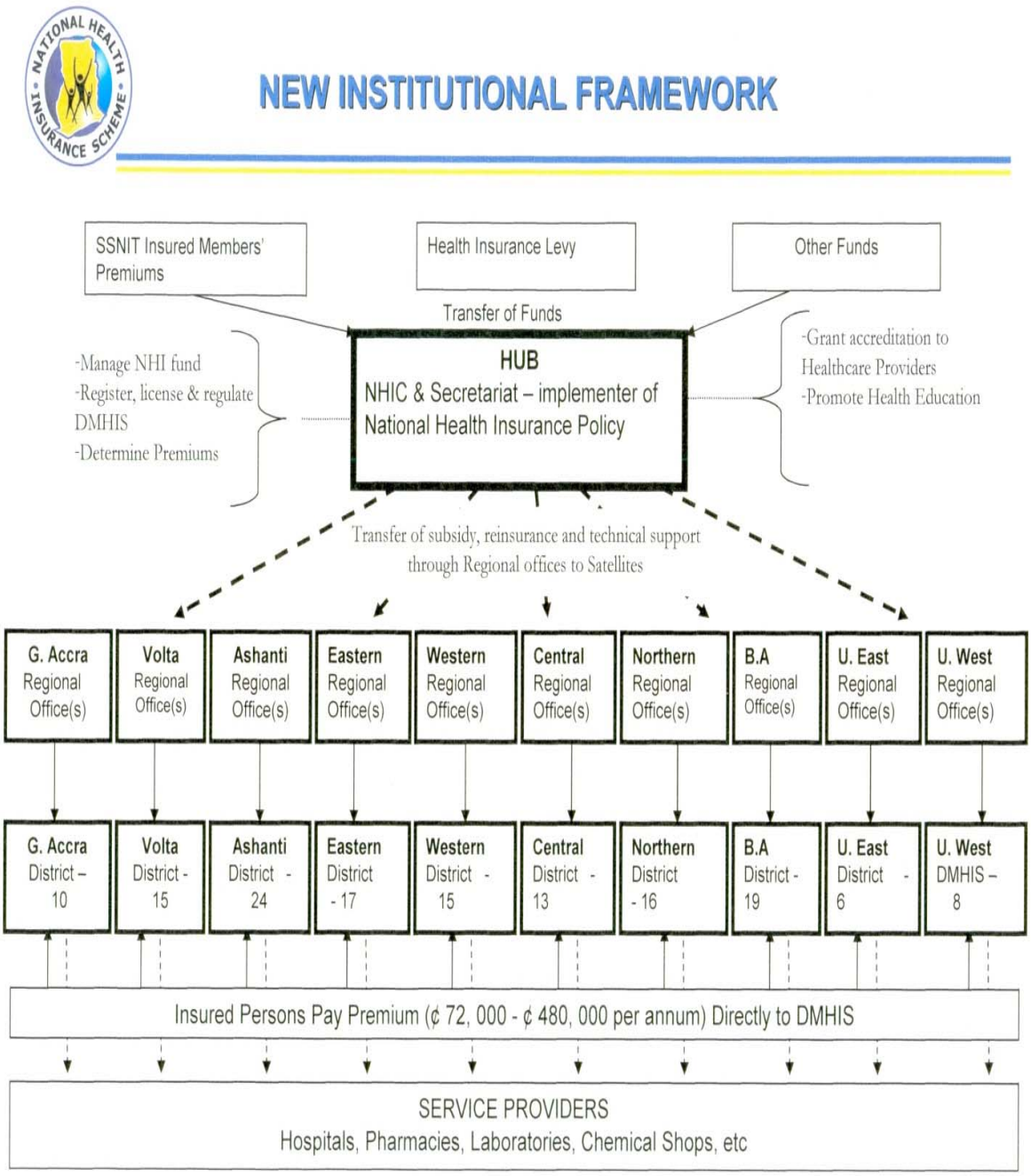


Figure 3.3: Structure of NHIS (*Source: Boateng, R. 2007. NHIS Presentation, Health Summit, Accra.*)

Each district health insurance scheme is managed by a board, elected by a General Assembly comprised of community health insurance committee members. The committee members exist officially to oversee the collection of contributions within its

designated Health Insurance Community, to supervise the deposit of these into the District Health Insurance Fund, and to represent community interests in the management structures of the district health insurance scheme (Alfers, 2009). Within each district health insurance scheme there are a number of departments namely the Accounts, Membership Registration/Data Entry, Claims Administration, Management Information Systems, and the Public Relations departments.

- Accounts: This department deals with financial transactions between the scheme members and providers. Monies are derived from field agents who go about and collect premiums from scheme members, and from members who also register at the office. Monies owed to service providers are also disbursed by the Accounts department.
- Membership Registration/Data Entry: They are mainly concerned with registering new clients for the scheme. This is done both through field officers who go around the catchment area of the scheme seeking to register people, or in the district offices. Most clients tend to want to be registered at the offices, since the general consensus is that obtaining your membership card is that much quicker done there. Field agents tend to keep the details of prospective clients until they have a sizeable number who have all paid their premiums before sending them to the office.
- Claims Administration: This department is concerned with reconciling claims made by health service providers for accuracy, and to determine if treatment guidelines are being followed. Where there are no problems found to be with a claim, the forms are then forwarded to the national head office for further approval, after which the service providers are reimbursed with the cost of treatment of the clients being claimed for. This department is one of the problematic areas of the scheme due to the large volume of claims that need to be processed, and the mainly manual systems that are being currently employed.
- Management Information Systems (MIS): The MIS department is mainly concerned with the maintenance of computer systems being used in the

scheme offices, and with the capturing of the data necessary for the production of identification (ID) cards for scheme members. Since ID cards are not produced by the individual schemes but at the headquarters, the MIS department also works on any problems that may occur to scheme members with respect to their cards. This includes activating new cards, obtaining temporary cards where the original is damaged or missing, and amending any data that an existing scheme member may need to update for example a change in address. The vast majority of the work done by the MIS department is of this nature.

- Public Relations (PR): They are mainly concerned with marketing the scheme to the general public, as well as signposting both scheme members and the general public to the appropriate departments for help needed when required. Membership drives and performance reports are also undertaken by this department.

Every department is headed by a manager, who in turn reports to the district scheme manager. The district scheme manager oversees the day to day administration of the scheme, and in turn reports to the regional manager, who also in turn reports to the national head office. All the departments have a number of national service personnel working in them in addition to the permanent regular staff of the scheme. National service personnel are citizens of Ghana, who are recent graduates of tertiary educational institutions that are bonded to work for the country after their education. It is compulsory for every citizen of the country and it was observed during the course of the field work that significant numbers of these personnel had been drafted in by the government to assist in the operation of the schemes. Most of them were mainly involved in doing menial work as many of them lacked the required skill to operate in that environment. Since they were also only there for a short period, it was difficult to properly train them, and for tangible improvements to be seen in the schemes during this period.

3.6.2.1 Growth trends in scheme usage

Since its inception in 2005 the membership of the NHIS has rapidly increased. With 1,348,160 active registered members in 2005 across the country, there were 8,163,714 active members of the district schemes by the end of 2010 in Ghana. This figure represents 34% of the total population of the country. Outpatient utilization of the scheme “increased by over twenty-eight fold from 0.6 million in 2005 to 16.9 million in the year 2010” (NHIA, 2011: p. 21).

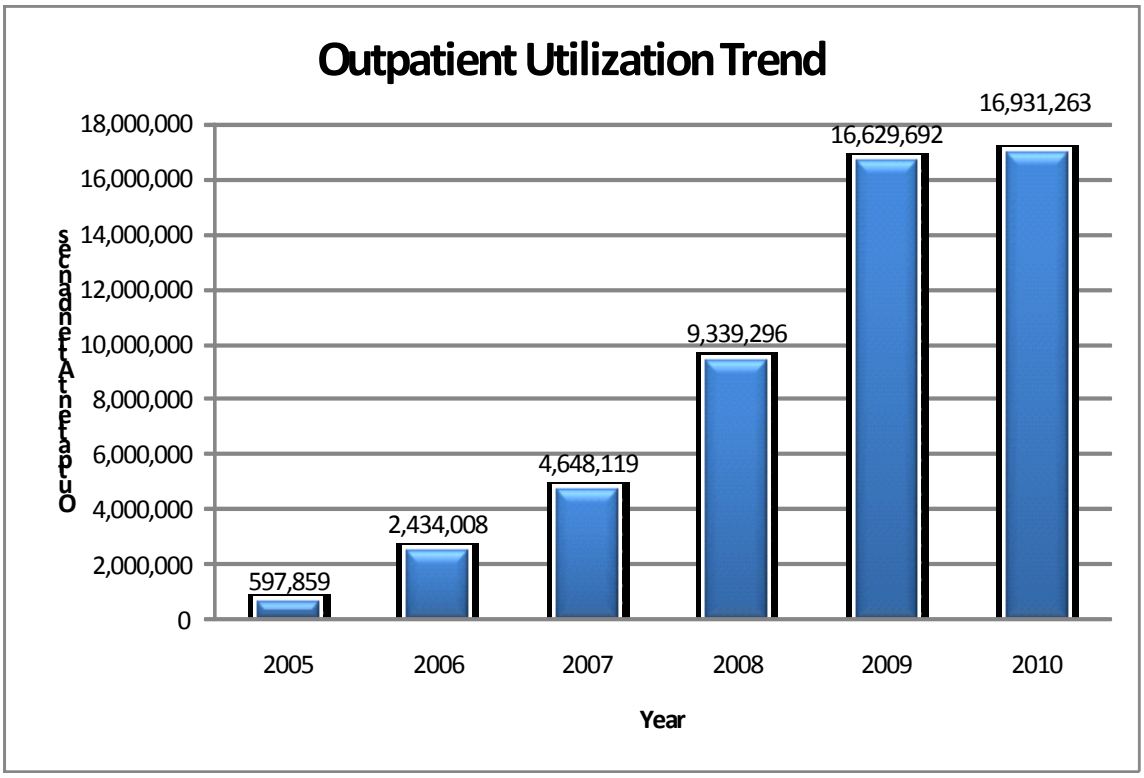


Figure 3.4: Outpatient utilization trend

Similarly inpatient utilization “increased over thirty fold from 28,906 in 2005 to 973.524 in 2009, but dropped to 724,440 in 2010” (NHIA, 2011: p. 22).

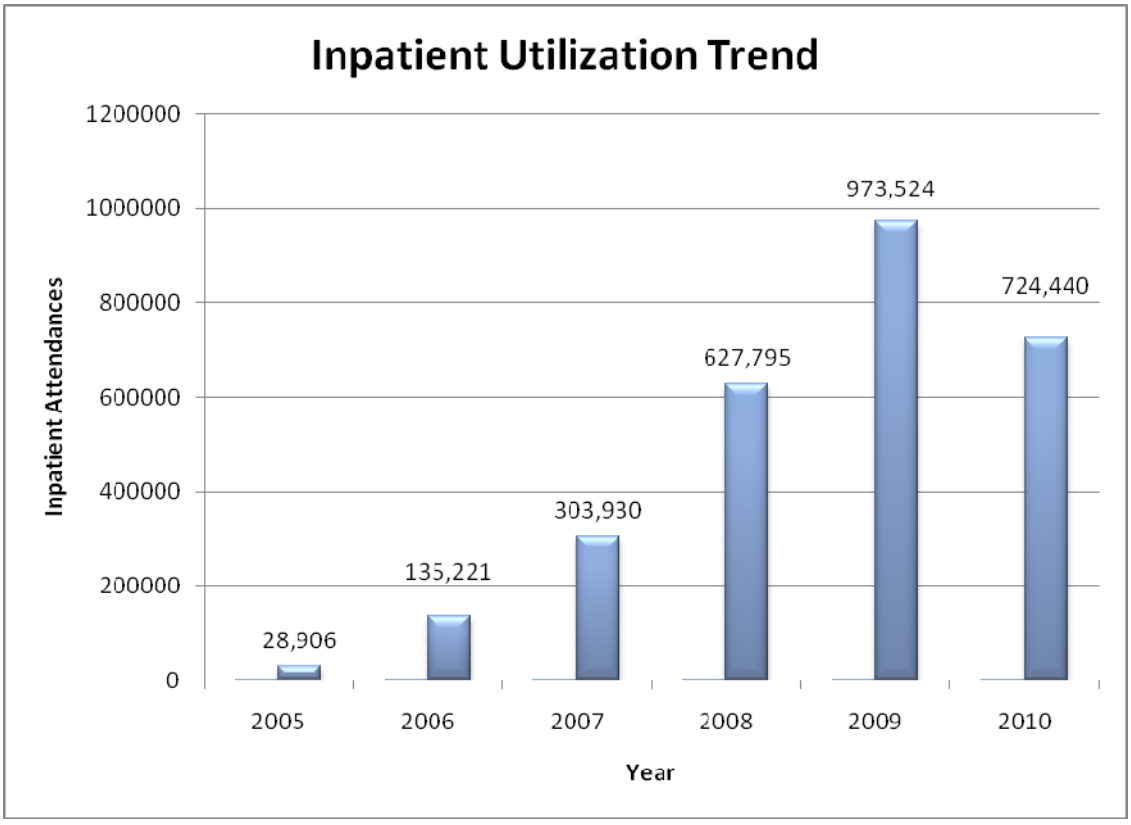


Figure 3.5: Inpatient utilization trend

This rapid increase in the membership and utilization of the scheme has put added pressure on the resources and information management systems of the schemes, which has in turn reduced their effectiveness. In visits by the researcher to the schemes talked about in this study, it was very common to see numerous stacks of documents waiting to be analysed or acted on, due to the nature of the information systems currently in use. This is illustrated by Figure 3.6 which is a room containing claims forms that have been sent to a rural based HI scheme, waiting to be validated and forwarded to the national head office for the claims to be reimbursed.

Figure 3.6: Claims processing at the Atwima district health insurance scheme office

3.6.2.2 Overview of the existing information management system

Even though information systems do not primarily require sophisticated technology for the management of data, they can be used to enhance their effectiveness and efficiency. There is currently no integrated computerised information system for the district health insurance schemes. There are however some computer based systems used in a couple of departments, namely the claims and membership registration departments. There is no network linking the various departments, but the systems in the claims and membership registration departments serve to facilitate the capture, processing and storage of data within those departments. These systems were developed using the Oracle platform. In addition to the Oracle based system, Microsoft Word and Excel was used in correspondence, accounting and in performing basic analysis on data. Data collection is mainly done by completing paper forms for entry into the system later, by landline telephone conversations and by face to face

contact. Telephone conversations mostly take place in urban areas, as there is very little landline telephone penetration in the rural areas.

As discussed in Chapter Two the rural urban technological divide means there are elements of technology available to HI schemes located in urban districts that are unavailable to those located in the rural districts. Figures 3.7, 3.8, 3.9 and 3.10 are examples of the interfaces of the current computer systems in use for membership registration and claims processing. Samples of paper-based systems in use for membership registration, premium collection and claims processing are located in Appendices C, D, E, G and H.

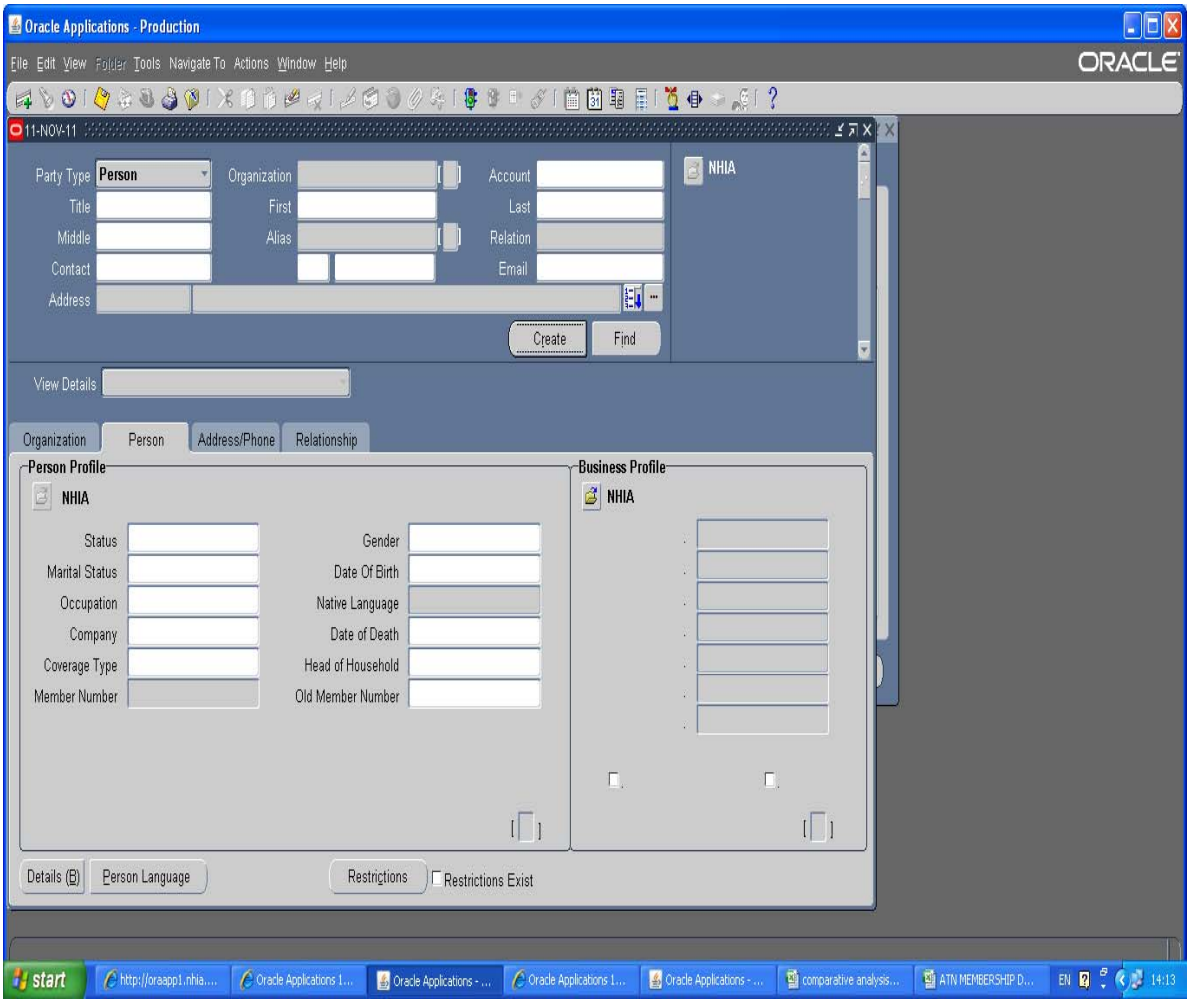


Figure 3.7: Membership registration main screen

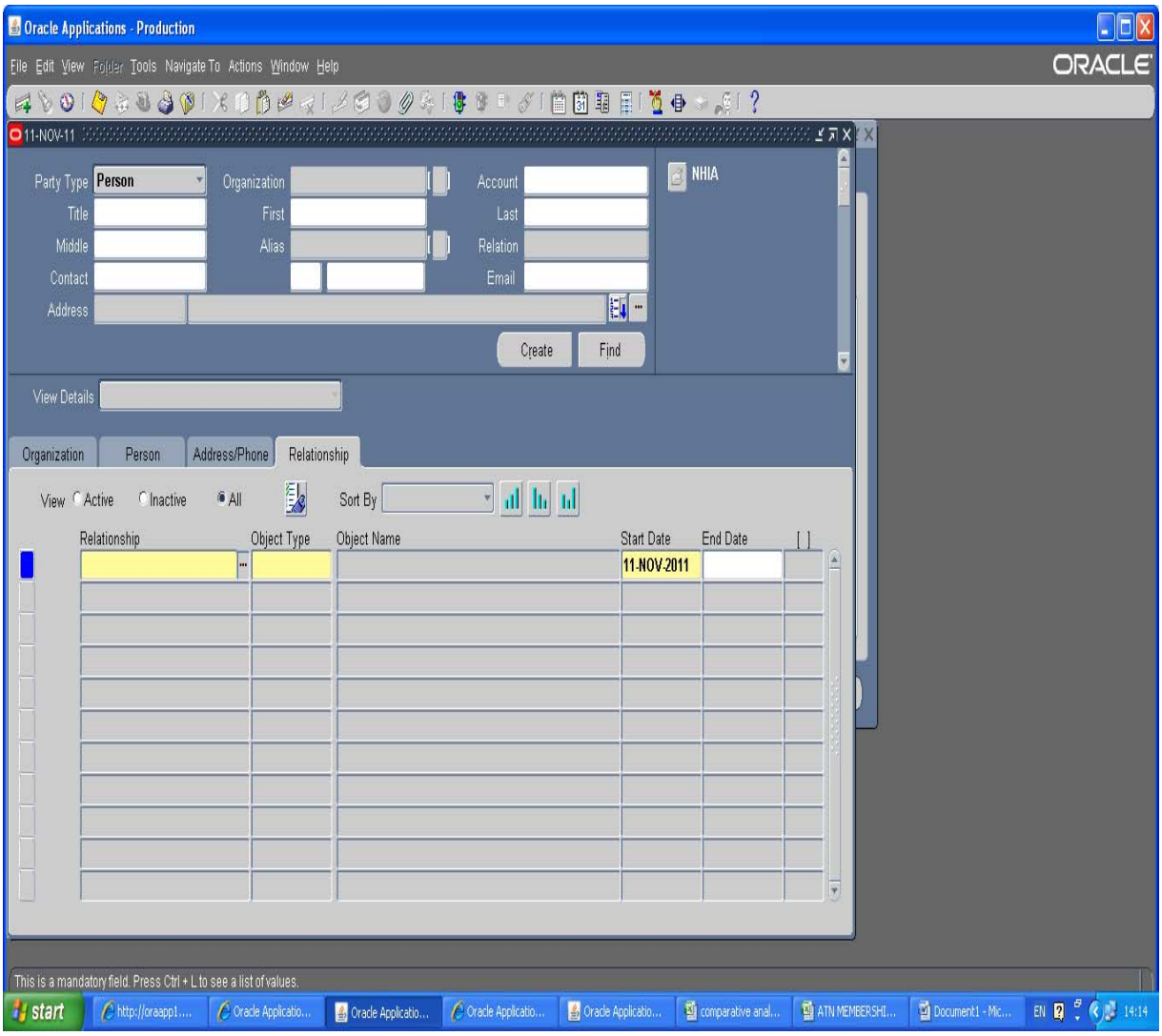


Figure 3.8: Membership registration secondary screen

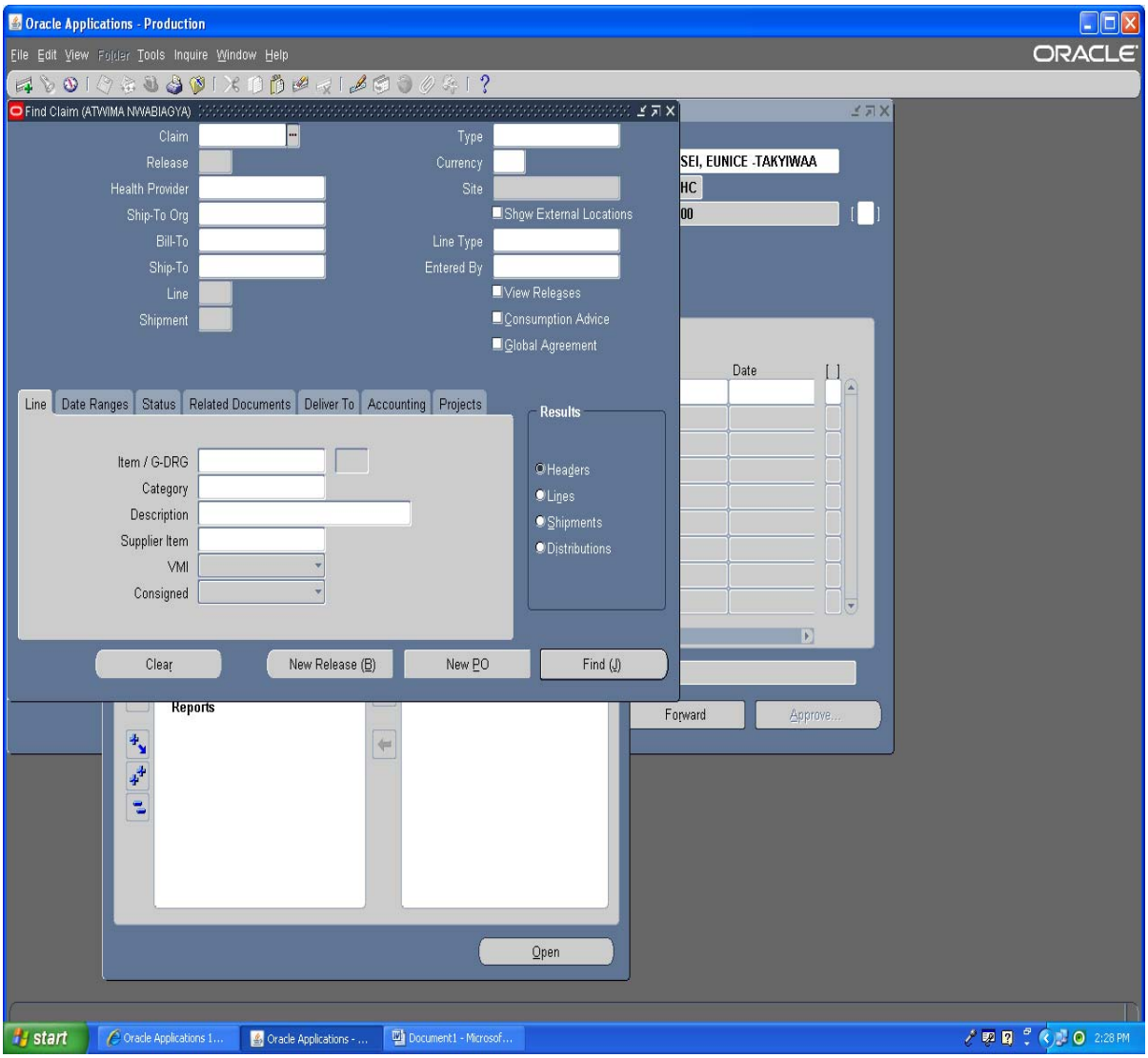


Figure 3.9: Claims processing main screen

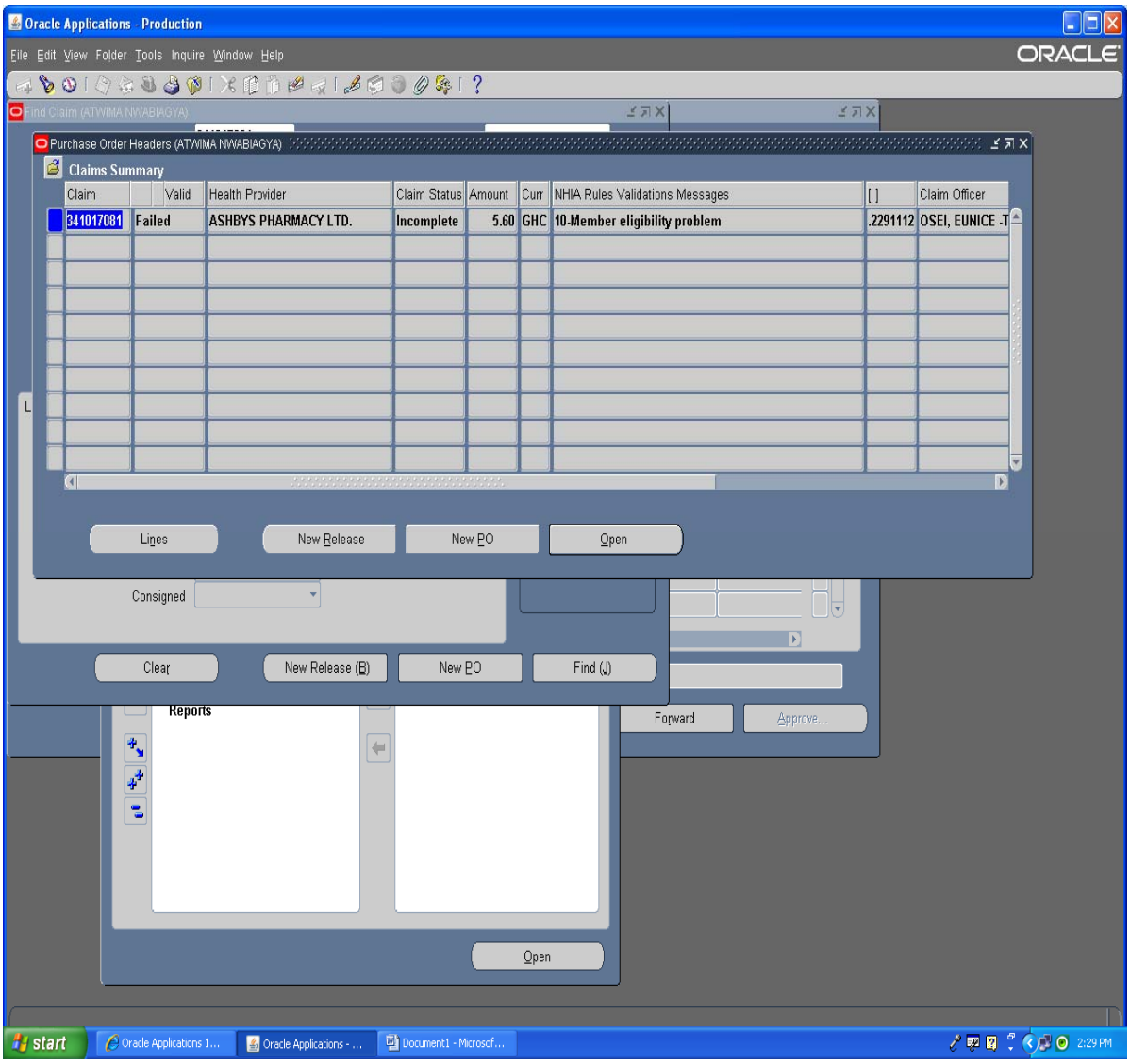


Figure 3.10: Claims processing secondary screen

3.7 Data flow in the current system

In this section, the processes undertaken by the various departments in the health insurance scheme will be explained to demonstrate the direction of the flow of information within the HI scheme, as well as the information systems employed in performing these processes. A process here is defined by the researcher as the sequence of events or activities undertaken by a combination of HI scheme staff, clients and service providers, that are brought together to deliver a particular result that can be identified as being critical to the operation of the HI scheme.

3.7.1 Tasks performed by the schemes

Within each health insurance scheme, the main processes undertaken include the following:

- Registration of members.
- Membership Renewal.
- Provider management.
- Claims Processing.
- Premium Collection.

3.7.2 Registration of members

The following steps are involved in the registration of new scheme member(s).

- Prospective member/family makes contact at any registration location. This could be at the individual's work place, home or at the scheme office.
- Identification is presented and validated.
- Eligibility is ascertained.
- Personal information is captured.
- Premium is calculated based on income if individual is not in exempt category.
- Premium is paid.
- Scheme membership card is generated.

This is demonstrated in the Figure 3.11:

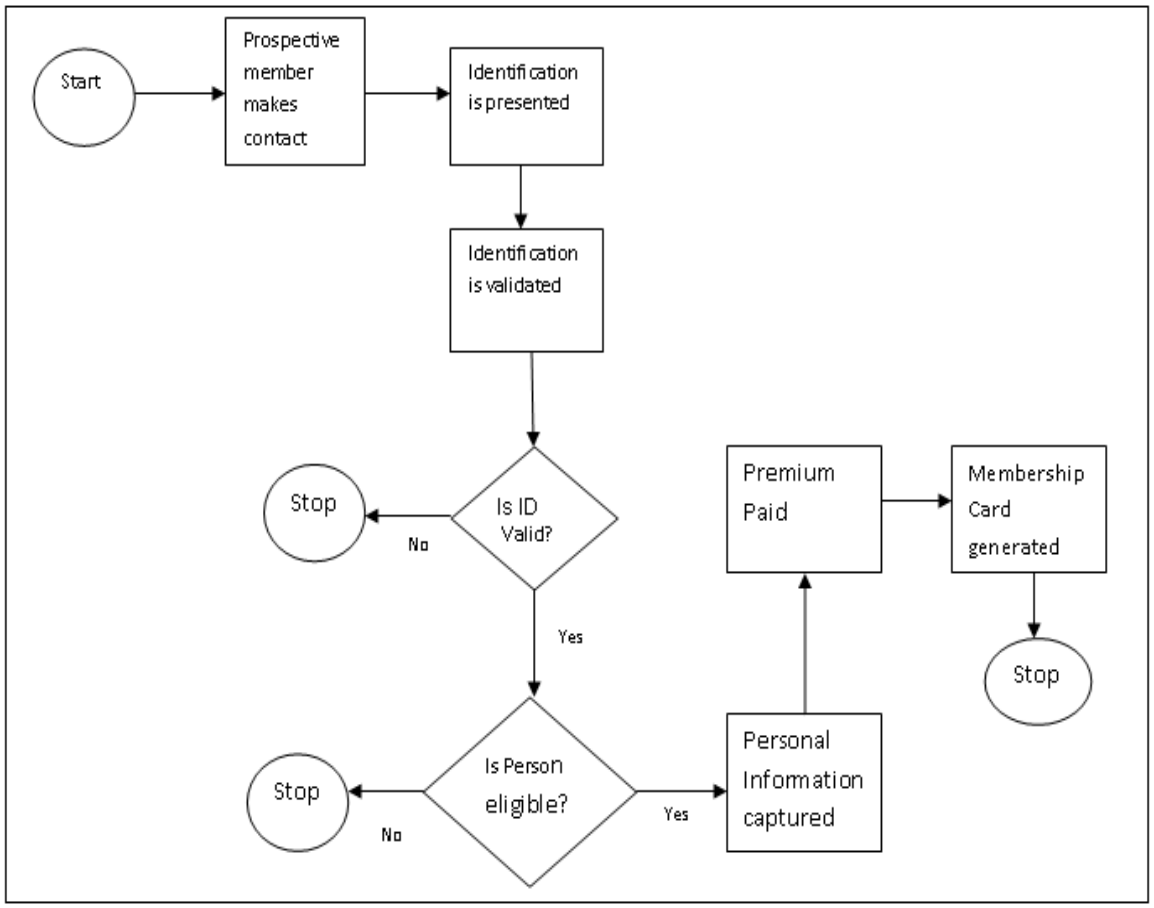


Figure 3.11 Flowchart of the membership registration process

The following data flow diagrams show the movement of data within the membership registration process. The diagrams show the various context levels at which the movement of data within the membership registration process can be demonstrated.

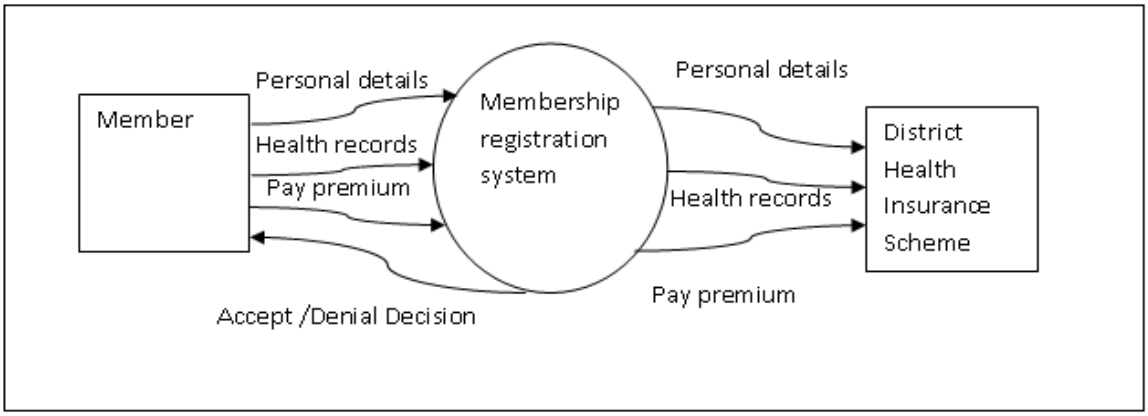


Figure 3.12: Level 0 context level diagram of the membership registration process

Every potential member inputs their personal details, health records and pays a premium before becoming a member of a district health insurance scheme. The precondition for payment is for their personal details and health records to be deemed acceptable.

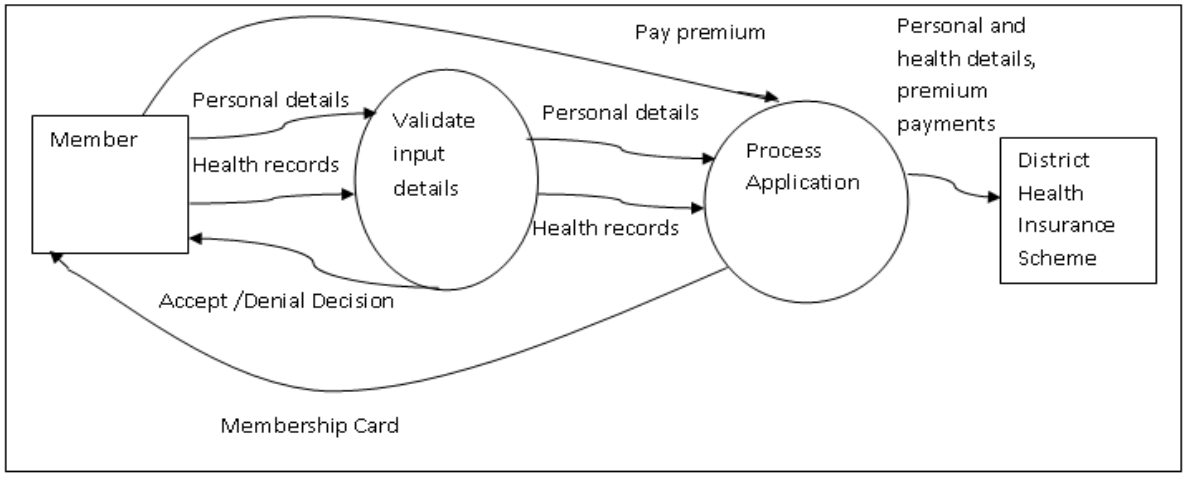
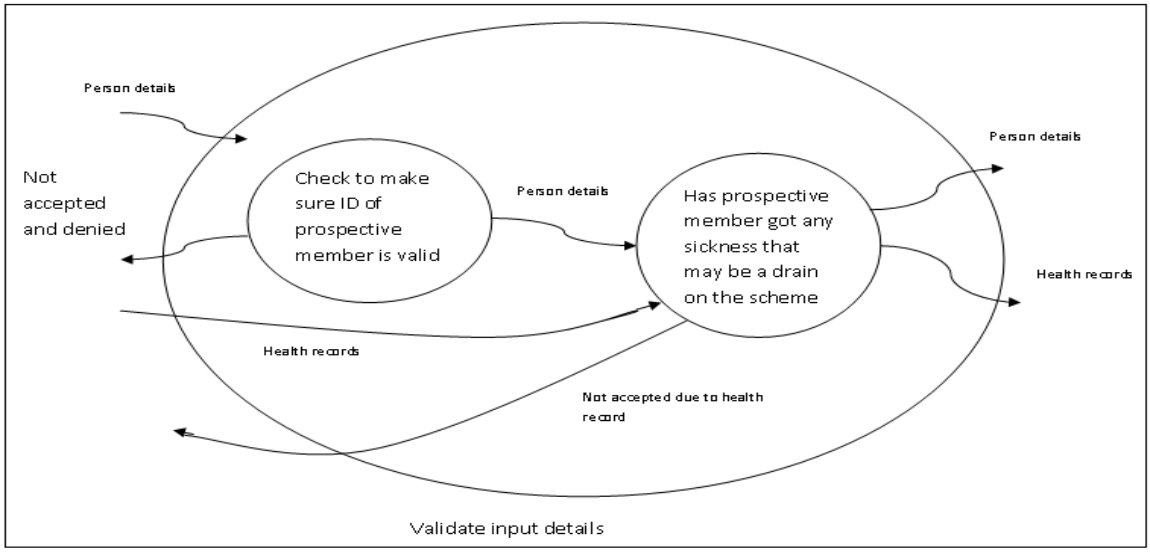


Figure 3.13: Level 1 context level diagram of the membership registration process

The membership registration system is made up of 2 parts. A person identification or details validation stage, and a process application stage.



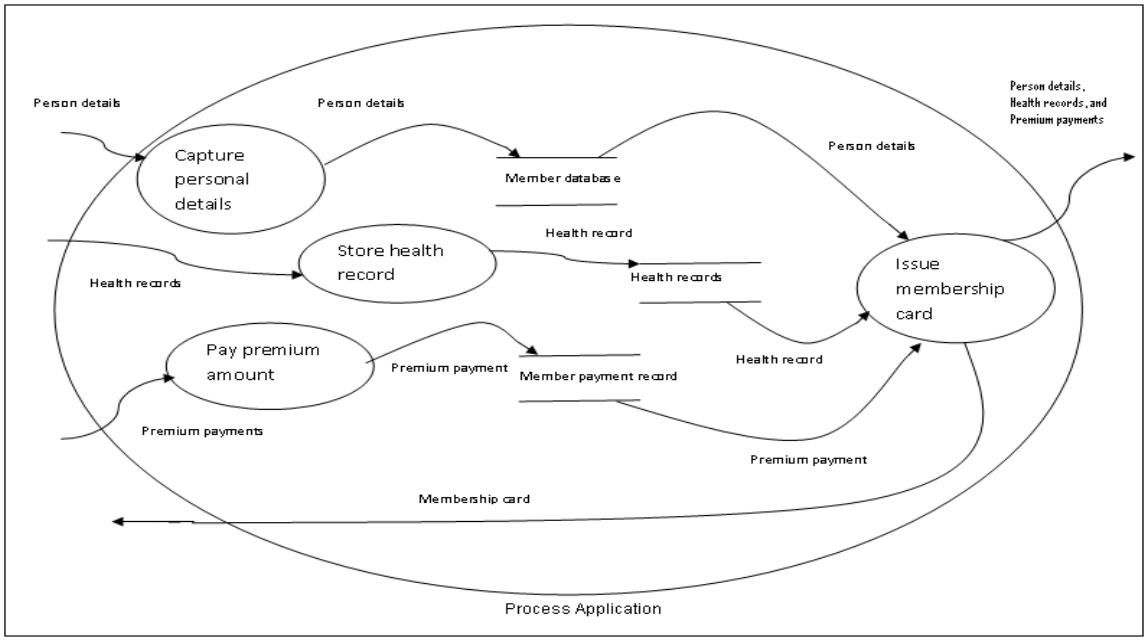


Figure 3.14: Level 2 context level diagrams of the membership registration process

At the validation stage the personal details and the health records of the individual are examined to see if they qualify for the scheme. Any paper documents verifying the individual's identity are manually examined, as well as that of any health records presented. Should they go successfully through this hurdle they move over to the process application stage. In the process application stage the personal details, health records and the premium payments of the individual is inputted into a computer database. If the individual's premium is fully paid up, he or she is given handed over to the MIS department for a membership card to be issued and begin using the schemes services.

3.7.3 Membership renewal

The renewal of the membership of an insurance scheme client for another year entails the following steps:

- Scheme member makes contact at district office.
- Membership ID is verified.
- Ascertain if premium is fully paid up.
- Member is sent to the MIS department, who has the authority to update client

details and records.

- Personal details updated if necessary.
- Dated hologram sticker is affixed to the back of card to show it is legitimate.

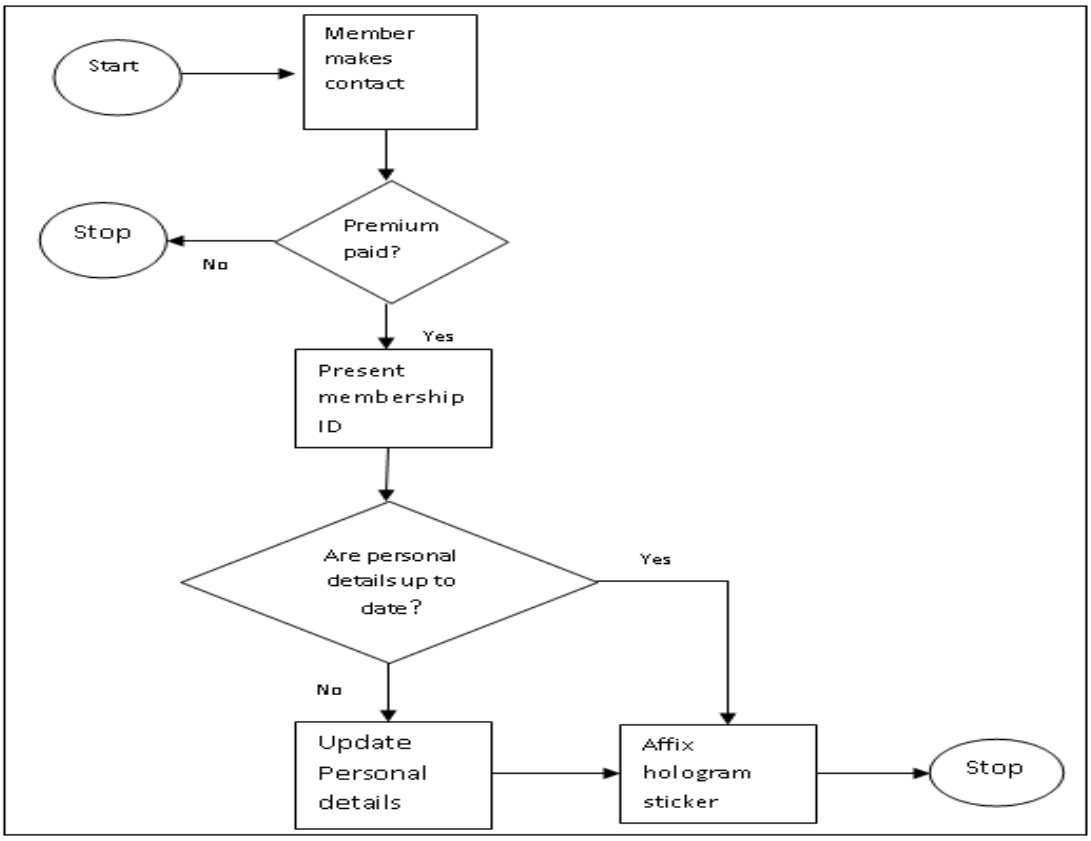


Figure 3.15: Flowchart of the membership renewal process

The following data flow diagram illustrates the flow of data within the membership renewal process.

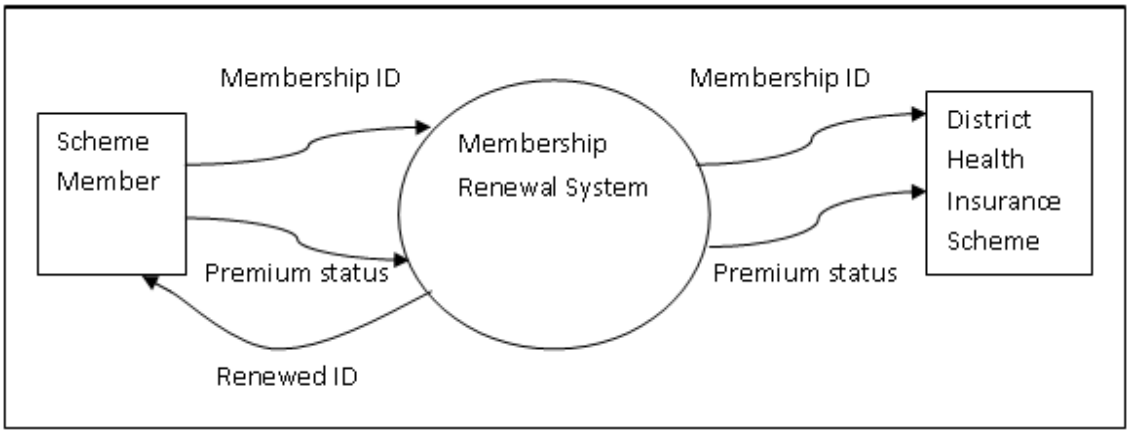


Figure 3.16: Level 0 context level diagram of the membership renewal process

The renewal of a client's membership for a year takes place only at the district office, and is carried out by the MIS department. After presenting their current membership ID, proof of full payment of the premium is required from the member. These are then cross-checked with the client's records on the scheme's computer database. The client's membership is then extended on the database for a further year following verification on the system of the member's full payment of the premium. A hologram sticker is then stuck on the back of the member's ID stating its validity. The client's personal details can also be updated at this time if it is required.

3.7.4 Claims processing

The processing of claims within the scheme comprises the following steps:

- Service provider completes claims form. The Claims form includes a schedule of the total cost of service, supplies, medicines and any other relevant attachments.
- Claims forms are aggregated and sent in batches to the district insurance scheme at the end of every month.
- Each completed forms then has to be validated for errors and then investigated to determine if the claim is within the accepted limits. If approved it is inputted into an electronic form and sent to the national headquarters. If it is accepted at the national headquarters, the claim is paid out to the district scheme, who in turn reimburses the service provider.

- If the claim is rejected it is sent back to the district office.

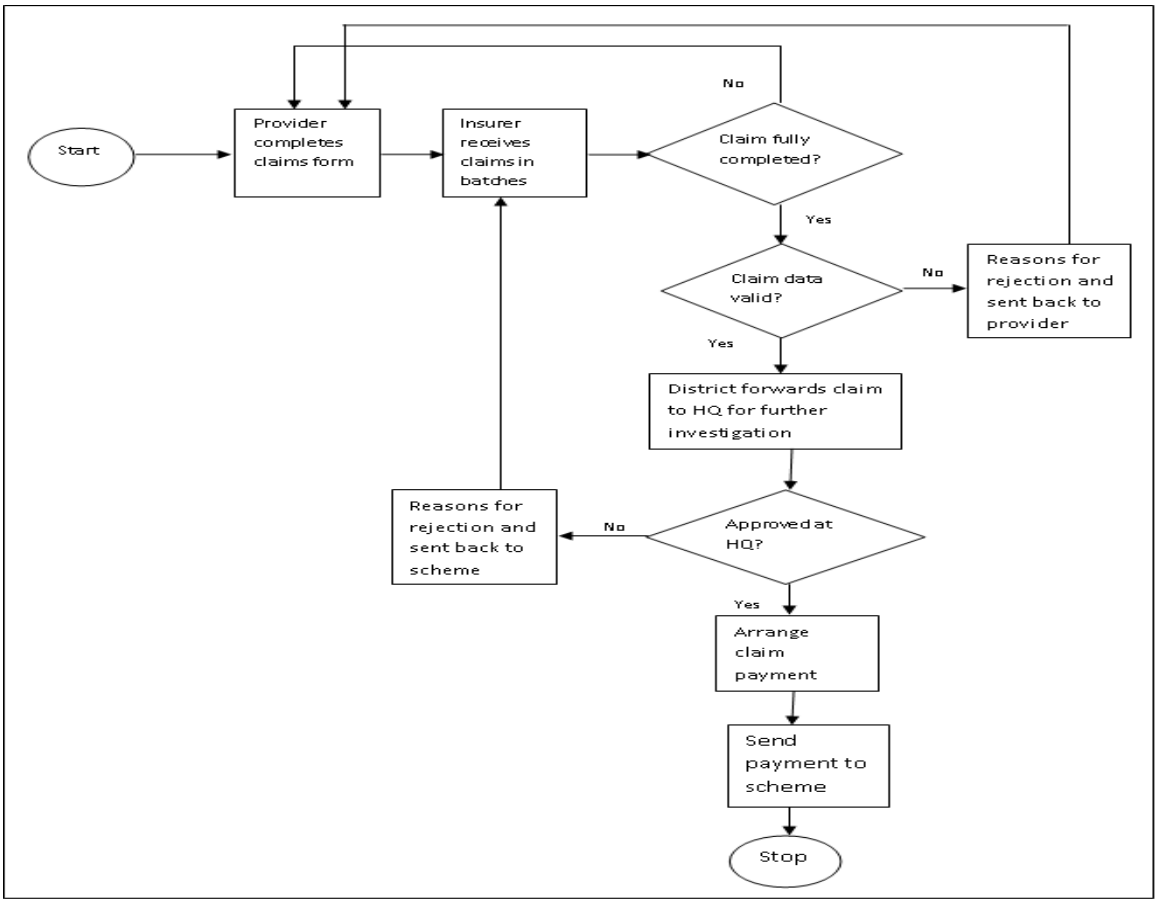


Figure 3.17: Flowchart of claims processing

The following data flow diagram illustrates the flow of data within the claims processing system.

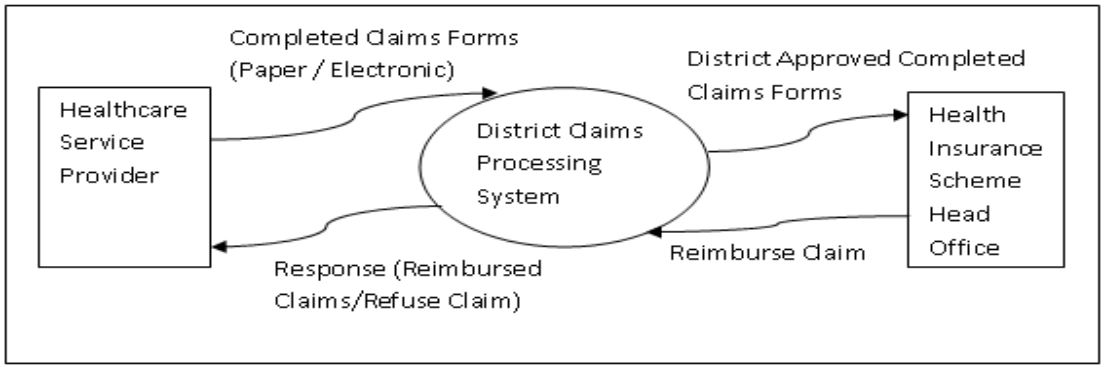


Figure 3.18: Level 0 data flow diagram of the claims processing system

3.7.5 Premium collection

The collection of premiums entails the following steps:

- Look through the list of beneficiaries.
- Identify if the member is liable to pay or is exempt.
- Identify premium rate of member.
- Find out if member is in arrears.
- Send reminder if member is in arrears.
- Update membership record and issue receipt if payment has been made.
- Allow member to proceed to MIS department for identity card to be prepared if payment is complete.

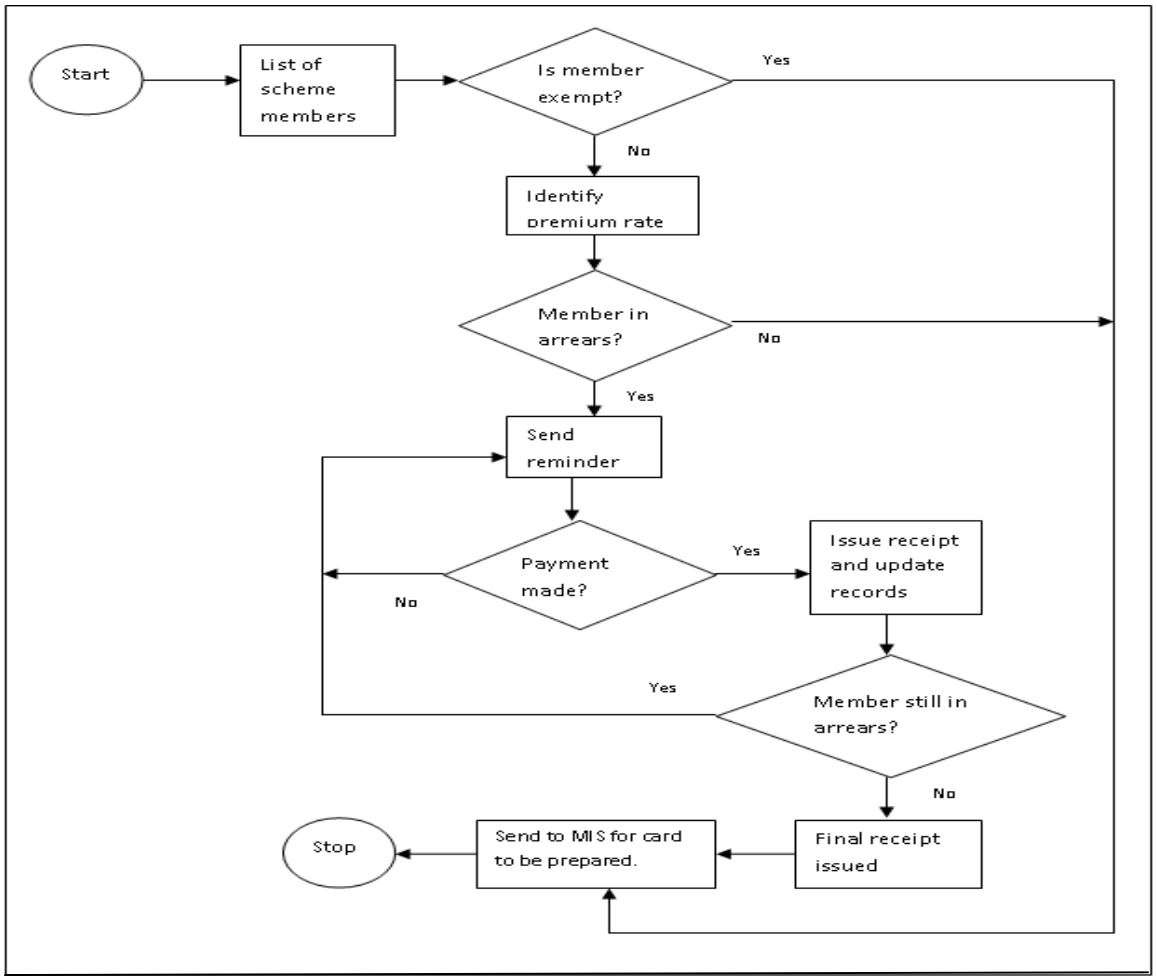


Figure 3.19: Flowchart of the premium collection process

The figure below is a data flow diagram of the premium collection process.

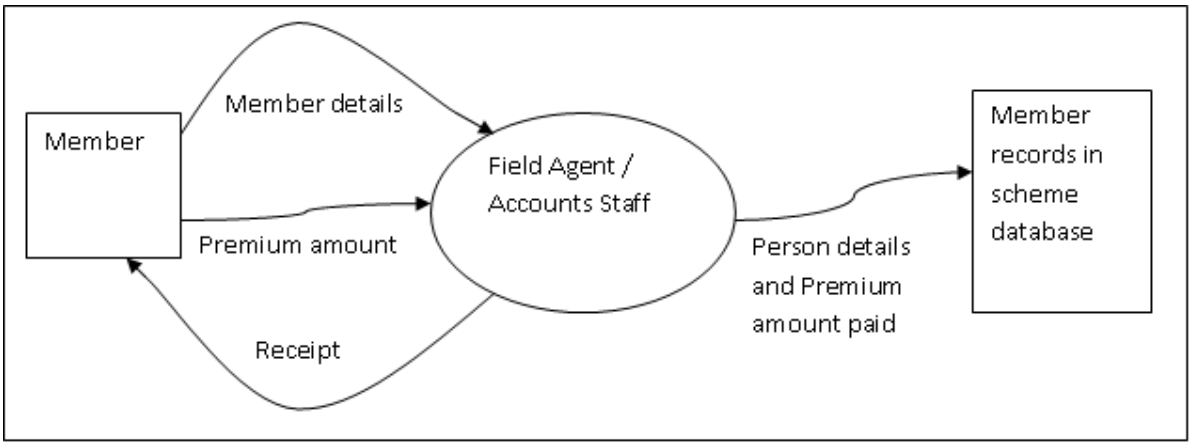


Figure 3.20: Level 0 data flow diagram of the premium collection process

Premiums are paid to either a field agent if payment is being done outside a district scheme office, or to a member of the accounts staff, if it is being done at the scheme office. Subsequent to this a receipt is issued to the scheme member.

3.7.6 Provider management

The registration of providers contains the following steps:

- The potential provider contacts a district scheme.
- Potential provider presents license to the scheme.
- Assess if potential provider meets the qualification criteria.
- If potential provider meets criteria, their details are captured.
- Registration fee is paid.
- Provider is registered onto the network if possible.

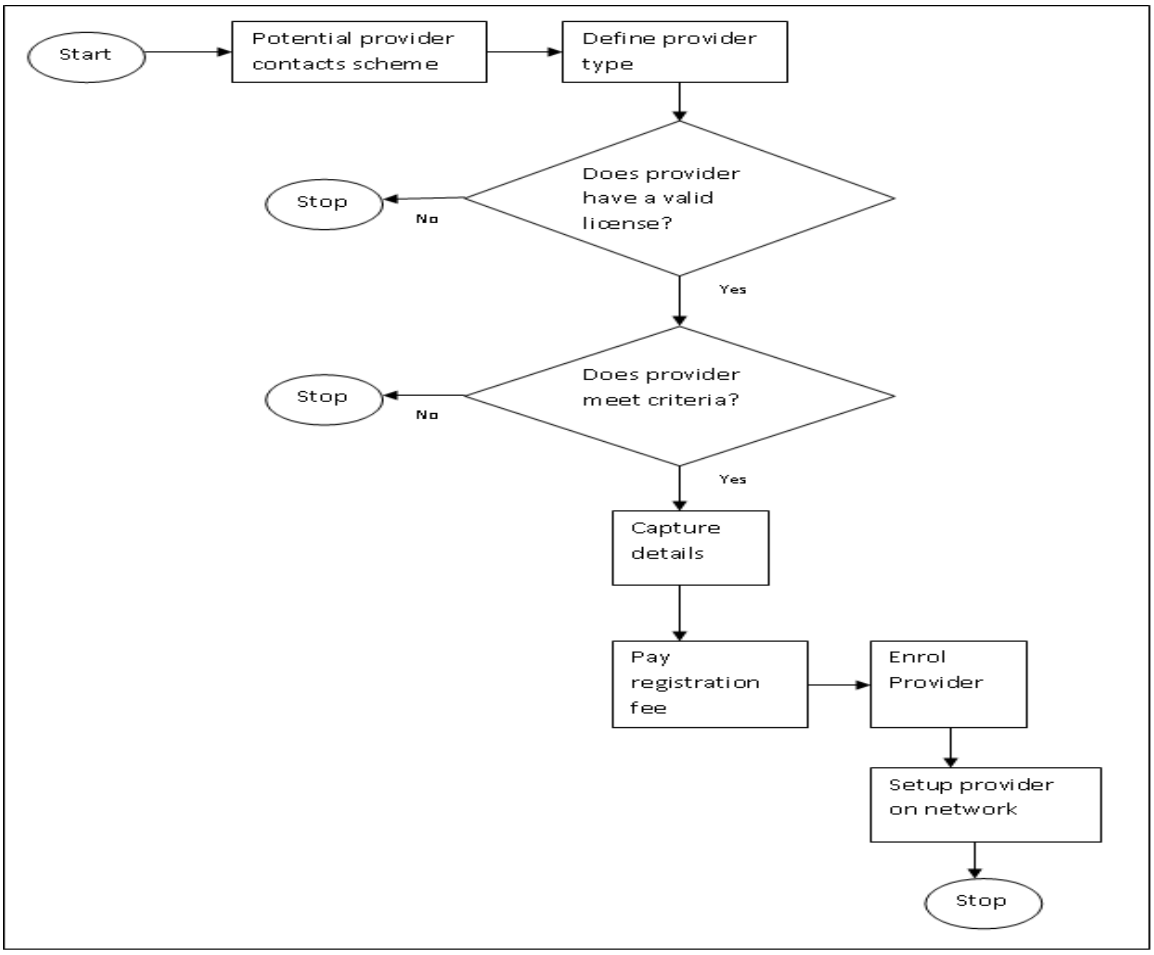


Figure 3.21: Flowchart of the provider registration process

The data flow diagrams below illustrate the movement of data within the provider registration process.

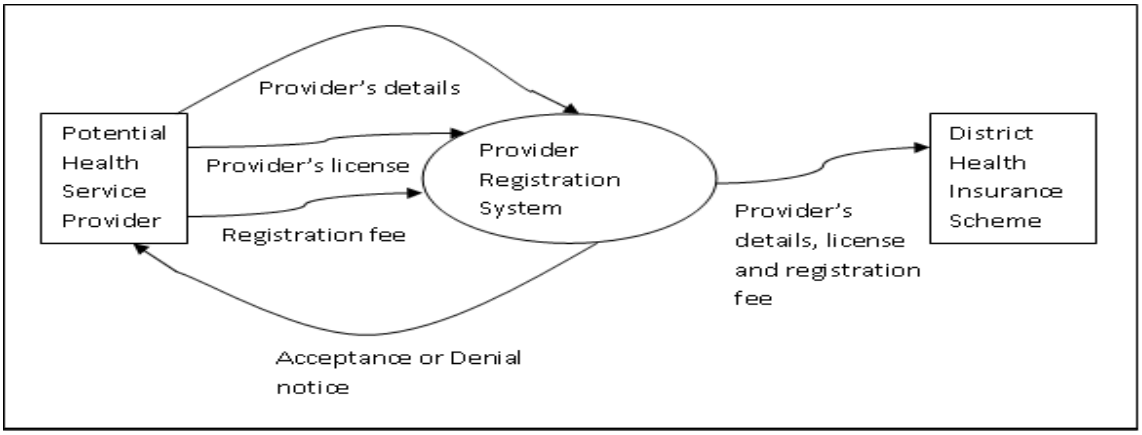


Figure 3.22: Level 0 data flow diagram of the provider registration system

Every potential health service provider provides their details, operating license and pays a registration fee before being accepted as a provider to the district health insurance scheme. The precondition for payment is for the providers details and operating license be acceptable and within the schemes requirements.

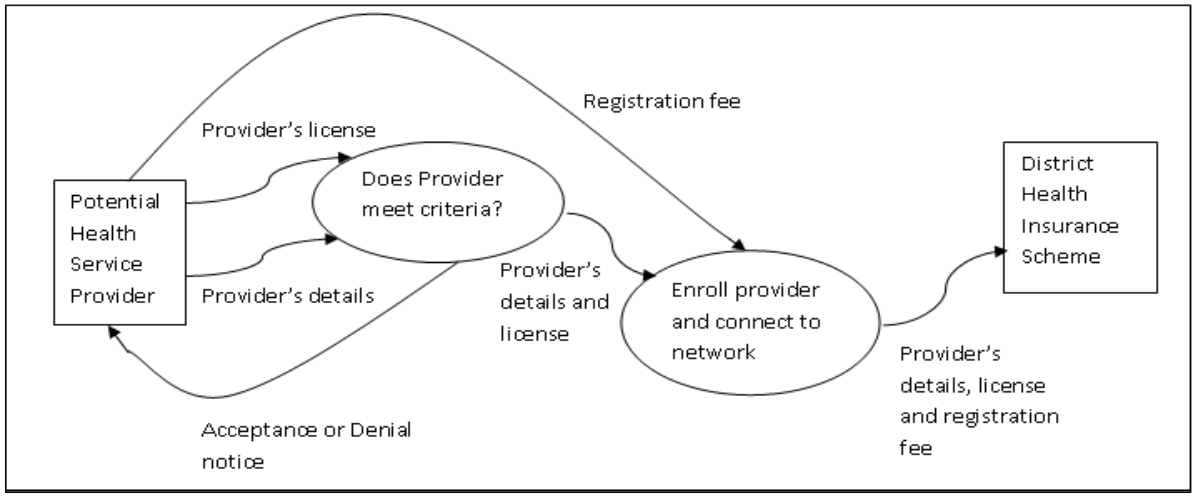


Figure 3.23: Level 1 data flow diagram of the provider registration system

3.8 Summary

The chapter has provided the necessary background to the research, giving an overview of the Ghana, the former health system, and the reasons for the introduction of the health insurance scheme. The chapter also presented an in-depth view of the various departments that are in operation within the HI scheme, in addition to an overview of the information system currently in place.

In conclusion, with the aid of flow charts and data flow diagrams, the final section of the chapter investigated the current information management model and indicated the processes and the movement of information within the district health insurance scheme.

The following chapter which examines the research methodology, will present the methodology employed in conducting this research, and will explain the use of a

mixed methods research approach to the study. In addition to this conceptual modelling and how it relates to the study is also presented.

Chapter Four - RESEARCH METHODOLOGY

4.1 Introduction

This chapter puts forward an appropriate research design for this study. The questionnaire, Interview and Observation techniques of data acquisition are examined, together with the advantages and disadvantages of each of them. The process adopted for data collection is described. In addition the limitations and strengths of the study, as well as the data preparation and how it was analysed are presented.

According to Yin (1994: p. 19), the research design, also known as the methodology, is the logical sequence connecting the empirical data to the initial questions of the study, and ultimately its conclusions. It can also be described as the way in the research was conducted in linking the results of the enquiry to the initial research question. Choosing the right methodology therefore is absolutely vital to the success of any given research study. Research methods on the other hand consist of all the techniques used in conducting the research. The methodology adopted in conducting any research may therefore employ a number of research methods. Kothari (2004: p. 8) further explains this by saying “when we talk of research methodology we not only talk of the research methods but also consider the logic behind the methods we use in the context of our research study and explain why we are using a particular method or technique and why we are not using others so that the research results are capable of being evaluated either by the researcher himself or by others.” The methodology chosen however is also influenced by the surrounding conditions, also known as the paradigm.

4.2 Research paradigm

Researchers are urged to position their work in a selected paradigm which according to Cibangu (2010: p. 177), “represents a philosophy or set of beliefs, worldviews, or values used to justify and put forth research priorities and choices”. Morgan (2007: p. 51) lists 4 different versions of the paradigm concept namely as “Paradigms as

Worldviews",”Paradigms as Epistemological stances", “Paradigms as Shared beliefs in a Research field", and “Paradigms as Model Examples". According to Morgan (2007: p. 50) “all four versions view paradigms as shared belief systems that influence the kinds of knowledge researchers seek, and how they interpret the evidence that they collect". The distinguishing feature between each of these four versions however is the level of generality of the belief system.

Four Versions of Paradigms				
	Paradigms as world views	**Paradigms as Epistemological stances**	**Paradigms as shared beliefs in a research field**	**Paradigms as model examples**
Defining characteristics	All-encompassing perspectives on the world, including beliefs about morals, values aesthetics.	Ontology, epistemology, and methodology from philosophy of knowledge	Shared beliefs about the nature of questions and answers in a research field	Relies on specific examplars of best or typical solution to problems
Place in social sciences	Common as nontechnical usage	Currently the dominant version	Relatively uncommon	Largely absent
Advantages	Recognizes role of personal experience and culture in science	Relies on well-known elements from philosophy of knowledge	Can be studied by examining the work of actual researchers	Very explicit, concrete
Disadvantages	Too broad, little direct relevance to research	Broad approach to knowing, less direct connection to research	Usually describes smaller research groups, not whole disciplines	Very narrow, limited applications
Defining characteristics	Little explicit use	Major impact	Minor impact	Little explicit use

Table 4.1: Versions of paradigms, moving from the most general to the most specific version. Source: Morgan, 2007

Of the four versions the dominant version within social science research methodology is Paradigms as epistemological stances. This “version of paradigms treats the best known epistemological stances (e.g., realism and constructivism) as distinctive belief systems that influence how research questions are asked and answered and takes a narrower approach by concentrating on one's worldviews about issues within the philosophy of knowledge….This approach builds on the insight that research inherently involves epistemological issues about the nature of knowledge and knowing." (Morgan, 2007: p. 52)

Within the version of paradigms as epistemological stances and despite minor variations the two main paradigms that underpin the design of research today are the positivist paradigm and the anti-positivist (or naturalistic) paradigm. “The two paradigms presented here are concerned with two concepts of social reality. While positivism stands for objectivity, measurability, predictability, controllability and

constructs laws and rules of human behavior, non-positivism essentially emphasizes understanding and interpretation of phenomena and making meaning out of this process". (Dash, 2005)

4.2.1 Positivist paradigm (Positivism)

The positivist paradigm stresses on observation and reason as the vehicle with which to interpret human behaviour. Based on the ideas of August Comte positivism argues that "true knowledge is based on the experience of senses and can be obtained by observation and experiment" (Dash, 2005). Dash (2005) further says of positivist researchers that their epistemology (defined as how we come to know (Trochim, 2006) must be understood within the framework of the principles and assumptions of science; the assumptions of which include determinism, empiricism, parsimony and generality. According to Dash (2005) in determinism events are caused by external circumstances and understanding them is vital for prediction and control. Empiricism entails the acquisition of data that can be verified to support theories and hypothesis. Parsimony is the "explanation of the phenomena in the most economic way possible". In generality the observation of a particular phenomenon is generalized to the world at large. These assumptions help to integrate and systematise findings into a theory or meaningful pattern.

4.2.2 Anti-positivism

In anti-positivism "knowledge is established through the meanings of the phenomena studied; researchers interact with the subjects of study to obtain data; inquiry changes both researcher and subject; and knowledge is context and time dependent" (Krauss, 2005: p. 759). Dash (2005) identified 3 schools of thought that mark anti-positivism namely phenomenology, ethnomethodology and symbolic interactionism. In phenomenology the behaviour of an individual is a reaction to ones interaction with phenomena, and rules out all forms of objective external reality. Human beings interpret and attach meanings to different actions and or ideas and subsequently construct new experiences during interactions with various phenomena. The researcher therefore has to develop an empathic understanding to know the process

of interpretation by individuals so that she can reproduce in her mind feelings, motives and thoughts that are behind the action of others. Ethnomethodology is concerned with everyday life and postulates that theoretical concerns pivot around the process by which "common sense reality is constructed in everyday face-to-face interaction" (Dash, 2005). The main interest is in the interpretation employed by people to rationalize social settings. Symbolic interactionism "emphasizes the understanding and interpretation of interactions that take place between human beings.... human beings interpret and define each other's actions instead of merely *reacting* to each other's actions.....Symbolic interactionists, therefore, claim that by only concentrating attention on individuals' capacity to create symbolically meaningful objects in the world, human interaction and resulting patterns of social organizations can be understood". Dash (2005)

Lincoln & Guba (2000) also observed the following differences between positivist and anti-positivist paradigms:

Positivist	Anti-positivist
Reality is single, tangible, and fragmentable.	Realities are multiple, constructed, and holistic.
Dualism: the knower and the known are independent.	The knower and the known are interactive and inseparable.
Time and context free generalization	Only time-and context-bound working hypotheses are possible.
Real causes, temporally precedent to or simultaneous with their effects (causal relationship)	All entities are in a state of mutual simultaneous shaping, so that it is impossible to distinguish causes from effects.
Inquiry is value free.	Inquiry is value bounded.

Table 4.2: Contrast between positivist and anti-positivist paradigms of research

Easterby-Smith, Lowe & Thorpe (1997) spelt out three reasons for the importance of having a philosophical base in conducting research. Firstly they argue that it would enable the researcher to adopt the most appropriate research strategy. Secondly,

they are of the opinion that adopting a particular philosophy enables the researcher to avoid unnecessary work by choosing the most appropriate methodology, earlier on in the study. Finally, it is argued that it has the potential to help the researcher to explore other methods previously outside their current scope.

4.3 Research strategy

Social science research basically consists of two approaches. These are the qualitative approach and the quantitative approach. Quantitative research is based on positivist philosophy, and according to Orlikowski & Baroudi (1991: p. 5) positivist studies “serve primarily to test theory in an attempt to increase predictive understanding of phenomena”. Quantitative data is mostly obtained from questionnaires and structured interviews, and is mostly numerical in nature. According to Seers & Crichton (2001), quantitative research is concerned primarily with populations, with data being obtained from a range of individuals. They further state that “one is therefore looking for general patterns for a population rather than at specific individuals” (p. 487). It is assumed in positivist research that an objective physical and social world exists independent of humans, and whose nature can be relatively unproblematically apprehended, characterized, and measured. “These origins are important because they influence the sort of questions asked, the type of data collected, how they are collected and then how they are analyzed and interpreted” Seers & Crichton (2001: p. 487). For example, organizations are understood to have a structure and reality beyond the actions of their members. Within quantitative research the period within which data is collected could potentially last for months. The actual time however spent with the people providing the data is relatively brief. When conducting structured interviews for instance the researcher may need to be in contact with the respondent if he is the one carrying the interview out. The data collection periods in such cases are relatively short. In some cases however when for example employing postal questionnaire surveys, there is no contact at all between researcher and respondent, and the period of data collection is relatively long.

As opposed to testing, supporting or rejecting theory in positivist research, interpretive (qualitative) research develops theories as part of the research process, and produces "an understanding of the context of the information system, and the process whereby the information system influences and is influenced by its context" (Walsham, 1993: p. 4-5). According to Klein & Myers (1999) a key task in interpretive research is seeking meaning in context - the subject matter must be set in its social and historical context so the reader can see how the current situation emerged. Qualitative research involves the use of qualitative methods to understand the data collected and analyzed during the research process (Bernsten, Sampson & Osterlie, 2004; Rowlands, 2005). Taylor et al (1995) point out that qualitative data is descriptive, and obtained from observation or unstructured interviews. "Qualitative research may or may not be interpretive depending upon the underlying philosophical assumptions of the researcher" (Myers, 1997). According to Myers (1997) qualitative methods include action research, ethnography and case study research. Myers (2009) also lists observation, interviews, documents and texts, and the researcher's impressions and reactions as qualitative data sources. Within the sphere of qualitative research, the methods employed require a relatively closer level of contact between the researcher and his data sources as compared to quantitative research.

The approach adopted in this study will be based on a mixed methodology, which combines both the qualitative (interpretive) and quantitative (positivist) approaches to research. Figure 4.1 summarises the sequence of methods employed in this study.

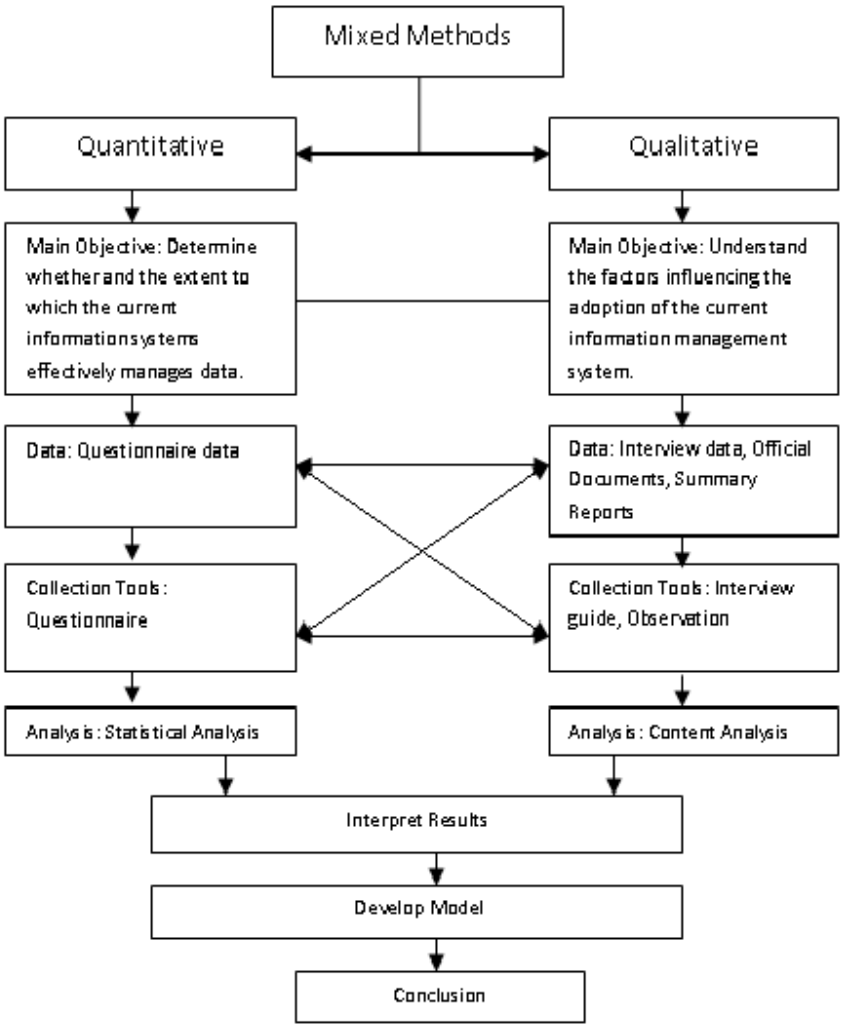


Figure 4.1 Summary of mixed methods approach used in this study (adapted from Danso Asante, 2006)

4.4 Mixed methodology

According to Jones (2004), a mixed methodology is a methodology that combines qualitative and quantitative data. Another definition for the mixed method approach to research as stated by Creswell (2003) is a study in which the researcher collects, analyzes, and integrates both quantitative and qualitative data in a single study or in multiple studies in a sustained program of inquiry. Johnson & Onwuegbuzie (2004) also defined mixed methods research to be the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study. Research carried out

using mixed methodology are not constrained by the usual methods of data gathering, but is guided by the foundation that underlies the research activity (Creswell, 2004).

Quantitative methodologies generally follow a natural science model of the research process, with emphasis on measurement when collecting and analysing data (Spratt, Robinson & Walker, 2004). Methods employed include surveys, structured interviews and structured observation. Qualitative methodologies major on the meanings rather than frequencies and distributions (Spratt, Robinson & Walker, 2004). Primarily qualitative research seeks to understand and interpret the meaning of situations or events from the perspectives of the people involved and as understood by them. Qualitative research methods include observation, unstructured and semi-structured interviews, and recordings. Thus for example both a semi-structured interview and a survey could be conducted on a group of respondents. Spratt, Robinson & Walker (2004) therefore observe that mixed method studies might include a survey followed up by detailed individual interviews, or observations used as the basis for constructing a questionnaire.

Mixed methods are emerging as a dominant paradigm in health care research (Doyle et al, 2009), and according to Brannen (2005) are being used increasingly in general research due to the following reasons:

- They present opportunities for skills enhancement,
- They also present opportunities for lifelong learning, and
- It is also an opportunity that deflects attention away from theoretical work often specific to particular disciplines.

As per figure 4.1 the outline being followed in this research would include both quantitative and qualitative methods of research. The two methods will give a deeper insight into the subject, than would have been possible with only one kind of research method.

There are two major types of mixed method approaches, namely the mixed model and the mixed method approaches (Traynor, n.d.; Mertens, 2005). In a mixed model approach both qualitative and quantitative approaches are mixed either within or across the stages of the research. An example of this would be where a questionnaire used in collecting data contains both open-ended (qualitative) and close-ended (quantitative) questions. In a mixed method approach however, within the context of a single study, there are separate and distinct phases of qualitative and quantitative methodologies in operation. A qualitative phase could for example be followed by a quantitative phase, all within the confines of the same study.

Mertens (2005) also identifies two forms of data collection namely Parallel and Sequential. In the Sequential form of data collection one type of data provides a basis for collecting another type of data, with priority usually given to the quantitative data (Creswell, 2003). The subsequent qualitative data can then be used to gain an insight into any unexpected results from the quantitative data. In the Parallel form also known as the Concurrent form, the two types of data are collected and analysed simultaneously. “In many cases qualitative and quantitative data is obtained from the same individuals, so they can be more easily compared.”(Driscoll et al, 2007: p. 20)

Creswell & Plano Clark (2007) identified Triangulation design, Embedded design, Explanatory design and Exploratory design as the four major types of mixed methods designs.

The Triangulation design according to Morse (1991, p. 122) is used "to obtain different but complementary data on the same topic”. Creswell & Plano Clark (2007: p. 62) posits that this design is most appropriate when a researcher seeks to directly “compare and contrast quantitative statistical results with qualitative findings or to validate or expand quantitative results with qualitative data”. The phenomenon under study by both methods (qualitative and quantitative) must be the same. Also known as the concurrent triangulation design (Creswell et al., 2003) it involves the separate collection and analysis of quantitative and qualitative data concurrently (in a single

phase). For example, qualitative methodology may be used to ascertain the views of nurse managers on a particular issue, and then compared with a survey of staff nurses' views (Doyle et al, 2009). "The researcher attempts to merge the two data sets, typically by bringing the separate results together in the interpretation or by transforming data to facilitate integrating the two data types during the analysis" (Creswell & Plano Clark, 2007: p. 64). Embedded design is characterised by having a dominant method, with the other data set providing a secondary or complementary role. Priority is given to the quantitative methodology, with the qualitative methodology being subordinate (Creswell & Plano Clark, 2007). Explanatory design begins with the quantitative phase and then the qualitative phase, with the aim of enhancing or explaining the qualitative results. "The researcher identifies specific quantitative findings, such as unexpected results, outliers or differences between groups that need further exploration using qualitative methodology. In contrast, the qualitative phase has priority in the participant selection model, and the purpose of the quantitative phase is to identify and purposefully select participants. The explanatory design requires a longer implementation time due to the sequential nature but is regarded as the easiest of the four methods to implement" (Doyle et al, 2009: p. 181). In Exploratory design, also known as sequential exploratory design, the first phase of the study (qualitative), helps to develop the second phase (quantitative).

4.4.1 Advantages of mixed research methods

According to Johnson & Onwuegbuzie (2004: p. 21) the following are some of the advantages for employing mixed research methods:

- Words, pictures, and narrative can be used to add meaning to numbers.
- Numbers can be used to add precision to words, pictures, and narrative.
- Can provide quantitative and qualitative research strengths
- Researcher can generate and test a grounded theory.
- Can answer a broader and more complete range of research questions because the researcher is not confined to a single method or approach.
- A researcher can use the strengths of an additional method to overcome the weaknesses in another method by using both in a research study.

- Can provide stronger evidence for a conclusion through convergence and corroboration of findings.

4.4.2 Disadvantages of mixed research methods

Johnson & Onwuegbuzie (2004: p. 21) also list the following as some of the weaknesses of mixed methods research:

- Can be difficult for a single researcher to carry out both qualitative and quantitative research, especially if two or more approaches are expected to be used concurrently; it may require a research team.
- Researcher has to learn about multiple methods and approaches and understand how to mix them appropriately.
- Some of the details of mixed research remain to be worked out fully by research methodologists (e.g., problems of paradigm mixing, how to qualitatively analyze quantitative data, how to interpret conflicting results).
- More time consuming.
- More expensive
- Methodical purists contend that one should always work within either a qualitative or a quantitative paradigm.

It is the aim of the researcher to employ “concurrent triangulation design” in conducting this research. Data will be obtained quantitatively through a questionnaire, and also qualitatively through semi-structured interviews, and observation. Within the field of healthcare research mixed methodologies are being increasingly employed. For example Foss & Ellefsen (2002: p. 242) posit in their study of mixed methods research in nursing research that the combination of quantitative and qualitative data “adds new perspectives to the phenomenon under investigation”. Another example of mixed methodology in healthcare research is Jenkins’ (2001) study of rural adolescent perceptions of alcohol and other drug resistance.

4.5 Questionnaire

A questionnaire is used to collect data in written format from a subject, and can be employed in various settings to collect information about the opinions and behaviour

of individuals (Williams, 2003: p. 245). Parfitt (1997) stated that “the questionnaire survey is an indispensable tool when primary data are required about people, their behaviour, attitudes and opinions and their awareness of specific issues” (p. 76). Since responses can easily be quantified and coded for more in depth analysis, they are a very useful tool in data collection.

There are many advantages in using questionnaires for data collection. Milne (2008) believes that since responses are gathered in a standardised way, responses are more objective and reduce bias. The problem of bias comes up either due to the personal interaction with an individual which could potentially divert the answer given either due to their presence or their level of skill in data acquisition techniques. Questionnaire responses could also be elicited from a large and a geographically dispersed group in a relatively quicker time when compared to other methods say the interview. As compared to interviews also, questionnaires are also less expensive. The cost of planning, sampling and mailing (for mailed questionnaires), and the cost of distributing questionnaires within a specified area is much cheaper than having to speak to everyone within the sample in the same area. Questionnaires can be used to maintain the anonymity of the respondents if they so require, this is especially important when dealing with very sensitive issues.

In spite of the advantages however, there are a few disadvantages in using this technique of data collection. Firstly due to their nature, questionnaires can be misunderstood if the questions are not straight forward. Secondly they do not offer a means to probe further. The responses have to be accepted as they are. There is also the potential of having a low response rate, and with the researcher not having access to the respondent, cannot be certain of the people who completed it.

4.6 Interviews

According to Polkinghorne (2005) the qualitative research interview is the most widely used qualitative research method. Fox (1997: p. 5) defined an interview as a technique of gathering data “involving verbal communication between the researcher

and the participant". Fox (1997: p. 5) also stated that interviews were used to "provide in-depth information about a particular issue or question", and according to (Suler, 1995) could be used to "confirm, enrich or even contradict the content of what the subject says". Kvale (2007) also defines the research interview as an exchange of views between two people, talking about a common subject they are interested in. Given that the life and experiences of individuals are not easily observed, the interview seeks to elicit from its participants first-hand accounts of their immediate surroundings, activities and actions from their perspective. According to Fox (1997: p. 5) an interview could be structured, in which case the answers of the interviewee are to specific questions, or unstructured, where the participant is given free rein to talk as he or she wishes.

One of the main advantages of interviews is that since the interviewer is present during the interview process, it is possible to collect nonverbal data and to clarify meanings of questions if the interviewees do not understand them. Interviewees are also not influenced by others in their groups. In a one-on-one setting the interviewee is free to be his or herself and speak more freely. Interviews also have a higher response rate, and provide more detail when compared to written responses (Pedhazur & Schmelkin, 1991: p. 132). Interviews also provide a platform for more detailed questions to be asked. The main disadvantages include the following; they can be very time consuming in their setting up, the interview process, transcribing, analysis and reportage. Another major disadvantage is that they can be very costly. High costs may be incurred in the selection, training and supervision and the general management of interviewees. Interviewer bias is also a major disadvantage in using interviews. The presence of the interviewer may in some cases cause the interviewee to say or do things that they would not normally do. Bias may also occur when the interviewer has some preconceived notion either about the subject or the interviewee. The lack of anonymity is also a disadvantage of the interview method.

4.7 Observation

Observation is a qualitative method of data collection, and defined by Marshall & Rossman (1989: p. 79) as “the systematic description of events, behaviours and artefacts in the social setting chosen for study”. According to Dewalt & Dewalt (2002: p. 7) it involves the “active looking, improving memory, informal interviewing, writing detailed field notes, and perhaps most importantly, patience”. Participant observation allows for definitions of terms used in interviews to be checked, to observe events that informants may be unable or unwilling to share, and to observe situations described in interviews, making them aware of distortions or inaccuracies (Marshall & Rossman, 1995). Dewalt & Dewalt (2002) suggested that observation may be employed to increase the validity of the study, as they may enable the researcher to have a clearer understanding of the context and phenomena under study. Observation can be a complex method of collecting data as it involves the researcher having to play a number of roles and use a number of techniques, including their five senses to collect data (Baker, 2006). Roles are defined by Chatman (1984: p. 429) as “the characteristic posture researchers assume in their relationship” with the phenomena or group under study. Baker (2006) explained that the role adopted by the researcher depended on the problem being studied, the phenomena or subject willingness to be studied, and on the researcher’s prior knowledge of or involvement in the subject’s world.

Gold (1958) provided four observer roles namely complete participant, participant as observer, observer as participant and complete observer that can be assumed in the field by researchers. Baker (2006: p. 174) explained that for instance “going into a new environment may require the researcher to adopt the role of complete observer, whereas studying a group in which she/he is already a member allows the researcher to adopt the complete participant role.” In a complete participant role the researcher is a member of the group being studied, but conceals their role from the group to avoid disrupting the group’s normal activity. In a participant as observer role, the researcher is a member of the group being studied, but also makes the group aware of the ongoing research activity. The researcher in this instance even though a part of the group is more interested in observing that in participating. The observer as participant

role requires the researcher not to be a member of the group, but participates in group activities to collect data and gain a deeper insight into the group's activities. In the complete observer role, the researcher is completely hidden from view whilst observing, or when in plain sight, the group being studied is unaware they are being observed.

The advantages of using observation include that it increases the richness of the descriptions in a study. It also provides opportunities for viewing or participating in unplanned events. Observation also improves the quality of data collection, interpretation and facilitates the development of new research questions (Demunck & Subo, 1998; Dewalt & Dewalt, 2002; Kawulich, 2005). Amongst the disadvantages is that researcher bias can cause the design of the study to be biased. The beliefs, philosophy and attitudes of the observer can potentially obscure his objective view of the subjects under observation. Also the subjects under observation may either not be credible or not representative of the larger population. Observation may in some cases be very time consuming and labour intensive. The presence of the observer may also influence the subjects being observed.

4.8 Selection of study region and districts

Ghana is divided into 10 administrative regions, which are further subdivided into 170 districts. There are three types of districts in the country namely metropolitan, municipal and ordinary districts. Metropolitan districts are densely populated urban districts with less populated surrounding areas. A metropolitan district comprises a number of sub-metropolitan districts. Sub-metropolitan districts are roughly the same as municipal districts, but are a part of the metropolitan district. Municipal districts are urban administrative areas, but much smaller in size than metropolitan districts. Almost every sub-metropolitan district and ordinary district operates a health insurance scheme. Given the time and logistical constraints it would have been impossible for the study to focus on all the regions as well as each district within the regions. For the purpose of the study therefore, the Ashanti region was deliberately selected. The region has features which make it suitable for the research. The

researcher's prior knowledge of the area, demographic data, the fact that it is the region with the largest number of schemes, and also that it is the region with the highest number of scheme members are all features of the region which cannot be ignored. The location of the region at the centre of the country, and the wealth of the region make it an attractive location, and has resulted in the arrival of large numbers of peoples from other regions in the country migrating into the region to settle. This has helped in no small terms to make the region the most populous in the country.

The last nationwide census carried out in 2010 stated the population of the region to be 4,725,046 out of a total national population of 24,233,431. This means almost 20% or 1 in every 5 Ghanaians is resident in the Ashanti region. There are currently 27 districts in the Ashanti region, of these Kumasi –the regional capital, with an estimated population of 1.773 million (CIA, 2012) – is a metropolitan district and has 10 sub-metropolitan districts under it. The sub-metropolitan districts are Asokwa, Suame, Subin, Oforikrom, Manhyia, Tafo, Nhyiaeso, Kwadaso, Bantama and Asawase. The Ashanti region also contains 6 municipal districts, and 20 ordinary districts.

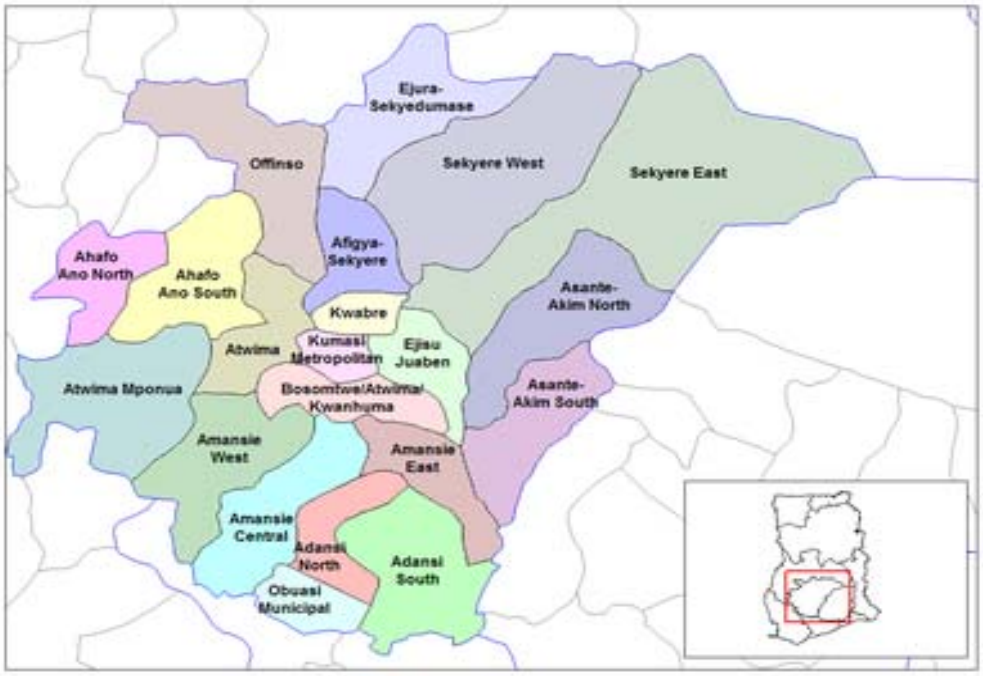


Figure 4.2: District map of Ashanti. Source: http://en.wikipedia.org/wiki/File:Ashanti_districts.png

Of the total number of registered clients in the country which totalled 8,163,714 as at the end of the year 2010, 1,585,097 (19.4%) of them were resident in the Ashanti region. This makes the region the leading region in terms of clients, resources used, and employees employed within the scheme. The total number of clients nationwide represents 34% of the country's population. The table below shows the number of new members, renewing members and the total number of active members distributed by region.

Region	2010 New Members	2010 Renewals	2010 Active Members
Ashanti	606,349	978,748	1,585,097
Brong Ahafo	323,092	691,462	1,014,554
Central	303,592	189,125	492,717
Eastern	316,861	613,482	930,343
Greater Accra	492,443	469,012	961,455
Northern	349,899	421,436	771,335
Upper East	238,935	278,932	517,867
Upper West	158,911	202,154	361,065
Volta	263,050	318,255	581,305
Western	466,458	481,518	947,976
Ghana	**3,519,590**	**4,644,124**	**8,163,714**

Table 4.3: New, renewing and total active members of the NHIS distributed by region. Source: NHIS 2010

The selection of the Ashanti region was based on pragmatism, availability and access to the data the researcher intended to gather for the research. Firstly, the researcher had a very good knowledge of the region and its health and socio-economic conditions, having lived, been educated, having worked and also having conducted a prior study in the region. This prior knowledge played a large part in selecting the region. Secondly the researcher had some very useful contacts in the region, which greatly helped in the collection of data. The researcher was previously employed in a firm which was involved in introducing the health insurance scheme into certain districts within the region. The contacts made, some of which were kept helped the researcher to access people and data that would have probably not have been so readily available. Finally, even though English is the national language of the country, Twi is the local language that is most widely spoken in the region. A language that the researcher is very fluent in. With many people especially in the rural areas speaking

very limited English, the knowledge of the local language and the ability to engage people in it would be of great assistance in helping to complete the survey.

Utility services are adequately provided in the region, but are largely unavailable to large parts of the population, due to their inability to pay for it. The availability of telephone facilities and the use of ICT in general are limited to major towns in the districts, with the appreciation of the benefits and uses of ICT among the population at a relatively low level. The use of ICT in health service delivery in the region is very much a reflection of the general situation across the country; it is non-existent. Information collection and dissemination on health data is done using paper based systems, with computer use largely limited to word-processing. In spite of the presence of the necessary infrastructure for the provision of Internet and other network facilities, they are very rarely used in either private or public health care delivery.

The 9 districts chosen for the survey were purposively sampled. They are the Kwabre East, Atwima Nwabiagya, Sekyere East, Offinso North and Sekyere South districts. The others are the Ejisu Juaben municipal district, Asokwa, Bantama, and Subin sub-metropolitan districts. Purposive sampling entails the choice or selection of subjects for a study based on specific qualities or characteristics that they possess. The researcher upon deciding what needs to be known goes out to find the people who can and are willing to provide the needed information either by virtue of their knowledge or the experience they possess in the subject under study. According to Patton (1990) where the researcher has a purpose in mind, has limited time and resources, and is not primarily concerned with the numbers of people included in the survey, (proportionality) purposive sampling can be a very effective tool in getting the work done. The main weaknesses of purposive sampling are that “samples are not easily defensible as being representative of the population due to the potential subjectivity of the researcher” (Black, 1999: p. 118). In employing this method of sampling it is imperative therefore to make sure that samples are not selected based on the convenience of the researcher. Whereas purposive sampling is based on the

ability of the sample to provide rich information, convenience sampling considers mainly time and cost factors.

4.8.1 Rationale for selecting districts in Ashanti region

Of the 9 districts selected for the study, 5 of them are ordinary districts, 1 is a municipal district, and the remaining 3 are sub-metropolitan districts. Since 2007, over 50 new districts have been added to the total number of districts in the country. Many of the new districts are as a result of the division of districts into smaller administrative sizes. With the result of the most recent census (2010) in the country yet to be published there is a dearth of specific published demographic information on some of these districts.

4.8.1.1 Ejisu-Juaben

Ejisu-Juaben covers about 10% of the Ashanti region, and measures an area of approximately 637.2 sq km. The district has the urban town of Ejisu as its capital. The urban settlements within the district are Ejisu, Juaben, Kwamo, Fumesua and Bonwire. These urban settlements account for 30.2 percent of the population in the district, with the remainder of the population located in 79 other rural settlements scattered across the district. The district can also be described as peri urban in nature, with its proximity to the largest urban settlement within the region (Kumasi), attracting an increasing number of in-migrants looking for lower accommodation costs to the area. As at 2006, the total population of the district stood at 144,272 with the district capital Ejisu having 9.2 percent of the total population. Population density was also estimated to be 138 persons/sq km.

Ejisu is bordered by six other districts, and is located in the central part of the region. To the North East and North West of the district are the Sekyere East and Kwabre Districts respectively, to the South are Bosomtwe-Atwirna-Kwanwoma and Asante-Akim South Districts, to the East is the Asante-Akim North district and to the West is the Kumasi Metropolitan district. Being a major urban centre, the majority of the road infrastructure in the district is surfaced. 69% of the population are users of electricity,

but it is at a high cost, with frequent power outages. 90.6% of the residents in the district are users of mobile cellular phones, with only 6.3% of them using fixed line telephones. Mobile phone signals are generally good within the district. The district also has a high percentage of ICT usage by both private and public sector organizations, and has the skilled personnel to manage and use ICT especially in the major towns like Ejisu, Juaben, Kwamo and Fumesua. (Ghana Districts, 2011). According to the district directorate there is an inadequacy of health facilities in the district which has resulted in the majority of residents patronizing health services outside of their settlements of residence, even though most of these facilities are located within the district (Ghana Districts, 2011).

"About 59.9 percent of the population patronizes health facilities outside the settlements they live whilst the other 40.1 percent patronize health facilities within the settlements the live. The type of health facility highly patronized within the Ejisu - Juaben district is the hospital constituting about 67.6 percent. Other health facilities like clinic, health post, traditional healers, maternity homes and drug store constitute about 27.1 percent, 0.3 percent, 0.7 percent, 2.0 percent and 2.3 percent respectively" (Ghana Districts, 2011). According to a recent study (Ghana Districts, 2011) about 20 percent of the population patronizes private health facilities, with the remaining 80 percent attending public facilities. Amongst the reasons given for the choices made include cost, proximity and the quality of service. The study also revealed that the majority of residents very rarely visited health facilities with visits made only when the case was very serious. Respondents to the survey enumerated some problems associated with the use of health facilities in the District to include long queues, poor attitude of staff towards patients, high cost, long distance and inadequate health personnel constituting 35.5%, 11.5%, 38%, 9.4%, 5.6% respectively. High cost being the dominant reason. It is hoped by the district directorate that the effective implementation of the NHIS will improve hospital attendance.

"The survey revealed that about 93.7% of the people are aware of the National Health Insurance scheme whilst 6.3% are unaware. This implies that there is high

awareness rate about the Nation Health Insurance scheme. Even though about 93.7% are aware of the existence of the scheme and its usefulness, only 46% the people have registered. The 56% of the people who have not registered attributed it to reasons like financial, political reasons, poor access, time factor, ignorance and scheme does not cover all ailments constituting 65.6%,5.0%, 19.4%, 3.1%, 6.3% and 0.6% respectively." (Ghana Districts, 2011)

The Ejisu Juaben district was selected for the study due to its peri-urban nature, offering a good mix of urban and rural Ghana in one setting. Its accessibility due to the excellent road network in the district, as well as access to key contacts were key considerations in choosing the district.

4.8.1.2 Kwabre East

The Kwabre East district covers just over 1% of the total land area in the region and measures about 246.8 sq km in area. It is almost located in the central portion of the Ashanti region, and is bordered by the Afigya Sekyere District to the North; Kumasi Metropolitan Area to the South; Ejisu Juaben District to the Southeast; Atwima District to the West and Offinso District to the Northwest. The district capital, Mamponteng is located approximately 14.5 km from Kumasi to the north east. The District is part of the greater Kumasi City region, which is made up of Kumasi Metropolitan Area and the surrounding Districts.

The district is the second most densely populated (6599 per sq. km.) in the Ashanti region after Kumasi which has 5,319 persons per sq. km respectively; the total population of the Kwabre East District in 2006 was 164,668. With its close proximity to the regional capital and rapidly improving infrastructure due to the government's poverty alleviation strategy, the district has seen a steady increase in its population over the past two decades. The composition of these in-migrants vary widely; they range from the relatively wealthy who seek to escape the city and live in the ever expanding suburbs of Kumasi, to the very poor who move into villages in the district to avoid the relatively high cost of accommodation in Kumasi, but commute to the city

daily in search of work. There are two private hospitals in the district owned and run by religious missions. There are also 10 level “A” primary health centres and two level “B” primary health centres. Level ‘A’ health centres serve communities, whereas level ‘B’ health centres are health centres or posts at a sub-district level. There is a third level (level ‘C’) which is the district hospital level. At this level (‘C’) the health centre serves the entire district. The district’s inhabitants derive their water supply through the pipe-borne system, boreholes, wells and streams. In all, eight communities have access to pipe-borne water. Electricity reaches 35 settlements in the district. Other sources of energy used in the district are kerosene, firewood and charcoal. Despite its large urban population due to its proximity to Kumasi, large numbers of the population live in rural settlements. 15% of the roads are first class roads, with the remaining roads being feeder roads. The majority of the district is covered by mobile phone services, with there also being a low level of ICT use in public and private institutions. (Ghana Districts, 2011)

Easy accessibility, an in depth knowledge of the area and earlier contacts with key participants were the reasons for selecting this district.

4.8.1.3 Atwima Nwabiagya

The Atwima Nwabiagya district is one of the largest in the Ashanti region and is located in the Western part of the region. It is bordered by the Ahafo Ano South and Atwima Mponua Districts (to the West), Offinso Municipal to the North, Amansie–West and Bosomtwe-Atwima Kwanwoma Districts to the South, and the Kumasi Metropolitan and Kwabre Districts to the East. It covers an estimated area of 294.84 sq km and has Nkawie as its district capital. The Atwima Nwabiagya district has a population density of 439 persons per sq. km which is the third highest in the region, after the Kumasi Metropolitan and Kwabre East districts, which have 5,319 and 659 persons per sq. km respectively. The total population of the District, according to the 2000 Population and Housing Census was 129,375 with the age of the population skewed towards the youth. “The highest proportions are in the Age groups 0-4 years

(15.5%) and 5-9 years (15.8%). Cumulatively, 43.2% of the population in the District is below 15 years". (Ghana Districts, 2011)

The District has one (1) Hospital, Four (4) Health Centres, Four (4) Clinics, Six (6) Maternity Homes and 40 trained traditional birth attendants. The Doctor/Population ratio is 1:39,407 and the Nurse/ population ratio of about 1:3329. There are 3 medical Doctors, 51 nurses and 143 auxiliary staff working to provide quality health care services in the district. The Doctor/Population ratio of 1:39,407 is far below the required standard of 1:25,000. The Nurse/ population ratio of about 1:3,329 is much closer to the required standard of 1:3,000. With regards to the NHIS, 60% of the population are registered members of the scheme. This is amongst the highest anywhere in the country.

Less than 50% of roads in the district have been surfaced, and a large percentage of them are not in good condition. Major towns in the district including the district capital Nkawie have electricity being supplied to them. On the other hand however, they suffer from very frequent power outages. Customers of all the major mobile networks are able to receive network coverage in the district, there are however fixed line telephone connections to only 6 of the 45 towns in the district. The district also generally has very low ICT usage by the public and private sectors, as well as low ICT infrastructure and skills. The Atwima Nwabiagya district was included due to the size of its population, accessibility to the area, and the size of health insurance scheme.

4.8.1.4 Sekyere East

The Sekyere East district is located in the north-eastern part of the Ashanti region and is the largest of all 27 districts in the region; covering a total land area of 4,231 sq. km. the district capital is Effiduase. The district is bordered to the west by the Sekyere West district, by the Ashanti Akim North to the South-East and Ejisu-Juaben to the South-West. The Sene and Atebubu Districts in the Brong Ahafo Region and the Kwahu North District in the Eastern Region also border the district.

The district population was estimated to be 191,354 in 2009 (Ghana Districts, 2011) with 66.3% of them in rural settlements. The remaining 33.7% are in urban settlements. 66% of the active population of the district is employed in agriculture. According to the Sekyere East mutual health insurance scheme report (2009) 73% of the districts population had been registered for the scheme by the end of 2009. There are currently 14 health service facilities in the district, but only 2 doctors serving the entire district as at the end of 2009. This is wholly inadequate. The number of doctors is down from 4 in 2008. There were however 140 nurses in the district by the end of 2009, up from 108 in 2008. There is almost universal coverage of the district by mobile phone signals, but only 6 of the settlements and towns in the district have access to fixed line telephones. Even though the location was deeply in the hinterland, with a very bad road network (83% of the roads are feeder roads), and with between 25 and 30 percent of the population with access to electricity, the Sekyere East district was included in the study due to the large population, largely rural setting and the population of its scheme membership. Electricity provision in the district also suffered from frequent power outages.

4.8.1.5 Sekyere South

The Sekyere South district formerly known as the Afigya Sekyere district is located in the centre of the Ashanti region, and is one of the newest districts to be created in the country. It has an area of 780 sq. km. and is bordered by the Sekyere East and the Kwabre district to the south, Ejura-Sekyeredumase to the north, Offinso municipal to the West and the Sekyere West district to the East. The population was estimated in 2012 to be 139,736. The location of the district in the central part of Ghana and also, along the highway which runs from the south to the north makes it easily accessible. (Ghana Districts, 2011)

Employment in the district is mainly agrarian related (64%). 4% of the population work in the industrial sector, with 32% of them employed in the service sector. Electricity is available is mainly available in the major towns, and subject to frequent outages, with

the use of ICT by public and private sector organisations being very low. (Ghana Districts, 2011)

Within this district, 70% of the roads are not surfaced; there is however extensive coverage of the district by mobile phone networks. The district was chosen due to its largely rural nature, its accessibility, and the availability of personal contacts.

4.8.1.6 Offinso North

The Offinso North district is located in the North-Western part of the Ashanti region. It is bordered in the north and west by the Techiman, Sunyani Tano and Nkroranza district which are in the Brong Ahafo Region. The District is also bordered to the east by the Sekyedumase district and to the south by the Offinso South Municipality.
It covers an area of about 6300 sq. km. which is about 2.6% of the Ashanti regions total surface area, and has Akomadan as the district capital. The current population is estimated to be 55,000, with about 78% of them living in rural areas. With the exception of some roads in the district capital, most of the road infrastructure is made up of a network of poor feeder roads, linking the over 100 settlements that make up the district to the district capital (MOFA, 2012). Electricity is available to only the major towns in the district, and is subject to frequent to outages. The use of ICT equipment, as well as the skills needed to operate them is also very low in both private and public sector organisations. Mobile phones are the most common means of communication within the district. The distinguishing feature of this district is that it was not in existence when the scheme was launched in 2003. It would therefore be interesting to see how it is implementing the scheme. It is also very accessible in spite of the poor road network, because the main road linking the regional capital to the north of the country passes through the district.

4.8.1.7 Asokwa, Bantama and Subin

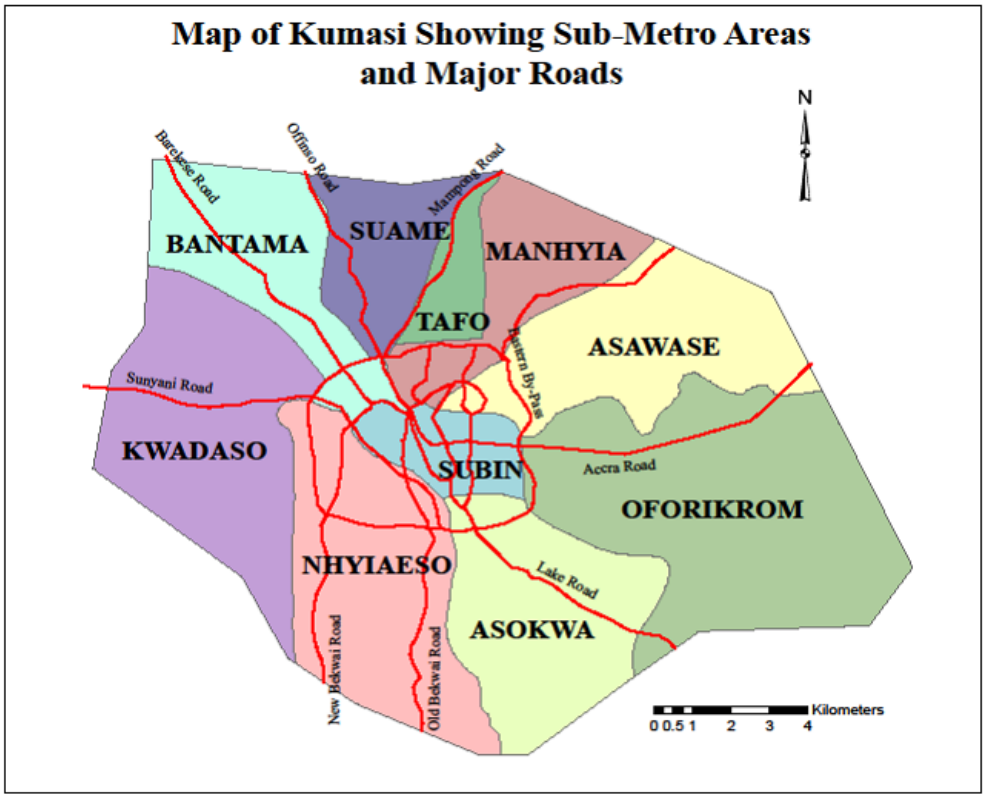


Figure 4.3: Sub-metropolitan district map of Kumasi. Source: Maoulidi, 2010: p. 9

These 3 sub-metropolitan districts are a part of the district capital Kumasi, and are strategically located in within the metropolis. Subin is located directly in the centre of the metropolis, with Asokwa being situated in the south. Bantama is located in the north of the metropolis. These 3 districts together give a good overview of the situation of the health insurance schemes within the metropolis. Subin covers the entire central business area of the city, whereas Bantama is host to the second largest medical hospital in the entire country, the Komfo Anokye Teaching Hospital. The table (4.4) below lists their populations and the size of the area they cover.

Sub-Metropolitan Area	Census population (2000)	Area (sq.km)
Oforikrom	124,869	54.1
Asawase	131,418	29.5
Bantama	101,409	30.6
Nhyiaeso	64,505	30.0
Kwadaso	118,039	34.2
Subin	100,979	8.5
Manhyia	163,986	17.1
Suame	114,751	14.6
Old Tafo	128,022	6.0
Asokwa	122,292	29.3
Total	1,170,270	253.9

Table 4.4: Population and size of sub-metropolitan districts in Kumasi

Kumasi is the second largest city in Ghana after the capital Accra, and also accounts for a third of the entire population of the Ashanti region. The metropolis has all the ICT equipment, social and communication infrastructure and the logistics available to any modern city, and has a highly literate workforce. The criteria used in the selection of the districts is summarised in table 4.5.

District Selection Matrix

District	High Population	Knowledge of Key contacts	Knowledge of the area	New District	Urban	Accessibility
Kwabre East	X	X	X			X
Atwima Nwabiagya	X					X
Sekyere East	X					
Offinso North				X		X
Sekyere South	X	X				X
Ejisu-Juaben		X			X	X
Asokwa	X		X		X	X
Bantama			X		X	X
Subin			X		X	X

Table 4.5: Criteria for inclusion of district in field survey

4.9 The Sampling process

"Sampling is the procedure a researcher uses to gather people, places or things to study" (O'Connor, 2011). Since it will be impossible to obtain data from every

employee within each of the district health insurance schemes being studied due to time, cost and human resource constraints, a sample will have to be drawn, based on which we can draw conclusions about the entire population. A sample is a subset or a part of the entire population that can be studied. There are two main sampling approaches that are used in research. The two approaches are probability and nonprobability sampling. In probability sampling all elements in the population have a chance of being included in the sample. In nonprobability sampling however, the elements in the population are either selected on the basis of their availability, or on the personal judgement of the researcher.

The population was defined as all of the staff in the district health insurance schemes working in the 9 selected district and sub-metropolitan health insurance schemes. This included all departmental heads, as well as the managers of the district scheme.

Sample Frame

To obtain the sampling frame, contact was made with the public relations officer of each of the schemes who gave access to the staff in each district scheme. Access to staff gave the researcher the opportunity to meet with the broader group from which the actual sample taking part in the study could be drawn.

Type of Sampling

Purposive sampling was used in the research. Within purposive sampling, criterion sampling was considered the most appropriate for use by the researcher. Criterion sampling involves searching for employees that meet specific criteria. The sample was all employees that dealt with the management (acquisition, processing and dissemination) of information in the scheme. The employees were divided into two groups, namely Junior and Senior staff. Junior staff included field officers, data entry clerks, management information system (MIS) staff, accountants and claims officers, whilst the senior staff comprised departmental heads and scheme managers. Senior staff were assumed to have more information and a more balanced view of the

operation as compared to junior staff. The insight of senior staff was particularly beneficial for the interview section of the study.

Research Sample

The sample size of the study was 135. This was based on the number of employees within the 9 selected schemes. The average number of employees in any given HI scheme is 20. This gives a total population of 180 of the number of possible people that could be sampled in the study. Of the sample size, a total of 120 completed questionnaires were returned. Further examination of the completed questionnaires resulted in the final number of valid completed questionnaires being 103. A total of 13 personnel were also purposively selected for the interviews. They comprised 7 senior management and 6 junior management personnel. Of the 13 interviewees, 6 of them came from rural districts, with the remaining 7 coming from urban districts.

4.9.1 Questionnaire design

The final questionnaire was arrived at with the aim of making the data collection procedure and subsequent analysis as easy as possible. The resultant questionnaire is listed in the appendix.

The questionnaire was organized in a manner so as to enable respondent's state their views on how data is currently being managed with the current information system, and to gauge their level of satisfaction with it. Respondents were also asked to state their suggestions for possible improvements in the system that in their opinion will enhance work flow and efficiency. The questionnaire is divided into two main sections; the first section collates demographic data, whilst the second collates data on the information management system currently in place.

In the first section, the questionnaire begins by asking for demographic data, including the gender, age, position and work place of the respondent. This was done to aggregate responses by position, and also by locality. The question about the work

place showed whether the respondent was either an employee of a rural or urban HI scheme.

In the second section, respondents were initially asked to give some information about the data they worked with and how it was acquired, transmitted and stored within the framework of the current information system. Information sources and their methods of acquisition vary. The questions were asked to find out how information from the various sources were being acquired and stored. Respondents were also asked if they had exclusive use of their information system. This was to find out if employees had to share or split the time for using these resources, as it could potentially limit the effectiveness with which they carried out their functions within the scheme.

The perceived advantages and disadvantages to employees in using the current information system were then also elicited. The questionnaire ends by asking about the level of satisfaction that employees have with using the system. According to Thong & Yap (1996: p. 602) “information systems are deemed to be effective only if they contribute to organizational effectiveness”, and user satisfaction is one of the methods used to measure this. To measure the satisfaction of users, a Likert scale was developed to measure the extent to which an individual is either in agreement or disagreement with the question about satisfaction with the current IM system. The scale was from 1 to 5 and featured very satisfied, somewhat satisfied, neutral, somewhat dissatisfied, and very dissatisfied. Suggestions for improvements to the current information system were also sought at this point.

4.9.2 Validity

The procedure adopted in the study for data collection needs to be examined for reliability and validity. Concerning reliability Joppe (n.d.) defined it as “the extent to which results are consistent over time and an accurate representation of the total population under study. If the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable”. Validity

according to Joppe (n.d.) “determines whether the research truly measures that which it was intended to measure or how truthful the research results are”.

In this study the method employed in measuring the accuracy of the findings was the triangulation method as stated by Creswell & Miller (2000). According to this method, researchers employ varied and multiple sources to provide corroborating evidence. The multiple source design, the different administrative levels and the different organizations involved in the study, facilitated the triangulation of data sources. For example, data obtained from different sources were compared; also responses to questionnaires, interviews and the information gathered by observation were crosschecked to determine if they corroborated each other.

4.9.3 Pre-testing questionnaire (pilot study)

Upon completing the questionnaire it is ideal for it to “undergo a formal pilot during which the acceptability, validity and reliability of the measure is tested” (Williams, 2003: p. 5). According to Williams (2003: p. 5) “the pilot should be based on subjects from a similar population to that being examined in your survey”. Piloting a study reveals local politics or problems that may potentially affect the research process (Van Teijlingen & Hundley, 2001).

In August 2011, the questionnaire was sent via email to a former colleague with whom the researcher had previously worked with at a management consultancy in Ghana. The reason for this was the inability of the researcher to travel to Ghana and personally do the pilot, due to time and financial constraints. The colleague was asked to send the questionnaire to urban and rural to schemes to test the appropriateness of the questionnaire to collect the data required for the study, and also to ascertain the correct procedure needed to do so. Six district HI schemes were purposively chosen from the Greater Accra region and the Ashanti region for this. The schemes were chosen due to the availability of prior contacts, proximity and the ease of transportation. Three of them were urban schemes, and three of them rural schemes. The rural schemes were the Ahafo Ano South, Offinsoman and Kpeshie schemes,

whilst the urban schemes were the Ga, Bantama and Asiedu Keteke schemes. A total of fourteen questionnaires were handed out in September 2011, all of which were returned. At each scheme, the purpose of doing the pilot study was initially explained prior to the questionnaires being handed out. Generally, no major comments were made about the questionnaire, with the exception of the official guidelines that needed to be followed when it was time to do the proper study. The pilot study also greatly helped the researcher to choose the Ashanti region as a primary base for the study, as the pilot study revealed the logistical and transportation constraints that will be encountered if the study took place in more than one region.

4.9.4 Questionnaire distribution techniques

Before embarking on the field work, permission had to be sought from the national headquarters of the NHIS in the capital, Accra. At the headquarters the letter of introduction from the University of Loughborough was presented to the office of the Chief Executive, who then directed the researcher to the Head of the research department. At the research department, the researcher was interviewed to ascertain the purpose of the survey and the content of the questionnaire. Following this a letter of introduction was handed to the researcher to present to the managers of each of the health insurance schemes in the districts in which the research was going to be conducted. After presenting the letter to the scheme managers, the researcher was led to the managers of the various departments within the scheme for the field work to begin. Without going through this procedure, it would have been impossible for the researcher to do the field work, as employees of the health insurance scheme are under a strict code which prevents them from divulging any information about the organisation to any individual outside of the scheme without authorisation from senior management at the national headquarters. Table 4.6 shows the questionnaires that were distributed and returned in each district.

Districts	Questionnaires Distributed	Questionnaires Returned
Sekyere South	12	7
Asokwa	15	12
Atwima Nwabiagya	14	9
Bantama	15	11
Ejisu Juaben	15	14
Kwabre	20	15
Offinso North	11	6
Sekyere East	15	12
Subin	18	17
Total	135	103

Table 4.6: Total number of questionnaires distributed and returned

At each of the schemes, the following procedure was followed:

- The researcher initially met with the scheme manager to present a letter of introduction.
- Following this, he was directed to the public relations officer (PRO), who in turn directed the researcher to the departmental managers and staff that fulfilled the criteria required for potential participation in the research.
- The researcher then explained the study to the managers and staff, following which the questionnaire was handed out.

Since it is within the job remit of the PRO to liaise with any external person or organisation studying the scheme, at each of the participating schemes the PRO was tasked with the job of reminding the staff to complete the questionnaires, and also to collate all the questionnaires upon completion. Where the PRO was not available to do this, the Management Information Systems (MIS) Manager was asked to do this. The MIS manager was chosen because the survey had basically to do with the information systems that were being used in the scheme. It was the job of the researcher then to liaise constantly with either of these managers on a constant basis till the questionnaires were returned. Table 4.7 shows the distribution of questionnaires by position.

Position	Questionnaires Distributed	Questionnaires Returned
Junior Staff	105	88
Senior Staff	30	15
Total	135	103

Table 4.7: Distribution of questionnaires by position

Upon receiving the questionnaire, the staff were advised as to when and to whom the completed questionnaires were to be returned. This was done so as to prevent the situation of the researcher having to go from office to office potentially disturbing staff.

4.9.5 The interview

The interviews were largely open-ended, using an interview guide, which specified key issues that were to be explored. The key issues covered were media used in sharing information, gaps in information needed, barriers and obstacles to data management, and suggested improvements to the current information system. In all 13 interviews were conducted, typically lasting between 20 and 30 minutes. The interview questions are found in the appendix. Table 4.8 lists the interviewees.

Position of Interviewees	**Number of Interviewees**
Accountant	1
Public Relations Officer	1
Claims Officers	2
MIS Managers	4
Scheme Managers	1
MIS Staff	4
Total Interviewees	**13**

Table 4.8: List of interviewees

Participants were selected purposively according to their job titles and the location of their schemes, whether it was in a rural or urban area. It was the aim of the researcher in interviewing these participants to obtain further insight into the current information management system, and any improvements they would like to see in the system, given their unique positions. The interviews were therefore an opportunity to bring some richness to the data obtained from the interviews. Having already

presented a letter of introduction for the questionnaires to be completed, no further demands with regards to clearance was required to conduct interviews with the identified potential interviewees. All respondents to the questionnaire were required to indicate if they would be prepared to undertake a follow-on interview. From the population of those who positively responded, a sample was randomly selected according to the required criteria for inclusion in the interview stage of the research. Interviews were recorded after verbally asking for permission to do so. No concerns were raised with regards to this by the interviewees.

In addition to the interviews, informal conversations were held with 2 key informants from the Kwabre East district and the Bantama Sub-metropolitan districts. The information obtained from these informants were not included in the interview data, but were used to gain deeper insights into the scheme and its working and in particular the conditions under which the employees of the scheme serve. Insight into salary issues, staff morale, the personal sacrifices and the struggles some of the employees make to enable the scheme to function was obtained during these conversations. Even though they are outside the scope of this report, they gave tremendous insight and provided some context into the operation of the district health insurance schemes. All of these interactions were written down. Other sources of information to the researcher were sample forms for membership registration, claims, and daily registration/collection which the researcher collected samples of during the interview process.

4.9.6 Observation

All observation was carried out by the researcher in the role of a complete observer. In this role the researcher was primarily in the plain sight of the group under study. The group however were not aware that they were being observed. Prior permission was obtained from the appropriate manager before embarking on the activity. Observations were carried out extensively in both urban and rural schemes, as well as in the various departments to gain a deeper knowledge of the health insurance schemes. The specific activities and systems that were observed included:

- Registration of new members.
- The renewal of cards of existing members.
- Claims processing.
- The replacement of lost identification cards.
- Updating of client details.
- Data management and storage systems in use.
- Physical infrastructure available.
- The existing human resources.
- Forms currently being used.

Observations made were noted, and where possible photographs were taken to help in understanding the phenomenon under study.

4.10 Conceptual modelling

Modelling is an important aspect of information systems development. According to Wand et al (1995: p. 285) it "is especially important in the analysis stage of systems development when abstract models of the represented system and its organizational environment are created. Such models are termed conceptual models." Conceptual models are meant to display knowledge about the application domain, rather than about the implementation of the information system (Wand et al, 1995). Bubenko (1980: p. 399) defined conceptual modeling as "an abstract model of the enterprise", whilst Mylopoulous (1992) stated that conceptual modeling describes "some aspects of the physical or social reality for the purpose of understanding or communicating" (p. 51).

Kung & Solvberg (1986) proposed that conceptual models have four roles to play. The roles are that:

- They provide a platform for communication between developers and users.
- They increase the understanding of analysts.
- They serve as a basis for design.
- They serve as documentation of the original requirements of the system for

maintenance purposes.

According to Wand et al (1995) the role of conceptual modeling can also be viewed in context of overall systems development, comprising the analysis stage, design stage and the implementation stage. “Analysis transforms a perceived real-world system into a conceptual model of that system. In the terms mentioned above, this is the creation of models of the subject and usage worlds. Design transforms the conceptual model of the subject world, into a model of the information system. In particular, the system interfaces are designed based on the usage model. Finally, implementation transforms the model of the information system into an implemented information system, which is a machine-executable representation” (p. 286).

Graphical conceptual models enable an individual to grasp several concepts and the relationships between them more easily than would have been possible were it to have been explained from a purely textual description (Boyd, 1998). Conceptual models are built by using a conceptual modelling language (CML). According to Wand et al (1995: p. 286), the language specification consists of fundamental modeling constructs and rules on how they can be combined into meaningful statements" about the modeled domain. Typical constructs used in conceptual models include entities, relationships, activities, processes, and objects”. The specification of a CML involves basic modeling constructors and rules on how these constructors could be combined in to meaningful statements about the problem in question (Andrade et al, 2006). The value of a CML however is determined by its ability to capture the required information about the problem domain, as opposed to the implementation aspects linked to the software solution domain.

There are currently several notations available on the market that can be used to build conceptual models. They include including Data Flow Diagramming (DFD), Entity Relationship diagramming (ER), State-Transition diagramming, IDEF techniques, Unified Modelling Language (UML) and Object Role Modelling (ORM).

4.10.1 Data flow diagramming (DFD)

DFDs graphically indicate or represent the movement of information through any given internal system and external entities, and shows the logical dependency of one activity upon another for its data (Beynon-Davies, 1993; Ward & Peppard, 2005). DFDs represent movement of data instead of activities, persons or organisations, and are made up of four basic elements: processes, data flows, data stores and external entities (sometimes called sources or sinks) (Beynon-Davies, 1993; Damij, 2007).

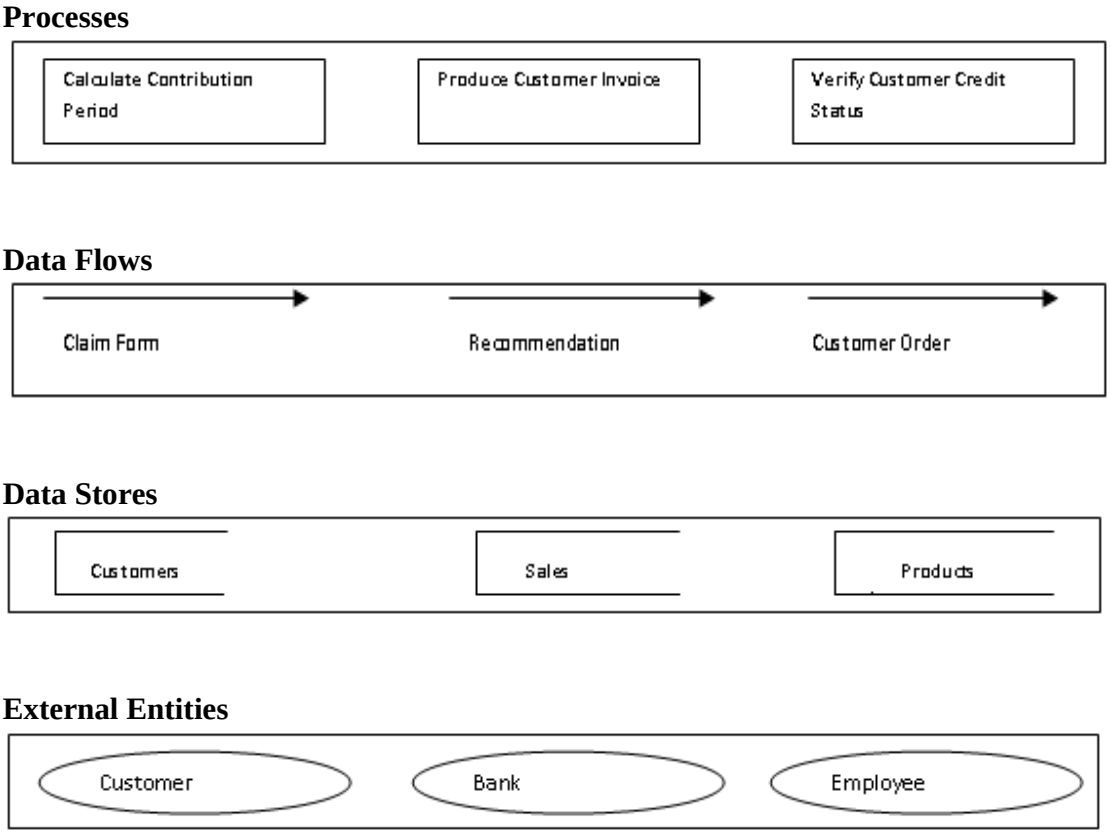


Figure 4.4: DFD notation (Beynon-Davies, 1993)

DFDs however present a number of limitations. “First, they focus exclusively (or at least primarily) on data and provide no modelling constructs on which to base representation of work flow, people, events, and other business process elements. Second, they provide no information on decisions and event sequences (temporal or precedence relationships). Finally, DFDs have no beginning or end points, nor execution paths. In other words, they are static representations of a system and the

system's functions that involve data manipulation; therefore, they do not lend themselves easily to analysis or decision making" (Giaglis, 2001: p. 221). In reconstructing the flow of information within the current information system, DFD's will be employed to do so.

4.10.2 Entity-relationship (E-R) diagramming

E-R modelling was developed by Chen in the mid 1970s, and shows the "relationships of the key entities or entity groups relevant to the organisation. Their main purpose is to define the underlying information architecture, independent of any functional considerations" (Ward & Peppard, 2005). E-R models are based on strong mathematical foundations, and consist of entities, relationships and attributes. ER diagrams have limitations similar to DFDs. "More specifically, they focus too much on data and their interrelationships and, hence, provide no constructs for modeling other process elements. Even more important, they provide no information about the functions depicted that create or use these data (as DFDs do). Finally, they are entirely static representations, providing no time-related information that could drive analysis and measurement" (Giaglis, 2001: p. 221).

4.10.3 State-transition diagramming

State-transition (ST) diagrams originate from the analysis and design of real-time systems and attempt to overcome the limitations arising from the static nature of DFDs and ER diagrams by providing explicit information about the time-related sequence of events within a system. ST diagrams use simple notation consisting of rectangular boxes to represent states and arrows to represent transition in states. Although they overcome some limitations of the aforementioned IS modelling techniques, their primary focus is still on the data portion of a system, ignoring other aspects such as work flow, control, and decision making (Giaglis, 2001).

4.10.4 IDEF techniques (IDEF1x)

IDEF1x was developed as a method for completing the design system activity and is most useful for database design after ascertaining the information requirements and

the decision to implement using a relational database has been made (Mayer, DeWitte & Painter, 1992). IDEF1x does not restrict modelling in the data elements being “manipulated by computers but extends its application to modelling manual-handled data elements as well” (Giaglis, 2001). For optimum benefit the target database should be a relational database. In combination with other IDEF models they complement each other effectively and can present the whole picture in any modelled system. This facility however comes at a potentially high complexity of developing and maintaining many different models for a single system (Giaglis, 2001).

4.10.5 Unified modelling language (UML)

UML is a general purpose graphical modelling language used primarily in the modelling of software systems (Damij, 2007; Giaglis, 2001; Laleau & Polack, 2008). There are several different types of UML diagrams, such as use-case, sequence, collaboration, activity, class, package, and other diagrams. An activity diagram is a flowchart, which is used to describe a use-case or to model a process by presenting its activities in a determined sequence order. The diagram develops a model that presents how objects (identified in use-cases) communicate amongst each other and various others users in time. Hence, the sequence diagrams show the sequence of messages between the elements of the system, as well as between the objects and the system’s elements in regard to time (Damij, 2007). Giaglis (2001: p. 223) points out that the reason for the widespread use of UML in information modelling is because it is a universal language, “covering everything from business process representation to database schema depiction and software components modelling”. It is unlike other languages that are aligned with a particular analysis and design method. According to Laleau & Polack (2008: p. 799) “UML class diagrams include concepts that are not required for database modelling, and lack some important aspects such as keys. Rigorous use of UML for data modelling requires some modification of conventional UML class diagram metaconcepts. Information System functional specification is often neglected, or is achieved by inelegant use of techniques designed for procedural program design (data flow diagrams, Jackson structures such as entity life histories)”.

4.10.6 Natural conceptual modeling language

According to Boyd (1998) however if the graphical models produced by these languages cannot be understood by lay people, their correctness cannot be validated. To mitigate this Boyd (1998) developed the Natural Conceptual Modeling Language (NCML), a simple language that addresses only the “primary syntactic elements of natural languages – nouns, verbs and the prepositions associated with verbs”. Due to its relative syntactic transparency, it can be used to “closely represent the semantics of simple sentences from any natural language that contains nouns and verbs”. The language makes use of labelled rectangles and labelled arrows and lines. Objects and sentence subjects are represented by the labelled rectangles, whereas verbs are represented by labelled arrows. Labelled lines are used to represent prepositions that contribute to the predicates of the verbs. These elements can be combined to create graphical models that represent simple sentences.

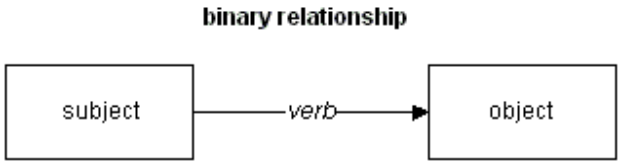


Figure 4.5: Binary relationship

A binary relationship as shown in Figure 4.5 is used to depict a relationship between 2 nouns; one being the subject and the other an object. It is the simplest form of sentence that can be constructed.

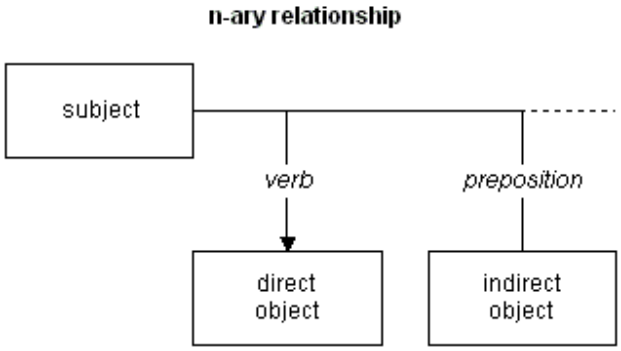


Figure 4.6: N-ary relationship

NCML can also be used to express much more complex relationships between a subject and many objects. They are called N-ary relationships. “This kind of sentence contains one or more prepositions that contribute additional nouns to the predicate of the verb. When the verb identifies an action initiated by the sentence subject, the additional nouns may become the arguments of an object-oriented message. When the verb identifies a static (often structural) relationship between the subject and the objects, the nouns may become the fields of a record in a relational table or the fields of another object - i.e., when the verb can be transformed into a noun through nominalization” (Boyd, 1998).

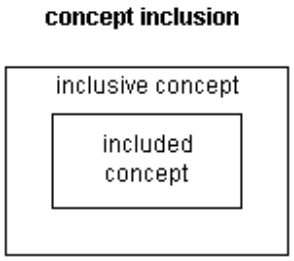


Figure 4.7: Concept inclusion

Concept inclusion is used when an idea includes one or more parts. The rectangle representing the included concept is nested in the rectangle representing the inclusive concept.

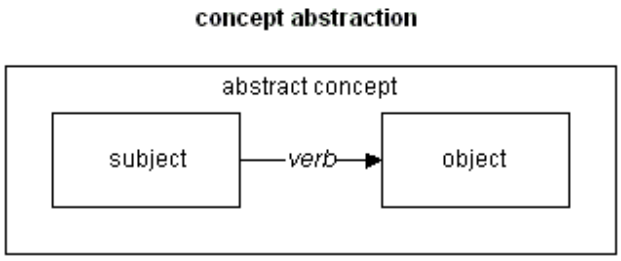


Figure 4.8: Concept abstraction

Abstraction is another form of conceptual inclusion, which is especially useful when complex sentences are being broken down into simpler ones. Some concepts can be defined in terms of relationships between other concepts. “Some sentences contain

complex combinations of dependent and independent clauses, especially sentences that contain conditions that express invariants, constraints, rules, etc. Abstraction provides a way of representing a relationship or a complex set of relationships as a single concept. For example, consider the following abstraction. Here, the verb "employs" has been nominalized by the **-**ment suffix, producing the noun "employment." The employment concept abstracts the relationship "employer *employs* employee."" (Boyd, 1998)

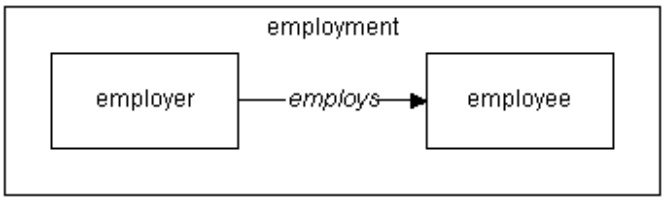


Figure 4.9: Example of concept abstraction

4.10.6.1 Advantages of natural conceptual modelling languages.

According to Androutsoloulous, Ritchie & Thanisch (1995), one of the advantages of natural language based conceptual modelling is that there is no learning overhead because the language is not artificial.

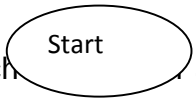
Natural language is also the way in which our thoughts are communicated. As stated by Frederiks & v.d.Weide (1996: p. 2) “since good communication between system analyst and domain expert is essential for obtaining the intended system, the communication between these two partners should be in a common language: natural language”.

Another advantage of using natural languages is that “it saves a translation between the initial specification and informal specification as we assumed the initial specification to be written in a natural language” (Frederiks & v.d.Weide, 1996: p. 2). This is especially so when being used for informal specifications, which in addition may point to the direction, in which a user may want to interact with the information system. Finally, using a natural language “increases the possibility of for domain experts to validate the formal specification”. (Frederiks & v.d.Weide, 1996: p. 2)

4.11 Flow charts

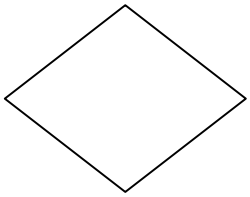
"A flow diagram is a graphical means of presenting, describing, or analyzing a process. This is done by drawing small boxes which represent steps or decisions in a chain of steps or decisions. Most flow charts make use of the following three symbols:

- Circles to show the start and the end of a process



- Rectangles, which show an instruction given or an action taken

- Diamonds, which show that a decison has to be made



These boxes are connected to other boxes by lines and arrows which represent sequence and dependency relationships (i.e., X must be done before Y can be done)" (Sil, 1999). Flow charts thus help to visualize a process and the sequence of logical steps undertaken in the process. Within each symbol that is employed in creating the flowchart, text is inserted into the symbol to demonstrate what the symbol represents.

4.12 Limitations, strengths and considerations

Despite of the best efforts of the researcher, the study is not without some limitations. Firstly, the selection of only 9 districts, all of which are situated in one of the country's 10 regions, out of a total of 170 districts in the country might have some effects on the external validity of the study. While it would have been better if a greater number

of districts and regions were included in the study, it was not possible due to resource constraints. This was however partly overcome through the use of purposive sampling. The location of the region and the districts selected were done to reflect as much of the general situation prevailing across the country as possible. Steps were also taken to ensure that the areas chosen were information rich to overcome the problem of selection bias.

Another concern was the employment of the mixed method approach used in the study. Even though it has the potential to bring about a greater understanding to the issue under study, it required “greater effort and expertise to adequately study a single phenomenon with two separate methods” as observed by Creswell (2003: p. 249). These difficulties were however overcome.

Despite of the limitations mentioned above, the research is not without its strengths. The use of a combination of questionnaires, semi-structured interviews, and observation in addition to the comparative analysis of the current information management model, and that of the real world situation as observed during the field work also allowed for the issues at hand to be delved into from a number of angles which brought about a deeper perspective of the issues at hand. Having also lived in the Ashanti region, and having previously had some work experience with the HI scheme during its introductory phase, the researcher was able to call on previous contacts and develop working relationships without which the research would have been more difficult to undertake, especially given the time, financial and logistical constraints under which the it was carried out.

4.13 Data preparation and analysis

All the responses to the questionnaires were typed up by the researcher into Microsoft Excel upon receiving them. Excel was then used to prepare cross tabulations, percentages and frequency tables. Excel was also used to present the figures in three dimensional graphs. Chi-square statistics were calculated with the help of Excel and Medcalc.

The nature of the interviews was such that some were recorded, and some transcribed verbatim, as the interviewee responded to the questions posed. Where the researcher was able to speak to an interviewee in an environment free of noise and disturbances, the interview was recorded before being transcribed. An example of this is with the Scheme Manager at the Ejisu HI scheme. Where the interview was carried out in an open plan office environment, the noise and occasional distractions did not lend itself to recording since, the probability of picking up a lot of noise in the background was very high. In such instances, the researcher wrote down the responses as they were made by the interviewee. An example of this is the interview with the MIS manager at the Bantama HI scheme. Following this the transcribed interviews were analyzed to determine any patterns and recurring themes.

4.14 Summary

This chapter has provided an overview of the research methodology employed in the course of this study. The chapter also analysed the different methods used in the collection and analysis of the data relevant for this study. A mixed method approach was used for the design of the study. Data collection methods employed in the study included questionnaires, interviews and observation. The chapter also discussed the selection of the Ashanti region and the districts that were selected for inclusion in the study, giving demographic, logistical and other reasons for their inclusion in the study. The chapter concluded with a discussion on conceptual modelling and the reason for the choice of using NCML in the design of the proposed information system.

The purpose of the next chapter is to present the results of the findings as obtained from analyzing the data obtained from the questionnaire and interviews. The chapter will also present findings from observations made during the field work.

Chapter Five - SURVEY RESULTS

5.1 Introduction

This chapter presents the findings of the questionnaire survey and the semi-structured interviews that were undertaken by the researcher between October 2011 and November 2011. Also included in the chapter are findings from observations made at the various schemes during the period with regards to the existing ICT, infrastructure, and human resources. As per the summary of mixed methods approaches illustrated in the previous chapter by figure 4.1, data collection was divided into 2 main strands. The results of the questionnaire address the quantitative strand, whereas the semi-structured interviews and the findings from the observation and documents address the qualitative strand of the data collection process.

5.2 Questionnaire survey - results

The quantitative strand of the study was included to address the following question: Whether the current information system effectively manages data, and the extent to which it does so? To do this the results of the questionnaire survey was analyzed and presented using descriptive statistics to establish any regular patterns in the responses.

Descriptive statistics according to Trochim (2006) “are used to describe the basic features of the data in a study, and to help present them in a manageable manner. They provide simple summarizations about the sample and the measures. Together with simple graphics analysis, they form the basis of virtually every quantitative analysis of data.”

Price (2000) also stresses that descriptive statistics describe patterns and general trends in a data set, and are in most cases used to examine or explore a variable at a time. The relationship between a couple of variables can however also be examined to enable us determine if a difference or relationship exists or is statistically significant using correlation and cross tabulations. Descriptive statistics are thus an avenue to

bring understanding to a given set of measurements. Using frequencies, histograms and cross tabulation of some selected variables, the results of the questionnaire, divided into three parts comprising demographics, use of information system, and satisfaction with information system are presented below.

5.2.1 Demographic data

Of the 103 completed questionnaires, 49 were from rural based schemes, whilst the remaining 54 were from urban based schemes. In the first section questions were asked about their personal data. Respondents were asked about their gender. Figure 5.1 shows that of the 103 respondents 72 (69.6%) were male employees, and 31 (30.4%) were female. The high percentage of male respondents would seem to indicate a generally male dominated work force within the scheme.

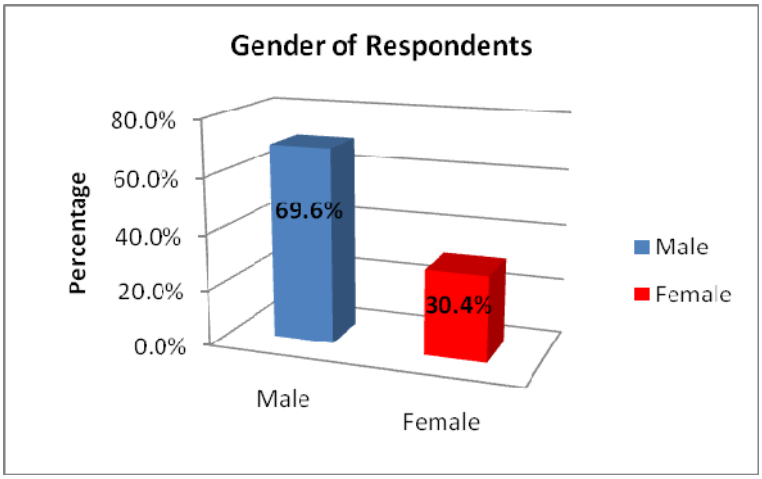


Figure 5.1: Gender of respondents

With regards to the location of respondents, it was realized that there was a much greater percentage of male respondents in the rural based schemes, as opposed to those located in the urban areas. This is indicative of the general trend in the country, as educated females are more likely to be found in urban areas, and are as such more likely to be employed in urban areas. The standard of living and the lack of amenities generally associated with rural life, makes working in rural schemes less of a viable proposition especially for females.

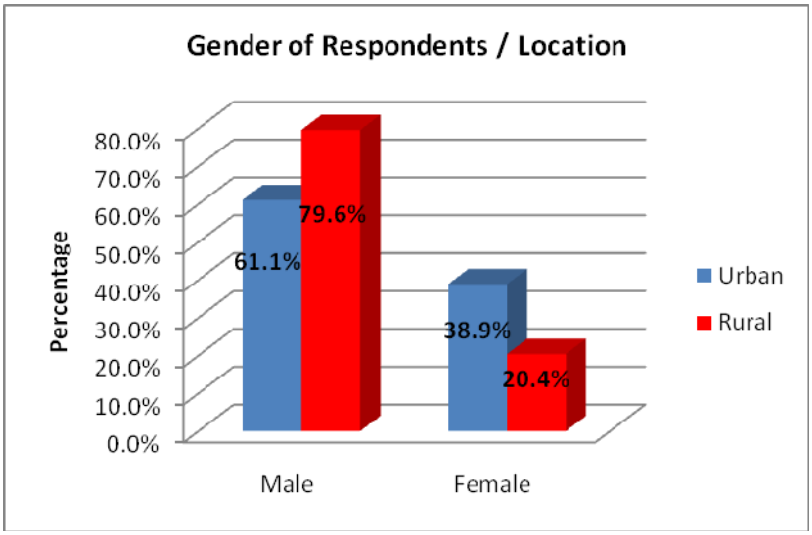


Figure 5.1.1: Gender of respondents by location

The respondents were then asked about their age, to determine their age group. It can be seen from Figure 5.2 that the majority of them (65.0%) were below 30 years of age. 28% were between the ages of 31 and 40, 6% between 41 and 50, and only 1% above the age of 50.

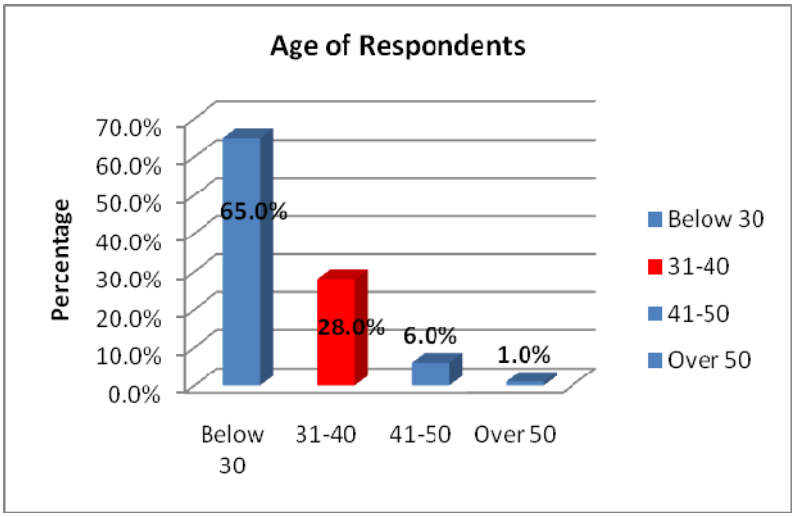


Figure 5.2: Age of respondents

Respondents were also asked to specify their job position. This was so as to be able to ascertain the level of responsibility of the respondent. From this it was determined

that 81.7% of them were Junior staff, with 18.3% being management level (Senior) staff. Figure 5.3 illustrates this.

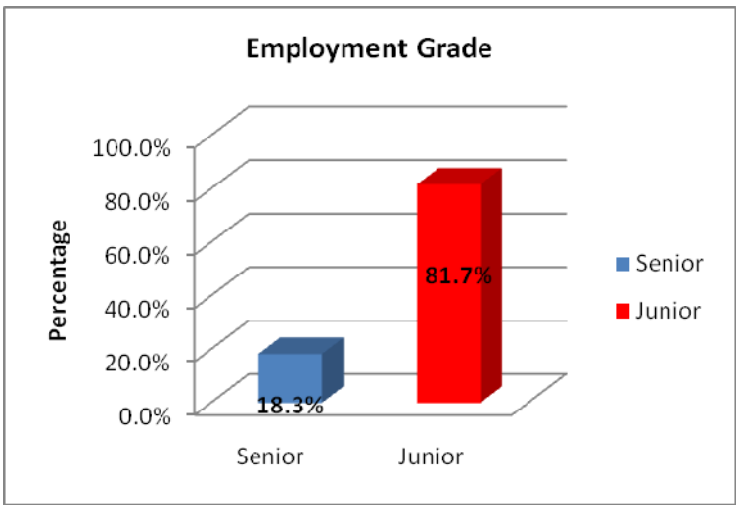


Figure 5.3: Employment grade of respondents

Of the total number of respondents, 74% said their work did not require them to deal directly with external organizations, whilst 26% answered that they dealt directly with external organizations. This is most significant because whatever information system is employed would have to possess the ability to adequately connect to, receive from, and transfer data to these external partners effectively, if so required. Table 5.1 shows that more than half (57.14%) of all senior officers and only a fifth (20.93%) of junior officers deal directly with external agencies.

Deal directly with external agencies		
Percentage		
	Yes	No
Senior Officer	57.14	42.86
Junior Officer	20.93	76.07

Table 5.1: Staff and external agencies

To investigate if dealing with external agencies was mainly linked the level of responsibility in the organization a Chi squared test was performed to test this, where H_0 stated that there was no difference in the responses of senior and junior offices

with regards to their dealing with external organizations. H_1 stated that there was a difference in their responses.

The Chi squared statistic (8.206187, df = 1, P<0.05). Thus we can reject H_0, and accept H_1 that there is a difference in the responses between that of junior and senior officers. The result of this indicates that any information system would have to have modules in them that enable officers at the appropriate level to interact with external organizations.

5.2.2 Information management

There are three types of data dealt with generally within the scheme namely Administrative, Financial and Medical data. Of these three, the most commonly handled type of data was Administrative data, with 62.6% of respondents handling this kind of data on a regular basis. This was followed by Financial data with 34.1%, and finally by Medical data with 22.0%. This is illustrated in Figure 5.4 below.

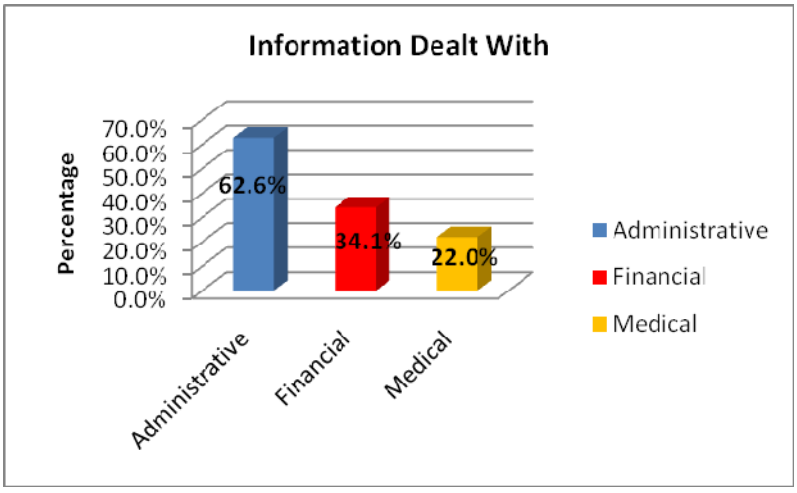


Figure 5.4: Information dealt with by respondents

Respondents were then asked to identify the sources of the information that they deal with. The sources of information flow into the district scheme offices are mainly through scheme members, healthcare providers and through the either fellow district schemes, a regional office, or the national headquarters.

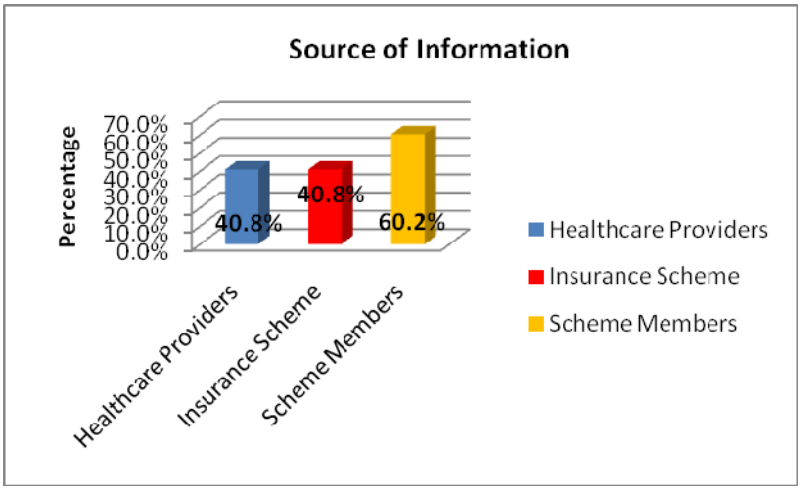


Figure 5.5: Sources of information

From this it was discovered that the vast majority of respondents dealt with data that originated from their interaction with the scheme members (60.2%). This was followed by information from Healthcare providers and information generated within the scheme itself with 40.8% each. With scheme members being the source of the majority of information into the scheme, the ability of the scheme to contact members and capture information from them is of utmost importance. Any tool that enhances the quick and secure capture of information, as well as the safe transfer of the information to the scheme offices must be appreciated. Given the nature of the other sources, any tool used for capturing data must also have the ability to reach out to healthcare providers and other insurance scheme offices regardless of their location, and the surrounding conditions under which they exist.

To determine the level of computer use within the organization, respondents were asked to specify whether or not they used computers in their work, and what they generally used them for. Figure 5.6 shows that of the 103 respondents, 94 of them representing 91.3% did use a computer, with the remaining 9 (8.7%) not using a computer. This indicates that the use of computers was very widespread in the management of information within the scheme. It also suggests that the average scheme worker has some basic technical competency skills in the least.

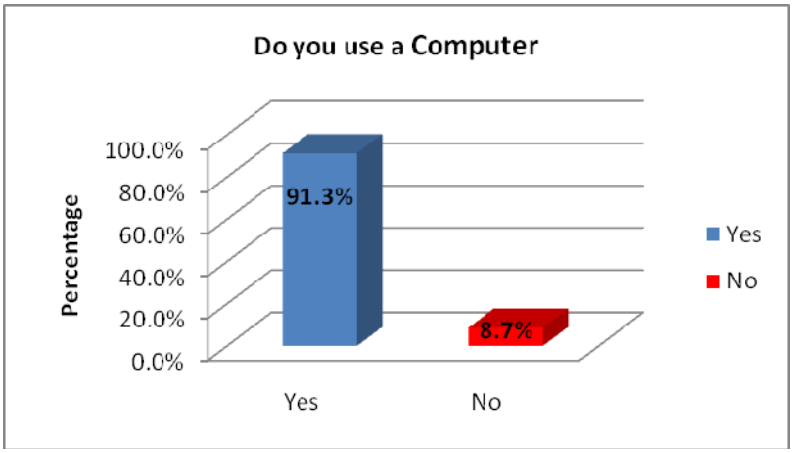


Figure 5.6: Do you use a computer

When analyzed with respect to the location of the respondents; it was discovered that both sets of respondents (rural and urban) had a very high percentage of employees using computers.

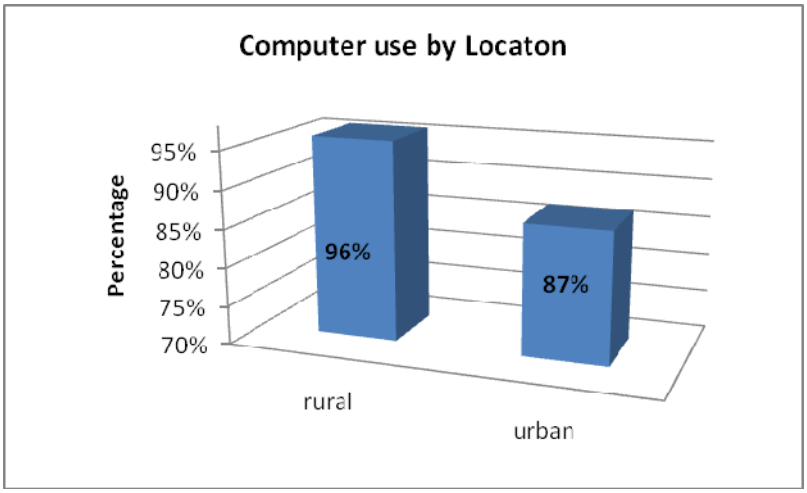


Figure 5.6.1: Computer use by location

Any differences then would therefore not be from the lack of the availability of computers, but appear to hinge on the ability of staff in the various locations to maximise the benefits that could potentially be obtained by employing computer based systems in their operations. As was later discovered, the lack of network

connectivity within the rural setting severely hampered the operations of schemes in these locations.

With regards to what the computers were used mainly for, Table 5.2 indicates that respondents used their access to computers mainly for processing data, word processing, report creation and lastly data analysis. Data processing is defined here as the inputting of data captured on alternative media (usually paper) onto computer based systems. This then suggests that a greater proportion of the time and effort used by the average office personnel was spent in just transferring paper based information onto the computer.

An alternative system that either speeded up or reduced the large amounts of time spent in simply inputting records, will free up staff to potentially engage in other productive activities.

Purpose of computer		
	Frequency	**Percentage**
Data Processing	87	93.5%
Word Processing	58	62.4%
Report Creation	61	65.6%
Data Analysis	54	58.1%

Table 5.2: Purpose of computer

Respondents were also asked to indicate the method by which information was acquired to perform their tasks. The alternative methods are manually (completed paper forms), electronically (electronic forms, emails etc), verbally or by all three methods. As indicated in Figure 5.7, 49.0% acquired some of their data electronically, with 68.4% acquiring some of their data manually. 16.3% of respondents acquired some of their data verbally, 7.1% acquiring data through all three methods.

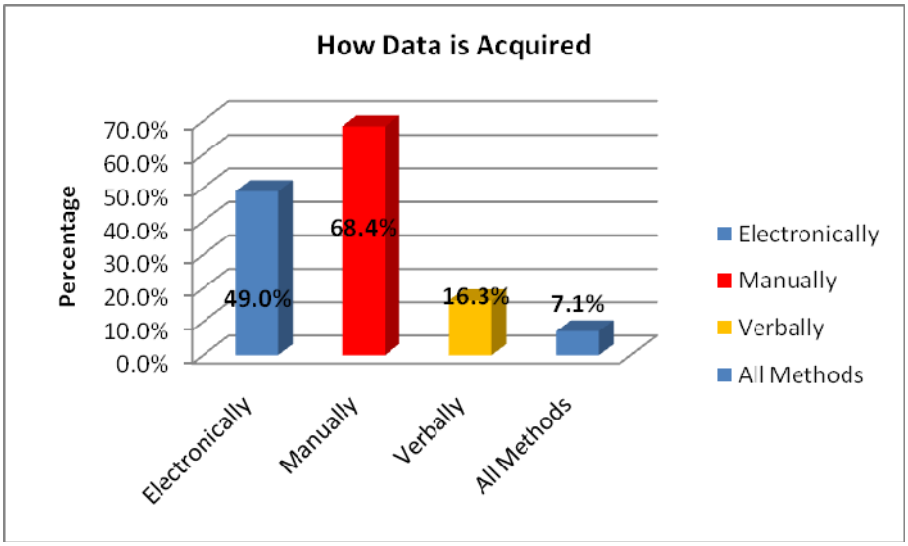


Figure 5.7: How is data acquired?

When the method of data acquisition was analyzed on the basis of the location of the scheme (whether it is located in an urban or rural district), it was discovered that the percentage of data acquired electronically in schemes located in urban districts (61.1%) was almost double that of those located in schemes located in rural districts (31.5%). The percentage of data acquired through manual methods was also a lot less in urban based schemes (46.3%), when compared to that of rural based schemes (55.6%).

The data indicates the presence of a division in the use of digital methods of data acquisition between urban and rural based schemes. It can be inferred from the data that schemes located in urban districts are more likely to use electronic means in acquiring data, as opposed to those located in rural districts.

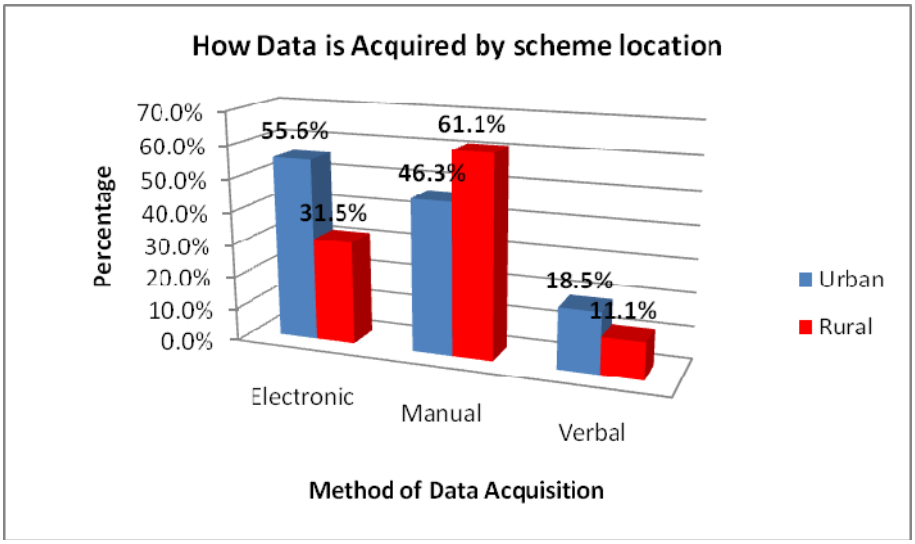


Figure 5.8: Data acquisition by scheme location

When the acquisition of electronic data was analyzed on a departmental basis the results were as in Table 5.3 below:

Department, Location and Electronic Data Acquisition		
	Percentage (%)	
Department	**Rural**	**Urban**
Accounts	20.0	33.3
Claims	33.3	40.0
Management Information System	45.0	50.0
Public Relations	20.0	50.0
Data Entry/Administration	28.0	50.0

Table 5.3: Crosstabulation of data acquisition method, location and department

The table shows that the majority of data in each of the rural based departments in the health insurance schemes is acquired in a manual or verbal method. This further confirms the digital divide between rural and urban based schemes. It could be inferred therefore that urban schemes are making a lot more use of the electronic tools available to them, as opposed to that of rural districts. Given therefore that the acquisition of data is indicative of a divide in the use of electronic tools in between the urban and rural districts, the tools employed in any model that is generated will have to take this very important detail into consideration. Any model developed will have to

employ technology that will be able to successfully bridge the digital divide and bring about a level of parity between the efficiency of services delivered in both locations.

Figure 5.9 illustrates what was actually done with the information received by the respondents. Apart from storing the data, which 76.5% of the respondents admitted to doing, the second most common operation on the data was the production of some sort of report (72.4%). The least performed activities on the data acquired were 'Forward to Internal Department' (49.0%) and 'Forward to External Department' (51.0%).

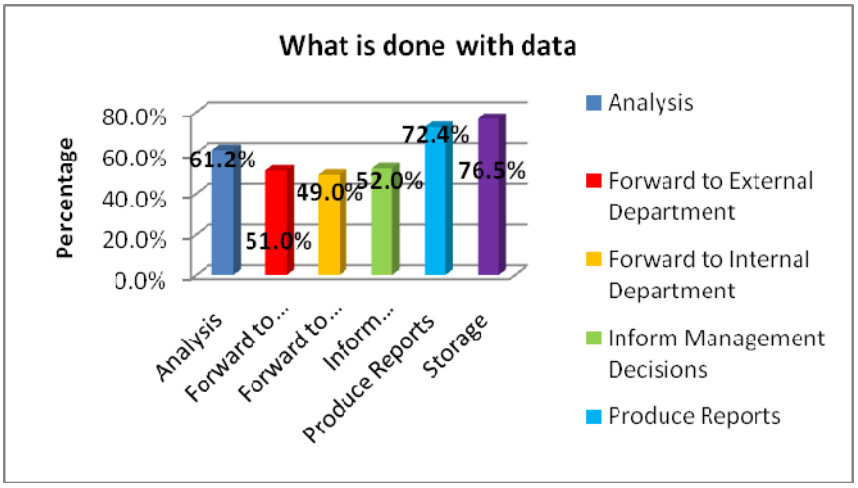


Figure 5.9: Activities performed on data acquired

To investigate how the data was stored, respondents were asked if it was done electronically, manually or both ways. As indicated in Figure 5.10 below, the majority (61.0%) of the respondents stored data electronically. This was followed by 30.0% of them storing data both ways, with only 9.0% doing so manually. With the knowledge that the majority of data is acquired manually, storage of such a high percentage of records in electronic format is indicative of the amount of effort, time and resources that are required to convert the manual records into electronic format at the scheme offices. Reducing or eliminating the need for the same data to input more than once should be an aim of the proposed model.

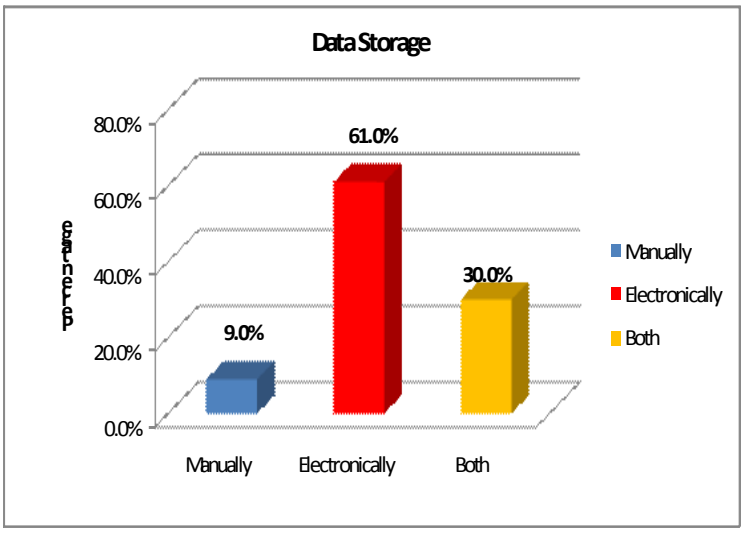


Figure 5.10: Mode of data storage

When the storage of data was cross-tabulated with the department of the respondent it was discovered that with the exception of the accounts department, all the other departments had a significant proportion of their data being stored electronically. It can also be seen from table 5.4 below that the Accounts department had the highest percentage of its data being stored manually.

Department and data storage			
	Percentage (%)		
Department	**Electronic**	**Manual**	**Total**
Accounts	21.4	21.4	57.1
Claims	41.7	8.3	50.0
Management Information System	78.6	0.0	21.4
Public Relations	50.0	12.5	37.5
Data Entry/Administration	77.6	2.0	20.4

Table 5.4: Cross-tabulation of department and data storage

It was also found out that for the majority of respondents (64.4%), data was transmitted electronically. The transmission of data is defined here are how information is carried from one point to another, either between schemes or between a scheme and a healthcare provider.

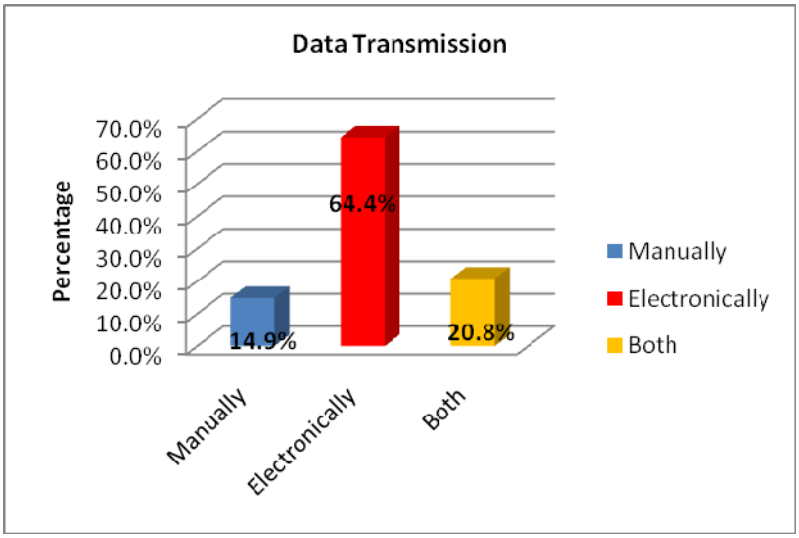


Figure 5.11: Mode of data transmission

20.8% did this both electronically and manually, with only 14.9% transmitting data manually. When the mode of transmission of data was cross-tabulated with the department of the respondent to determine the situation within the various departments within the schemes, it was discovered that a very high percentage of data was transmitted electronically in the MIS (71.4%), PR (62.5%) and Admin/Data Entry (76.9%) departments.

Department and data transmission			
	Percentage (%)		
Department	**Manual**	**Electronic**	**Total**
Accounts	21.4	28.6	50.0
Claims	30.8	46.2	23.1
Management Information System	7.1	71.4	21.4
Public Relations	12.5	62.5	25.0
Data Entry/Administration	11.5	76.9	11.5

Table 5.5: Cross tabulation of department and data transmission method

The transmission of data by manual methods was highest in the Accounts (21.4%) and Claims (30.8%) departments. Given that both these departments dealt with very sensitive information, any improvement in the information management system should aim to develop a means by which the transfer of the premium payment information and claims that are managed by these departments will be more efficiently handled.

Software mostly used by respondents		
	Frequency	**Percentage**
MS Excel	64	62.1%
MS Access	20	19.4%
MS Word	47	45.6%
Other	47	45.6%

Table 5.6: Software used by respondents

Table 5.6 shows the software that is most commonly employed by respondents in doing their work. It can be seen that the most common software employed is MS Excel, with MS Access being the least used software package. The other software package is a bespoke Oracle based system used in the registration and update of scheme members' details.

Amongst all respondents the following advantages were attributed to the current system that is in use. 66.0% were of the view that it was very easy to use, with 53.4% saying that the system was secure. 48.5% opined that the system was accurate with 43.9% and 30.1% giving reliability and speed as advantages of the system. When these advantages were further investigated by the location of the respondents, it was discovered that a lesser percentage of rural respondents as opposed to urban respondents agreed to the reliability of the current being an advantage. This is shown in Table 5.7:

Advantages				
	Urban		Rural	
Accuracy	25	47.2%	25	51.0%
Speed	16	30.2%	15	30.6%
Security	27	50.9%	28	57.1%
Reliability	26	49.1%	19	38.8%
Ease of use	34	64.2%	34	69.4%

Table 5.7: Advantages of current system by location

When asked for their opinions on the disadvantages of the current system, 78% of respondents were of the opinion that the information system was too slow in helping them to manage their information needs. 49.4% commented on the inability to connect to share information and connect to other networks as a disadvantage of the system, with 13.2% concerned with the lack of adequate security systems in place to protect information. When analyzed on the basis of the location of the respondents, it was discovered that urban respondents had a higher percentage of misgivings with the information system on the average, when compared to rural respondents. This is illustrated in Table 5.8.

Disadvantages				
	Urban		Rural	
Connectivity	24	45.3%	21	42.9%
Slow	38	71.7%	33	67.3%
Insecurity	9	17.0%	3	6.1%

Table 5.8: Disadvantages of the current system

Amongst all 103 respondents, 54 of them representing 52.4% of them stated a number of improvements they would like to see in the current information management system. The most suggested improvement by 44.4% of them was for a way to be found to increase the speed with which data is captured, processed, stored and transmitted. This is in line with the main disadvantage that was given about the system. 33.3% of these respondents were also of the opinion that improving connectivity – defined here as the ability to link the data sources, data, applications and the platforms used by the separate departments and organizations involved in the scheme - would greatly enhance the management of data. 27.8% also suggested that any form of upgrade in the current systems would improve data management. Other suggestions included the introduction of Reporting modules, Accounting modules, and enhancing the security of the system.

5.2.3 Satisfaction with current system

In response to a question to determine satisfaction levels amongst respondents using the current system, 14.6% claimed to be very satisfied with the current system. 51.7% of respondents were somewhat satisfied, with 29.2% being neutral about it. 4.5% were of the opinion that they were somewhat dissatisfied with the system. None claimed to be very dissatisfied with the information system.

Having more than half of the respondents claim to be somewhat satisfied can be interpreted to mean that even though they were acceptable of the system in place, they could do with an improvement on it. Also, even though there were no claims of respondents to being dissatisfied with the system, various comments were made during informal interactions with employees to the effect that they were dissatisfied with the system.

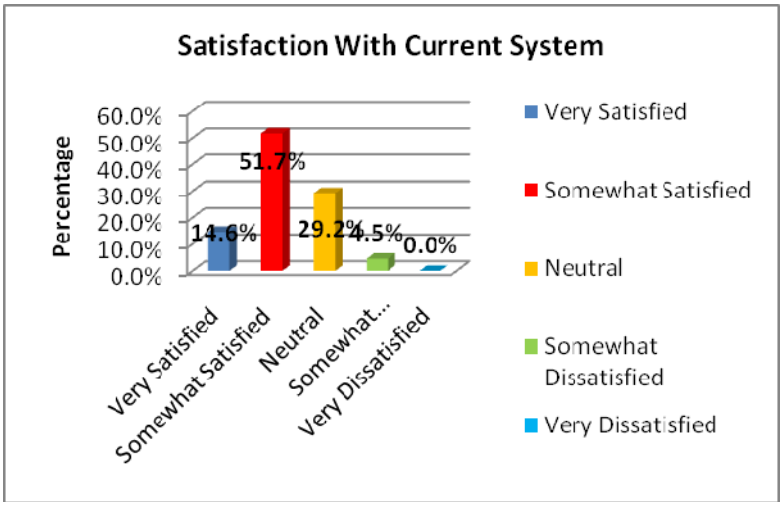


Figure 5.12: How satisfied are you with the current system

The responses to this question were further analyzed to determine if their responses were in any way influenced by factors such as their location, department and level (whether junior or senior staff). As per table 5.9, the percentage distributions of the number of respondents for each level of satisfaction were as Indicated in the table.

Management level		
	Percentage	
Satisfaction with current System	Junior	Senior
Very Satisfied	14.7%	14.3%
Somewhat Satisfied	52.0%	50.0%
Neutral	29.3%	28.6%
Somewhat Dissatisfied	4.0%	7.1%

Table 5.9: Management level satisfaction with the current system.

From this table it can be observed that the percentage of respondents in each of the levels of satisfaction were virtually the same for both senior and junior staff. To find out whether or not if the satisfaction of respondents with the information system was dependent on the management level, a Chi squared test using Yates' correction was performed to this effect where H_0 stated that the level of satisfaction was independent of the management level of the respondent. Yates' correction was used since a number of the observations were below 5. H_1 states that the level of satisfaction was dependent on the management level. The Chi squared value of 0.9652 is less than the distribution table value of 7.815 at 0.05 significance level and 3 degrees of freedom. Thus we can H_0 accept that the level of satisfaction is independent of the management level of the respondents.

To find out if the level of satisfaction was dependent on the location of respondents, a Chi squared test was performed to this effect where H_0 stated that the level of satisfaction was independent of whether a respondent was either based in a rural or urban area. H_1 stated that the level of satisfaction was dependent on the location of the respondents. The idea here is that since more resources are readily available in the urban areas, a lot more of these resources could be mobilized to create a more effective information management system than would be possible in the rural areas. The Chi squared value of 0.5020 is less than the distribution table value of 7.815 at 0.05 significance level and 3 degrees of freedom. We can therefore accept H_0, and conclude that the location of the respondents and as such employees of the HI scheme did not have a bearing on their opinion of the information system.

Finally, the responses to the satisfaction of respondents with the information system were investigated to verify if they were dependent on their department or not. H_0 stated that the level of satisfaction was dependent on the department of respondent, whereas H_1 stated that satisfaction with the current information system was linked to the department of the respondent. The Chi squared value of 12.635 is less than the distribution table value of 21.026 at 0.05 significance level and 12 degrees of freedom. Hence we can accept H_0, and conclude that the attitude of workers to the information scheme was not dependent on the department that he or she works. It can be observed consequently from the above analysis, that the respondents to the questionnaire while not overly enthusiastic about the current information system, were resigned to using it, and that factors such as the position, location or department did not have a bearing on their satisfaction with the system.

5.3 Semi-structured interviews results

The qualitative objective was met by analyzing responses obtained from semi-structured interviews, direct observations and by looking at documents. Interviews were conducted with selected personnel of the health insurance schemes. The interviewees, having been selected by purposive sampling, were chosen because of their position and access to relevant information. This was done to enable a richer picture of the current information system to be drawn. Amongst the interviewees were an Insurance Scheme Manager, a Public relations officer, Claims officers, Management Information System personnel, Data entry staff and an Accountant.

A total of thirteen semi-structured interviews were carried out, with eleven of the interviewees being male and two being female. All of the respondents were asked the same questions, with the responses being analyzed to determine if there were any themes running through them. The adoption of semi structured questions in the interviews resulted in the responses including a variety of comments and opinions. Table 5.10 shows the number of respondents to the interviews and their positions within their various departments.

Position of Interviewees	Location	Number of Interviewees
Accountant	Rural scheme	1
Public Relations Officer	Urban scheme	1
Claims Officers	Rural (1), Urban (1)	2
MIS Managers	Rural (1), Urban (3)	4
Scheme Managers	Rural scheme	1
MIS Staff	Rural (2), Urban (2)	4
Total Interviewees		**13**

Table 5.10: Position, location and number of interviewees

In addition to using the question guide to obtain information from the interviewees, informal conversations were also held with two of them on a wide range of issues to augment my knowledge of all the operations and intricacies of the schemes. There was one each from a rural and urban based scheme. This information was not however included in the data for analysis. The main areas covered in the interviews were the media currently used in sharing information, gaps between information needed and what is currently available, problems related to data management, barriers and obstacles to managing information, and possible improvements to the current system. The list of the interview questions is included in the appendix.

5.3.1 Data sharing media

In order to find out how information was shared within the organization, respondents were asked to list any media currently being used in sharing data. Since the success of the scheme depends on the ability of data and information to be moved between various departments within the scheme, and also between the scheme and partner organizations, it was important to find out what media were employed in sharing data and information. Responses to this question indicated that there were a number of ways in which this was done as indicated in the excerpts below. Within urban based HI schemes typical responses included the following:

"We have what we call a digital network here, and I just use it to send reports by email when they are requested from me."

"There is an internal email system running MS Outlook on the intranet within the organization, which can be used to share information. Outside of the scheme, we either use the phone or physically visit the organization in question, to obtain or give them data."

A respondent from a rural based scheme gave the following response:

"The claims department visits the health delivery facilities to receive records and to talk to clients about service provision when they need to."

It was discovered during the course of the interview that even though in theory, every department within a scheme had access to the intranet, in practice only specific departments (MIS, Claims) within the scheme had access to it. Those departments without access to the intranet were generally of the opinion that their work was made that much more difficult because of this. Any transfer of data was laborious and error prone and had in some cases led to *"data redundancy and duplication"*. Schemes located in rural areas also were mostly without access to the intranet, as they were either not connected to the network, or where they were suffered from significant "down time" to the network.

5.3.2 Gaps between information needed and what is currently available

The interviewees were also asked to identify any gaps that they feel exists between the information that is currently available and what they need. This was to determine the extent to which the current information system was able to provide the information needed to help them to appropriately do their work. Amongst the responses were the following:

"Querying the system to know current active members is a problem. There is no access to live data, and manual recording and tallying of data could possibly lead to redundancy and duplication. There are problems with "dead" records which are taking up storage space."

"For example I will like to be able to find out about the attendance at a health facility today, but that is not possible. The earliest time I have access to this data is at the end of the month, or when the facility decides to submit their data. Data is therefore subject to manipulation by some of these facilities, and we have on occasion had reason to suspect that this was going on in some facilities."

With regards to gaps in information, the general consensus amongst the interviewees was that there was a lack of live data, which hindered reporting and efficient management of resources within the scheme. All the data that was available to the schemes are obtained on a regular basis from the headquarters. This was either by being connected to the internet, as some of them are, or by receiving the data by physically travelling to the regional office and having it copied by using a USB memory device.

5.3.3 Problems related to data management (access, storage, manipulation, transfer)

Even though data is sourced at the district level, the data is centrally stored at the head office in Accra via the internal network. There are however issues with this in that even though all district schemes are supposed to be connected to the national internal network, in reality quite a number of them currently do not have access to it. This makes the keeping of up to date records of the schemes operations very difficult, as other means have to be found to adequately transfer data to the head office. This situation is also replicated in the access of the district schemes to information from the health service facilities. Some of the facilities are able to communicate with the district schemes via network, whilst others are not. One urban based interviewee said that "*all government run health service facilities are joined onto the network, and the private facilities are not on the network. To help the private facilities therefore have up to date records of their clients, the MIS staff have to go around regularly to these facilities to update their records. In cases where records are not kept electronically or where there the facilities lack the staff to manage records; this has to be done manually."*

A couple of rural based interviewees also said; *"we have something regularly here called downtime time with the network, during which time the network is not working. This impedes data movement".*

"We sometimes have problems with viruses during the transfer of data."
"*There are sometimes problems with the accuracy of the data sent to us."*

5.3.4 Barriers and obstacles faced by the organization in managing information. In analyzing the responses given by the interviewees to this question, a number of opinions were given as to what the perceived barriers and obstacles to effective information management were. For a number of interviewees the main obstacle being faced in managing information was the current system of having *"the creation, deletion and updating of client accounts being only done at the head office".* Another put it this way: "*in my view the main barrier is that currently all administration is done at the head office in Accra"*. As previously mentioned this means at any given time district schemes and health service facilities do not have access to "live" data, but have a snapshot given to them as at a specific previous date.

Other interviewees were also not overly pleased with the technology that was available to the scheme. One of the views expressed by a rural based interviewee was that: *"there is a lack of adequate technological systems to help us do what we have to do". The manual systems make for difficult reporting; there is a need for automation". "In my department there is a woeful lack of computers with which to do our work. There is 6 staff to 1 computer"*. Another (urban-based) also said *"the low bandwidth used in the internal network where it is available, greatly slows the network, with very frequent downtime for the network. This leads to delays in sending and receiving data on the network*". Even if the system is not ideal as some of the interviewees intimated to me, the "lack of reliability" further hinders it.

5.3.5 How can the information management system and the use of information be improved

At the district level, the main use of information by the insurance scheme is to detect the level of enrolment, and to prepare basic reports on client's queries. For this to succeed there is the need for data being inputted to the system to be very accurate, and for there to be an increase in the availability and reliability of the current system. Were information to be used in the strategic management of the scheme at the district level, "there would be the need for "*appropriate storage facilities*", "*improved security*", and "*staff training*". These were the views of some of the interviewees.

5.3.6 Proposed improvements in the information management

Given the issues interviewees have with the information system, one of the main improvements that they would like to see is for the information system to be decentralized, with more authority given to the managers at the district level to manage their information. Specifically some of the interviewees were of the opinion that having access to live data, as opposed to snapshots of data as at a date in the recent past would greatly enhance their work. "*It will reduce duplication and redundancy*".

Another interviewee was of the opinion that an enterprise or integrated system for the scheme, which brought every facet of work carried out under one encompassing system would greatly aid the management of data, and eliminate many of the current errors and delays experienced. One interviewee opined that "*the current fragmentation leaves a lot to be desired. Every department within the scheme either has or operates their own system which is does not have the ability to communicate with other systems within the scheme". "Having one system that has different interfaces or sections opened to the departments that need them, but with a common platform on which data and information could be easily shared would be very beneficial".* As is the current case, every department runs their own system that captures, manipulates, stores and transmits information. Many of these do not directly "talk" to each other. Whilst some of the departments have systems developed by the

national body to oversee that section, other departments have to make do with either paper based systems, or in some cases have developed their own in house computer based system to do aid in their work. In such cases as one interviewee said "*should a system be developed at the head office for our department, we may have problems with migrating data from our in-house based system onto it".*

Other improvements suggested include the ability of the photographs of clients to be seen when their records are called up. The present hidden picture with client data was described by one interviewee as "*not very good*". Another improvement also suggested was for the adoption of a more user friendly interface with the system. The current Oracle based system and its interface deemed to be not very user friendly.

5.4 Field observations on the functioning of the health insurance schemes

In this section the discussion would centre on the observations made and the perceptions formed during the field work. The section would also include responses given to the researcher through informal conversations with staff, as opposed to the formal responses obtained during the interviews. In describing the present state of the HI scheme it would be right to say observations made in the urban areas were quite different from those made in the rural areas. Differences in the operation of the scheme within the Ejisu-Juaben, Asokwa, Bantama and Subin districts (urban) and the Kwabre East, Atwima Nwabiagya, Sekyere East, Sekyere South and Offinso North (rural) districts will be illustrated in the following findings in the segment below.

5.4.1 Findings on the existing information and communication technology in the scheme

The HI scheme is responsible for the management and coordination of information within scheme, in collaboration with affiliated health service providers. ICT equipment therefore required for the management of information in the scheme will need to be possessed by the scheme, if it be able to carry out its responsibilities effectively. Some of the offices lacked the adequate resources including skilled manpower, access to the corporate network, computers, software and affiliated tools needed to

adequately manage the system. Whereas ICT equipment was provided in the urban areas, the same could not be said of schemes in rural districts. For example in one rural district, the accounting department which had three staff members had only one computer to account for the flow of monetary resources in and out of an ever expanding scheme. Without any dedicated software to do their accounting with, the scheme used notebooks to record transactions by hand, and later inputted then into Microsoft spreadsheets to create reports when they had to be sent to either the scheme manager, regional or the national offices. The use of paper based information systems was a common feature observed in districts that had challenges in the use of ICT equipment. For example it was noticed that all claims within the rural based schemes had to be presented on paper forms to the scheme by the health service providers which potentially led to errors in verifying the huge numbers of claims, and delays in reimbursing those that were approved. Some urban based healthcare providers on the other hand had the ability to complete and send claims to the schemes in a digital format, thus speeding up the process and reducing errors. It was observed for example in the Kwabre East district that hundreds or probably thousands of claims had been strewn on the lawn in front of the scheme office building, and were being verified by a few employees in broad daylight. Such a practice raises issues of confidentiality, and the possibility of the destruction of a large number of documents were there to have been a sudden thunderstorm for example.

Within the urban based schemes however, there was not any situation observed of the lack of computers, or software required to manage their information. In my informal interactions with the manager of the afore-mentioned accounts department, he complained bitterly about the workload, lack of staff and the inadequacy of the systems at his disposal to effectively do his work. He also complained about not being motivated anymore as a result of this and other conditions attached to his service. To help alleviate the lack of functioning ICT systems to assist in their operations, it was observed that temporary personnel in the form of national service personnel had been drafted in to help the schemes cope with the work load. Since the personnel were there only for a maximum of nine months and were poorly paid, their output according

to one rural based manager was not the best. In this rural based manager's view, they were there to fulfil their obligation of working for the government for a period, and combined with their poor conditions of service, did not give off the best with regards to work attendance and quality of work. They also had to be trained to do the work, but then were off to find a better one as soon as they had completed their obligatory 9 month service to the government. Also present in most of the schemes observed were satellite receivers which are supposed to be used to hook up individual schemes to a nationwide network. What was observed however was that amongst the rural based schemes all of them were not operational. A result of this was that the ability to exchange information quickly and securely with partner organizations which was available to urban based schemes was not available in the rural areas. Even though all the scheme offices had access to land line telephones, the same cannot be said of residents in the surrounding areas, especially in rural areas. The most common equipment used in verbal communication, and in sending short messages seemed to be the mobile phone.

It was also observed that there were a number of forms that collected the same information about clients several times. Since most of the contact with members began with the completion of a paper form before being inputted onto a computer based system, the data that was collected by the form had most likely been collected on another form or during an earlier encounter. This has led to the situation where client details are collected at several points, leading in many cases to duplication, inconsistency and redundancy of data. This system of collecting the same data for a member who accesses a service in the scheme also creates problems with data storage, as the paper forms had to be stored after they had been used. For example the membership application form, the membership renewal form and the ID replacement form contain several fields which collect the same data. Whilst this was the issue across both rural and urban districts, problems with storage were more pronounced in rural schemes given that they used a lot more paper-based forms.

5.4.2 Findings on the existing infrastructure

With regards to infrastructure it was observed that there were many similarities, but also notable differences with regards to what was available to both sets of HI schemes. All the schemes that were observed had newly purpose-built office buildings which were furnished with computers and communication equipment. The main differences were in the number of functioning computers and communication equipment available. Urban offices seemed to have more of these available to them. Rural district schemes suffered from a paucity of access to transportation and communication facilities and technologies. Access to roads, telephones, electricity, and the internet were poorer, as compared to that of urban based schemes. With the exception of the main trunk roads that passed through the centre of the rural districts, the vast majority of the roads serving the district were of very poor quality. A result of this is that journeys that should take a few minutes, took hours to complete. The lack of alternate sources of electricity and the cost of power outages was observed at one rural scheme, where a power outage led to the cessation of all the work that needed to be done using computers. Some workers sat idle for a long period due to the lack of electricity to get their computers running. Such frequent power outages causes delays and also leads to the destruction of the few ICT equipment available.

The lack of adequate physical infrastructure was also said to be the reason for the lack of qualified personnel in technical positions in rural areas. One departmental manager in a rural scheme made it known that he commuted from Kumasi the regional capital to the district scheme office daily, as he could not live in the rural area with the lack of amenities, even though this substantially increased his transportation costs. He further stated that he was looking for another job close to where he resided, and would leave should he get one, or failing that even look to emigrate from the country.

Another observation made was that the offices of urban based schemes were always very full of people coming to register, renew membership or conduct some other business. This was however not the case with the rural based schemes. A lot more

mention was made of field workers in rural schemes, and there were fewer people coming to conduct business in the offices. Given the isolated, dispersed and relatively poor transportation services available to rural populations (Huggins & Izushi, 2002), it could be inferred that the relative lack of high volumes of human traffic in the offices could be explained by the state of the road infrastructure. According to Huggins (2001), a weak transportation infrastructure is a major cause of social exclusion in rural communities, as it was an enabling factor in preventing significant proportions of the population from accessing places and services.

5.4.3 Findings on the existing human resource

Observations carried out revealed that there was a lack of skilled manpower with a very deep understanding of the health insurance process and affiliated areas, including information systems and data analysis. The very knowledgeable staff seemed to be based in the urban areas, and for those based in rural districts, showed in their interactions that they were either not too keen to be working at the scheme or were not wholly committed to the project. It cannot be said categorically that this was the general case for all rural based skilled personnel, but for instance, the MIS manager for a rural HI scheme told the researcher of his web page designing business which he did on the side to supplement his income, and produced his business card to confirm this. Given that the salary scales are the same for employees regardless of location, the relatively higher turnover of staff that was found to exist in the rural areas would most likely be due to infrastructure, or the office conditions and equipment available to employees.

Most of the employees that were seen at the scheme offices seemed to be under the age of 35, had recently completed their education, and were on their first job. Given the salary structure being equal in both rural and urban areas, an argument could be made for an improvement in office conditions and equipment leading to lower rates of staff turnover in rural district schemes.

Given the tools at their disposal, it was observed that the output of staff in operating the processes within the scheme both in the rural and urban districts was highly commendable. Membership registration, premium collection, the registration of service providers and claims processing were done with as much efficiency as could possibly be, given the environment within which staff operated. This is also viewed within the context of an ever increasing workload given the massive increases in membership and claims in the years following the establishment of the HI scheme (see Chapter 3). With a more efficient system in place, and even with all other conditions remaining constant, an argument can be made for an even better delivery of service in the NHIS.

5.4.4 Findings on the processes within the scheme

The main processes that are undertaken by each scheme includes the following,

- Registration of members
- Membership renewal
- Provider management
- Claims processing
- Provider management

5.4.4.1 Registration of members

A client can be registered either in the field or at the scheme office. To do this the potential client fills a form and pays the required premium either partially or in full. After this the potential scheme member's information is then entered into the computer system and then has their picture taken (this is for those registering for the first time). The client's information from the district offices are then sent in batches to the national headquarters (after clients fully pay up their premiums) where identification cards are issued to enable the client begin using health services as a member of the scheme. The waiting period for a client to obtain a card lasts about 3 months. For rural based clients initially registered in the field (outside the office e.g. their homes or work places) they usually have to wait even longer to obtain their identification cards. This is because the field agents have to travel long distances and

in many cases on foot (especially in the rural areas, where the communities are small and widely scattered) to reach potential clients. This means they (field agents) usually wait for clients to finish paying their premiums before sending the details of potential scheme members to the office for them to be entered into the system. The most likely scenario is for potential and existing clients to pay their premiums over a period of time mainly due to poverty, resulting in a lack of funds. Within urban areas, clients are registered as they walk into the scheme office. Membership drives are usually undertaken on a regular basis to sensitize the general public as to the benefits of the scheme and to encourage them to sign up.

In cases where the potential clients are registered away from the scheme offices and especially live in rural settlements, delays in receiving the payments from the potential clients and scheme members coupled with the manual accounting techniques in use, usually causes severe delays in the registration process. Further problems also come up through data duplication, fragmentation and human error in the recording of data. There have also been instances where the paper records of premium payments made have gotten missing or damaged in the field. Please see the appendix for sample registration forms.

5.4.4.2 Membership renewal

Information systems in the urban areas are connected via a network to the national head office. District schemes in the urban areas therefore have easier access to current client data. Connections to some of the urban service providers also mean that these providers are able to more effectively screen potential users of their services. Where district schemes and health service providers do not have access to current data, unscrupulous people can present either false or expired identification cards to access services or to have them renewed.

5.4.4.3 Provider management

Within rural areas health service providers are not connected to the internal network of the health insurance scheme. The same situation applies to private (non-

governmental) service providers in urban areas. Within urban areas however, information can be quickly exchanged between public urban based service providers and their district schemes due to their interconnection via the schemes internal network. Information interchanges between insurance schemes and rural-based service providers or with private service providers however takes much longer. Not being connected to the network hampers the fast and efficient processing of claims, updating client information, and the general information management process.

5.4.4.4 Claims processing

All government owned health services providers are supposed to be linked to their local district health insurance scheme via a network. In reality however this is not the case in the rural areas, but quite successfully operational in the urban areas. The internal network available to the schemes and service providers in the urban areas means claims originating from government owned urban health service providers can be submitted and verified quicker than that of either private or rural based health service providers. Within rural based HI schemes, paper based claim forms are usually completed and sent by the healthcare providers to the district scheme offices in batches at the end of each month. The result of this is a large number of paper forms which arrive at the scheme offices from healthcare providers at the end of each month. Once there the forms are manually vetted, and if approved entered into the computer system, before being sent usually by email to the national head office for further scrutiny and reimbursement. Since the forms have to be manually validated and investigated for compliance to standards, they consume a lot of time and are prone to misjudgements being made due to mistakes and oversight by tired staff. Incomplete claims that have to be sent back for completion also increase the time taken to process claims. Forms can also get lost or damaged, which also negatively impacts on the claims process. In urban based schemes, the availability of the internal network enables claims forms to be completed and sent online. This speeds up the process and reduces the errors made in completing the claims forms, as validation features in the online claims form helps to improve the accuracy of the completed document. This urban situation is illustrated in Figure 5.13.

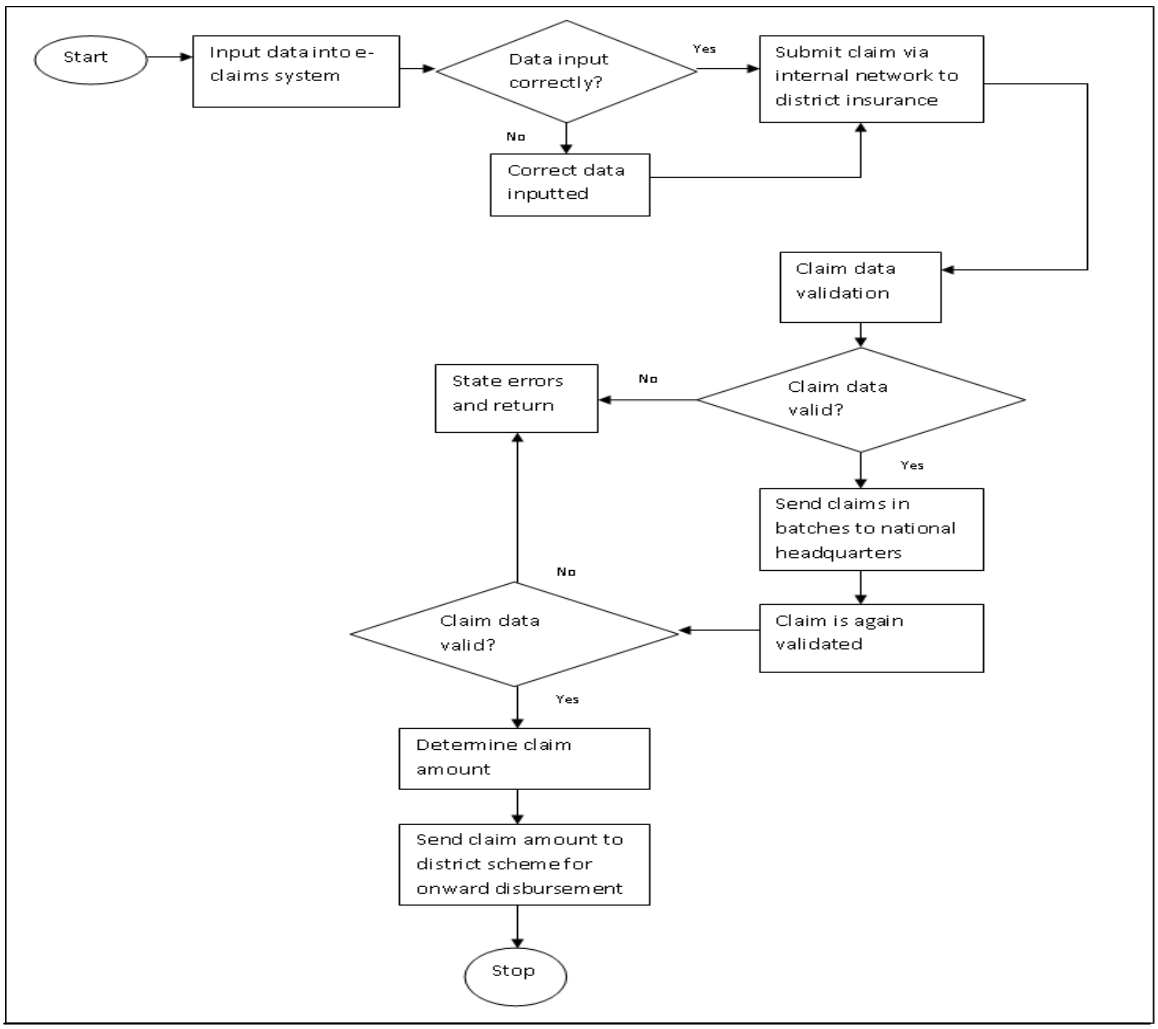


Figure 5.13: Flowchart of claims processing by public (government owned) urban-based service providers

5.4.4.5 Premium collection

There are 2 different methods of making premium payments which greatly impacts on the management of the information of scheme members. After paying at a scheme office the records of the member can be updated immediately. This is however not the case when payments are made to field agents. Due to the dispersed nature of settlements in rural areas, field agents tend to wait till all payments are made by members before submitting them to the scheme offices. This results in delays in updating records, and delays the membership registration and membership renewal processes.

5.4.4.6 Other issues identified.

One issue that was identified is that the information system does not allow for the pictures of clients to be shown on the screen. This makes the identification process laborious, especially when scheme members report their cards missing and have to be issued with temporary identification documents to enable them access health services.

There also seems to be no direct policy on filing documents. The large number of documents received by the district schemes are often placed in boxes and stacked in rooms. This was mostly prevalent in rural areas, due to the sheer volume of client records they deal with, and the manual nature in which they were processed. This situation seemed to cut across all the departments in the schemes, and it was not uncommon to see tired employees working on these stacks of documents. Fatigue could also lead to errors in recording or verifying documents.

5.5 Summary

Chapter Five has presented the results of the questionnaire survey and the results of the interview, as well as the findings on the observations made by the researcher during the field work. The Chapter analysed the results of responses made to the questionnaire and presented graphs and cross tabulations to interpret the responses. With regards to the interviews, responses were codified to find general themes in the responses, which were then presented in a narrative, giving quotations of critical statements made by the interviewees to back up the narrative as was found necessary. The final segment of the chapter also presented the findings of observations made during the field work grouped under four sub headings namely; findings on the existing ICT, findings on the existing infrastructure, findings on the existing human resource and finally findings of the processes within the scheme.

The following chapter will compare the conceptual model of the HI scheme as previously described in Chapter Three, to the real world situation as described in Chapters Four and Five. The result of this will be recommendations for change that

will be employed in developing the proposed information management model. Following this, graphical conceptual models of the various processes within the scheme that will counter the issues that have been raised about the effective management of data within the current information management model will be developed with the aid of the Natural Conceptual Modelling Language (NCML).

Chapter Six – DISCUSSION

6.1 Introduction

The previous chapter presented the results of the questionnaire, as well as responses obtained from interviews made to selected employees of the scheme in both rural and urban based schemes. Added to this was a narrative of observations made in the operations of both rural and urban based schemes, contrasting the technology, social infrastructure, human resources and the various processes being undertaken in the scheme.

The themes emerging from the analysis of data from the questionnaire, interviews and observation have mainly to do with the 'lack of appropriate technology', as well as 'old and failing infrastructure'. Issues identified from the analysis of the data include the following:

- The majority of data used within the scheme is obtained from members of the scheme. Depending on the location of the scheme, the technology available for the collection of data from scheme members operates effectively and efficiently to varying degrees.
- There is a very high level of computer use within the scheme. This is the in both in rural and urban based scheme operations. This is suggestive of a very technology literate workforce.
- A large percentage of the data used in the schemes' operation, most especially in rural based schemes is obtained through manual methods.
- The majority of data in both rural and urban areas is however stored electronically. This reveals that a great amount of time and effort is being spent particularly in rural areas just to convert manual data into an electronic format.
- There is a significant amount of disruption on the network used in the transmission of data.
- There were also marked differences in the social infrastructure including roads, housing and electricity, as well as human resources available to schemes in both rural and urban areas.

- All of the above mentioned factors impacted on the ability of the HI schemes in both rural and urban areas to adequately perform the processes needed for the optimum functioning of the HI scheme.

6.2 Results of data analysis

The initial part of this chapter will address the first research question, which is "How is information managed within and between the rural and urban based Health Insurance schemes, given the technological constraints?" The themes emerging from responses to the questionnaire, interviews and the data obtained through observation will be incorporated into the discussion, with links being made to the relevant literature.

Information management includes the creation, organisation, maintenance, manipulation, sharing, communication and disposal of information using a variety of tools, techniques, standards, languages, processes, methods and hardware (Lee et al, 2005; Hicks, Culley & McMahon, 2006, see Chapter 3). To establish how information is currently being managed within and between rural and urban based HI schemes, data obtained from responses to the questionnaire and interviews, as well as observations made during visits to various scheme premises was analyzed. The results show that even though there is a system in place for managing information, there were differences in the operation of the information management system, between HI schemes based in the rural areas and those based in the urban areas due to infrastructural and technological constraints (see Chapter 5). The adoption of the current information system put the districts that did not have the required infrastructure and technological capacity to implement all the components of the system at a disadvantage. According to Hicks, Culley & McMahon (2006) many organisations expend considerable resources in acquiring ICT to manage their information resources. Even though investments in ICT were made by these organisations however, they noted that the benefits to the organisation were realised depending on how the ICT was deployed within the organisational setup.

Even though no evidence was found of direct information flow between individual HI schemes either in the rural or urban areas, there was evidence however of the movement of information between rural and urban based HI schemes and the regional and national head offices which are all based in urban areas. This suggested that the information system was not required to necessarily have channels of communication between schemes, but was required to have channels of communication between the district HI schemes and their regional offices, as well as the national head office. It was also vital for communication channels to be available linking the HI schemes and health service providers, as well as members of the schemes.

In the light of these results, the discussion in this section will centre on how these constraints affect the management of information in the rural and urban based HI schemes in Ghana. The discussion will be focused on the following topics:

- Old and failing infrastructure
- Lack of appropriate technology

6.2.1 Old and failing infrastructure

Information is said to be the lifeblood of organisations (Zeffane & Cheek, 1994, see Chapter 3), and Ferris, Burns & Liatsopoulos (2007, see Chapter 3) attribute one of the main barriers to effective information management as being that of old and failing infrastructure. Given this, it stands to reason that the NHIS would take the necessary steps to ensure that the appropriate infrastructure was in place to ensure the effective and efficient management of the organisations information resources. The findings however indicated that the management of information is greatly hindered by the currently available infrastructure, and is a contributory factor to the differences in the way information is managed by rural or urban based schemes. This confirms the assertion made by Daudi (2004) and Furuholt & Christiansen (2007) that the introduction of management information systems in developing countries is mainly at the national and regional levels due to inadequacy of the technological, political and legal infrastructure.

As indicated previously in the literature review, there are differences between the infrastructure available in the rural and urban districts (Daudi, 2004; Rao, 2005); and these differences have influenced the collection, storage, manipulation and transfer of information within the HI scheme. Rural districts are generally characterized by poor transportation infrastructure, poor water and electricity, inadequate housing and inadequate sanitation conditions, as a result of the lack of adequate investment in either maintaining or upgrading the infrastructure available (see Chapter 4). Where these facilities exist in any of the rural areas, they are almost always in a state of disrepair. A result of this is that, the technology available to residents and organisations and the HI scheme in particular, as well as the skilled personnel needed to operate them is greatly hindered (Braa et al, 2007).

Evidence of the impact of the old and failing state of the infrastructure on the management of information within the HI scheme was found for example in the tendency of rural based field officers to keep the personal information and premium payments of clients for long periods before sending them to the district office, thus reducing the number of journeys they had to make to the scheme offices from the field. With the majority of data used in the scheme coming from the scheme members, it is imperative for data collection from the members to be done in a very efficient way. The delays in collecting and sending data most especially in rural based schemes has led in many cases to data redundancies and duplication. The main reason given for holding on to data for long periods was because scheme members in rural communities lived in dispersed and distant settlements which were mostly connected by very poor roads. The movement from these settlements to the HI offices therefore became a very difficult task, especially if it had to be done regularly. Given the nature of the road infrastructure, journeys that could be done in minutes could take several times longer because of the bad nature of the road network.

The intermittent supply of electricity, stated by Rao (2005) as one of the main infrastructural bottlenecks working against the introduction of ICT's in rural areas, also led to frequent periods of inactivity at the scheme offices, especially where electricity

was required for the completion of the process. It was discovered through observation during the survey that power cuts in rural based schemes led to the cessation of all computer based activities at the HI scheme offices. No evidence was found of alternate power sources at any of these schemes to counteract the effects of these power cuts. Power cuts meant that aspects of membership registration and renewal, claims processing and premium payments either had to be suspended, or delayed during these periods.

This was not however the case in the urban based schemes. The relatively more advanced infrastructure greatly reduced the constraints on the movement of field officers. The better road network made it possible for both scheme employees and members to travel much easier. This eliminated the practice prevalent in rural based HI schemes of field workers keeping information for long periods before submitting them to the scheme offices where they are needed. A result of this is a reduction in the cases of data redundancies and duplication, which blights data in rural based HI schemes.

The power supply required to operate computers and other equipment in the schemes experienced a lot less outages in the urban districts. This meant that the tendency of rural based HI schemes to experience lengthy periods of inactivity due to the lack of electricity to operate their computers and any other electronic equipment was greatly reduced. Processes therefore carried out in the field by HI staff in the urban areas, were usually completed quicker, and with fewer errors. Also, the availability of better housing, water, and other basic social amenities as opposed to that of the situation in rural areas means that the technology required and the skilled personnel needed to operate them are readily available and in abundance in the urban districts.

6.2.2 Lack of appropriate technology

The current information system in use by the HI scheme ideally requires the use of computers and computer networks, appropriate data storage facilities and efficient communication systems, if it is to be able to function at an optimum level. The nature

of the information system however has led to significant differences in the way data is managed amongst various schemes, depending on the technology operable and available to the individual schemes. Where schemes have access to the required technological systems needed to optimally operate the information system, they stand at a distinct advantage as opposed to those that do not have access to these systems. It was discovered from the data sources (questionnaire, interview, observation) that communication systems employed in the HI scheme were inoperable, unreliable, expensive and unavailable in certain sections of the country, particularly in the rural areas. Some of the responses during the interview were:"lack of computers", "lack of appropriate software", "low bandwidth", "the network experiences frequent downtime" and "the satellite receiver has not worked since it was installed". Within the context of the location of HI schemes there is therefore a clear digital divide that exists between schemes located in the rural areas, and those located in the urban areas (Chapter 2). Urban based schemes have access to communications equipment and digital networks that rural based schemes do not have access to.

In spite of the presence of satellite receivers in all the schemes included in the survey, it was discovered that for rural based schemes, they were either not operational or when they were operational, experienced significant 'down-time' which rendered them almost inoperable to the employees and other interested parties of the scheme. A result of this is that information which could either have been received from or sent to other parties electronically is done using manual methods. It was discovered during the observation that whereas urban based schemes could receive completed claims forms electronically form some health care providers, the same option was not available to rural based schemes. This confirms the assertion made by Braa & Blobel (2003) that paper-based systems were mostly used in rural areas in data collection and reporting with a lack of integration and the poor use of information being recognized as problems that could be potentially encountered in using such systems. Urban based schemes were therefore able to complete the claims process quicker and with more efficiency and accuracy, as opposed to that of their rural based

counterparts. The problems regarding data network transmission also confirmed the assertion made by Rao (2005) that organisations unable to conduct their business over digital networks risked being left behind by those who did so. At a government run health service provider in a rural district it was found out that in spite of the presence of a satellite receiver that had been installed there when the service provider joined the scheme, the satellite receiver had never functioned before. There were also no computers to setup the information system. A result of this was that the provider (the main hospital in the district) used manual paper based systems in managing information with regards to the HI scheme. The differences in the rural and urban based information management systems described here are consistent with those of Rao (2005), and Mosse & Sahay (2003) who registered the lack of technology as a major contributory factor to the digital divide.

The high cost of the components of the current information system also mitigates against its implementation by all the organisations involved in the scheme. As previously observed by Heeks (2002), it came to light that the cost of computers and having a working digital network infrastructure was beyond the reach of some of the healthcare service providers, both in the rural and urban areas. Added to this is the additional cost of having to train staff to keep the systems in continual operation. With the exception of government operated and large private health care service providers, this additional cost burden made the implementation of the information system difficult, and had led to the adoption of manual methods to manage information. It was also discovered that the high cost of ICT devices also meant that several employees sometimes had to share a computer as was elucidated in one of the HI schemes located in a rural district. Employees of the Accounts department at a rural scheme for instance had to take turns in using one computer in this particular district HI scheme. Using manual paper based forms and systems in the rural based schemes to manage their information has also resulted in the problem of having huge stacks of paper forms and the need for them to be appropriately stored.

The topography of certain rural districts and the remoteness of their locations also affected the ability of the information system to function effectively in these areas. In areas with this problem, data networks were unable to function, as satellite systems were incapable of sending or receiving information. Issues with topography and their effect on ICT performance was previously highlighted in the literature by Chetty, Blake & Tucker (2004) and Fosu (2011)

The above section has sought to discuss the question about how information is managed in the HI scheme by the current information system in the rural and urban areas, given the technological constraints. It was discovered that there was a two tier system in place – a digital divide – which meant that there were marked differences in the abilities of schemes to manage their information given the resources and technology available to them. Schemes located in urban areas largely had access to the technology and resources required to quickly, effectively and efficiently manage information. This was however not the case in rural based schemes. Rural based schemes had a number of factors mitigating against them which greatly limited their ability to implement the current information system and enjoy the benefits that the schemes that had implemented them were enjoying.

To obtain further evidence of the differences in operations between the rural and urban based schemes, a comparative analysis of the processes undertaken by the scheme was carried out. The following section makes a comparison between the reality of the current system as obtained from the responses to the questionnaire, interviews and through observation to the processes needed for the system to be in operation as previously detailed in Chapter 3. The results of the questionnaires and interviews, as well as the reports of the observation carried out, have shown the “real world” (current) situation and the difficulties affecting the information management system of the district health insurance scheme in Ghana. Specifically, the previous chapter (5.4.4) highlighted the differences that currently exist between processes carried out in the rural based schemes as opposed to those that are carried out in the urban based schemes.

6.3 Comparative analysis

Chapter 3 listed the activities or steps that must take place in a specific order so as to enable the processes that the organisation carries out to be accomplished. These series of activities known here as the “information management model” (IM model) are grouped beneath the following headings:

- Membership registration
- Membership renewal
- Claims processing
- Premium payments
- Provider management

6.3.1 Membership registration

- **Prospective member/family makes contact at any registration location.** Within the IM model an individual can make contact with the scheme to register either in their homes, workplaces or at the district scheme offices. This was found to be the same in the real world situation. It was however found that there were differences in the proportion of members making contact with a view to registering at the different registration venues when urban and rural schemes were contrasted. Urban schemes had a lot more contacts made at their office premises as opposed to rural based schemes. The poor road infrastructure and the remote and dispersed nature of rural settlements are possible causes of this disparity.
- **Identification is presented and validated.** Following contact, identification documents are presented and validated by an officer to determine the individual’s authenticity, after which his or her eligibility is ascertained. This was also the case in the real world situation, in either urban or rural districts.
- **Personal information is captured.** In the IM model the potential members’ personal information is captured following them being declared eligible to join the scheme. In the real world situation, the method of capturing this information differed according to the location at which it was done. In rural based schemes, this was done mainly using paper forms both in the field and at the scheme’s

offices. Away from the rural schemes offices, information recorded on paper forms were usually kept by the officers on their person in the field until the potential client had completed paying their premium before being sent to the district office for it to be inputted the computer system. There is the potential here for completed forms to be either lost or damaged. There is also the potential for delays in completing the registration process due to the time that elapses between the forms being completed and then inputted into the system. In urban based schemes, a combination of paper forms and computer based forms are used to capture client information. This is mainly due to the large numbers of clients that register at the scheme offices. Some clients have their details captured directly using computer forms, whilst others are captured using paper forms to be inputted into the computer system later.

- **Premium is assessed and paid**. The next step following this in the IM model is for the premium to be assessed and paid. In the real world situation the manner in which premiums are paid depends on the location of the client. The usual practice for payments made in the field in rural areas is for the field agents to keep the payments until the full premium has been made before sending the information to the scheme office for the clients' records to be updated. This is done to prevent the field agent from making long repeated journeys between the scheme office and the clients' location, due to the remote and dispersed nature of rural settlements. A result of this is the possibility of delays in the registration process. There is also the potential for the loss of payment information and data duplication when the information is finally being inputted into the client's database at the schemes office. Clients in rural areas also have the alternative of paying their premiums at the scheme offices. In the urban areas, due to the majority of clients being registered at the scheme offices, most of the payments are made at the scheme offices, and are immediately inputted into the clients' records. Payments made in the field in urban areas are also more easily transferred to the scheme offices and used to update clients' records, due to the advancement in communication and transportation facilities available.

- **Scheme membership card is generated.** The final step in the membership registration process according to the IM model is for the card to be generated. This is accomplished in the real world by having the details of the potential member sent to the national head office where the cards are then produced and then posted back to the district schemes for distribution to the members.

Given the myriad of potential problems and issues associated with the registration of members especially given the unique situation in schemes based in rural areas, a single point of entry where client data recorded immediately sends appropriate sections of the record to both the membership registration and accounting sections will minimize a lot of the issues that crop up in client registration.

6.3.2 Membership renewal

- **Scheme member makes contact at district office**. Within the IM model an individual has to make contact with an officer at their designated district HI scheme office. This was found to be the situation in the real world. All of the aspects of the membership renewal process had to be carried out at the HI scheme offices.
- **Membership ID is verified**. Following contact at the office, the member's identification documents are verified to determine the individuals' authenticity. This was also the same in the real world situation. Identity cards are verified by making sure that security features on the card have not been tampered with, and that the details of the card bearer are on the schemes database.
- **Ascertain if premium is fully paid up**. At the scheme office the clients' financial records are examined to determine if their premiums are fully paid up. This verification was done by the accounts team who then gave a note to the member stating that they were fully paid up. Rural schemes that are not connected to the national digital network do not have immediate access to current data as schemes in the urban areas do. This is due to lack network connectivity. Urban schemes connected to the network, and as such with access to the most current data, were able to accomplish this step more

efficiently. Rural based schemes therefore sometimes have to examine paper based records to ascertain if a client is fully paid up. Using manual methods in doing this has the potential to increase errors, and cause delays in the process.

- **Member is sent to the MIS department, who has the authority to update client details and records.** In the real world situation, clients sent to the MIS department have to wait for long periods before being served. The number of employees in this department was about 3 on the average. Considering the large numbers of clients that had to be served on a daily basis, most of the MIS staff were overworked.
- **Dated hologram sticker is affixed to the back of card to show it is legitimate.** The real world situation was the same as the IM model, in that following the update of clients' details – if it needed to be done – a hologram sticker was affixed behind the card to show its legitimacy. The sticker showed the expiry date of the card.

A means of transferring the most recent data to all schemes as opposed to only those on the network will greatly improve the service.

6.3.3 Claims processing

- **Service provider completes claims form.** In the real world situation the claims form can be completed either electronically or on a paper based form. Paper based forms are used in the rural districts, where the lack of the network connection that exists in the urban districts prevents the utilization of electronic forms. Within urban districts, only government operated health service providers are connected to the network, and as such have the ability to complete the forms online, and send them to the district HI scheme office.
- **Claims forms are aggregated and sent in batches to the district insurance scheme at the end of every month**. In the real world situation, claims forms completed by government operated health service providers in the urban districts are sent to the district HI scheme office immediately upon completion. These forms are completed electronically, and are sent via the electronic

network. For all other service providers, paper claims forms are completed and aggregated to be sent at the end of the month to their respective HI scheme offices.

- **Each completed forms then has to be validated for errors and then investigated to determine if the claim is within the accepted limits**. In the real world situation, subsequent to receiving the forms from the health service providers, each completed form is validated to determine its validity and authenticity. If satisfied with the claim, it is then inputted into an electronic form and then sent to the national headquarters for the claim to be reimbursed. If approved it is inputted into an electronic form and sent to the national headquarters. If it is accepted at the national headquarters, the claim is paid out to the district scheme, who in turn reimburses the service provider. Since claims sent by government operated service providers are already in electronic format, the urban schemes skip the step of converting the paper forms into electronic format. The forms are validated upon receipt and sent to the national head office for payment to be effected. Claims made by the government service providers have a faster turnaround time than that of the others.
- **If the claim is rejected it is sent back to the district office**. In the real world situation, claims may be rejected at the head office, if they are not found to be conforming to acceptable standards. Should the forms be required to be sent back to the service providers for amendments to be made, service providers with access to electronic forms would be able to make quicker changes as opposed to service providers that work with paper based forms.

A system which reduces or eliminates the use of paper forms and speeds up the transfer of information between the healthcare providers and the insurance schemes, will greatly improve the processing of claims.

6.3.4 Premium payments

- **Look through the list of beneficiaries.** In the real world situation the client database is regularly scoured for clients who are in arrears of premium

payments. Rural based clients are contacted at either their work places or in their homes by field staff If payments need to be made. Most urban clients make their payments at the scheme offices.

- **Identify if the member is liable to pay or is exempt.** Client records in the real world situation already have the clients premium payment status included in them. This status is however liable to change for example with changes in age or employment status. Attached to the records is the rate of premium that the client is liable to pay.
- **Find out if member is in arrears.** In the real world clients are issued with receipts for any payments made. Any outstanding balances are also recorded on these receipts. For clients in rural areas, the receipts are the main way of ascertaining the amount of premium in arrears. The loss or destruction of receipts issued may potentially disrupt the process, as it becomes difficult to ascertain previous payments made, especially if there is no electronic copy or paper copy of the receipt. For urban based clients however, payments made are immediately recorded in the clients' database. Thus it is relatively simpler to access information about whether the client is indebted to the scheme or not.
- **Send reminder if member is in arrears**. In the real world situation reminders about arrears are not sent to clients. It is the duty of the client to know his or her financial state.
- **Update membership record and issue receipt if payment has been made.** In the real world all payments made must be recorded in the clients' database record, and a receipt issued to the client. In both rural and urban districts clients are issued receipts upon making any payments, there are however differences in the manner in which the clients' records are updated. Whereas urban clients can have their records updated as soon as payments are made in the office, rural clients paying away from the district offices have their records updated when the field officer goes back to the office. This is usually after a significant amount has been paid. This is done to cut down on travelling time between the office and sometimes very distant and remote communities.
- **Allow member to proceed to MIS department for identity card to be**

prepared if payment is complete. As in the IM model, following the completion of the premium payments the scheme member is directed to the MIS department where their memberships are either renewed (in the case of membership renewals), or to have their details sent off to the head office for a membership card to be generated.

A system that will enable the immediate transfer of information to the district offices about payments made to field agents by members in rural areas will improve data consistency and currency, and improve the management of information within the scheme. The proposed information management model should also have the ability to send reminders to clients about arrears owing, to further streamline the process.

6.3.5 Provider management

- **The potential provider contacts a district scheme**. In the real world situation any provider of health services that wants to be a provider on the scheme will have to go to their local HI scheme office to register their intention to be a part of the scheme. This is true for both urban and rural based schemes.
- **Potential provider presents license to the scheme**. All documents proving the right of the provider to operate must be shown to the registering officer. All documents must be originals.
- **Assess if potential provider meets the qualification criteria**. Following verification of their right to be in operation, the potential providers' facilities are inspected by scheme officers to determine their suitability for the scheme. All service providers in any given category must meet a minimum requirement of equipment, staff and service delivery standards. The same procedure is followed in both rural and urban areas.
- **If potential provider meets criteria, their details are captured**. In the real world situation. Subsequent to meeting the minimum criteria required from all service providers, the potential service provider is required to complete a paper based form which provides their details to the HI scheme.
- **Registration fee is paid**. The registration fee in the real world situation is paid

at the HI scheme office to the Accounts department, who issue a receipt upon receipt of the registration fee.

- **Provider is registered onto the network if possible**. In the real world situation, registering of clients onto the HI schemes internal network is only possible in the urban areas. This is due to limits in bandwidth and a lack of the infrastructure needed to operate this network in the rural districts. Communication and the exchange of information between the service providers and the HI scheme office in urban areas is therefore quicker and more efficient, as opposed to that of service providers in rural areas.

The comparison between the IM model and the real world situation has demonstrated that the current IM model adopted by the HI in Ghana is operating differently depending on the location of the HI scheme: whether it is located in a rural or urban area. This is due to the rural-urban digital divide.

A system that helps to link the health service provider to the HI scheme, enabling the fast and efficient flow of information between them will greatly improve the performance of the HI scheme. Linking service providers and the HI scheme will improve the dissemination of information, claims processing and the monitoring of service providers.

The study has also previously shown in Chapter Two that the widespread use of mobile phone technology in Ghana, and its ability to overcome the barriers resulting in this divide make it an excellent tool for developing any IM system to bring some level of parity in the management of information within the HI scheme, regardless of location.

6.4 The proposed information management model

The previous section compared the IM model of the information management system of the HI scheme in Ghana, with that of the real world situation. Differences between the two scenarios as well as possible solutions to the any issues raised were then

highlighted. It is the aim of the researcher to employ mobile phone technology as a means of dealing with the issues raised with regards to the current information management system. In this section the various processes undertaken by the various departments in the health insurance scheme, as well as other concepts that are relevant to the operation of the scheme, will be explained in light of the proposed information system with the aid of the Natural Conceptual Modelling Language (NCML). Other concepts including the regulations governing the scheme and the organisational structure of the scheme are included to bring a deeper understanding of the schemes' operations.

To begin with a narrative of the proposed model will be written. This will entail the various processes undertaken by the scheme at the district level, and include innovational concepts which in the opinion of the researcher will help to improve the management of information within the scheme. The narrative will then be analyzed to produce graphical conceptual models of the processes that are involved in the operation of the district schemes. During the modelling of the narrative, each statement or group of related statements will be considered separately. The analysis section adapted from Boyd (1998) and Boyd (1999) is organized as follows:

- The original statements are quoted.
- The statements are rephrased through a series of transformations.
- Each transformation is done so as to preserve the original meaning.
- Each transformation is identified as being either semantic or syntactic.
- The statements are rephrased until suitable for modeling.
- The final statements are composed into graphical conceptual models.

6.4.1 Application of mobile phone technology

As previously stated in Chapter Two, the advantages and features of mobile phone technology make it an ideal platform in the quest to develop an information system that will overcome the challenges that the current information system has not been able to appropriately deal with, particularly in the rural areas.

In applying mobile phone technology to the health insurance scheme, the existing forms used for client data collection, recording premiums and other payments, as well as in processing claims will have to be analyzed, condensed and reformatted to enable them to be used on a mobile phone platform. The forms can then be used to capture information and have them stored on the mobile phone. Structured data entry via the use of check boxes, radio buttons and lists will help to speed up the data capture process and increase data accuracy. Using GPRS the captured data can also be sent to a centralised database located on a dedicated server at the office of the health insurance scheme. The flow of data within the proposed system is illustrated graphically below.

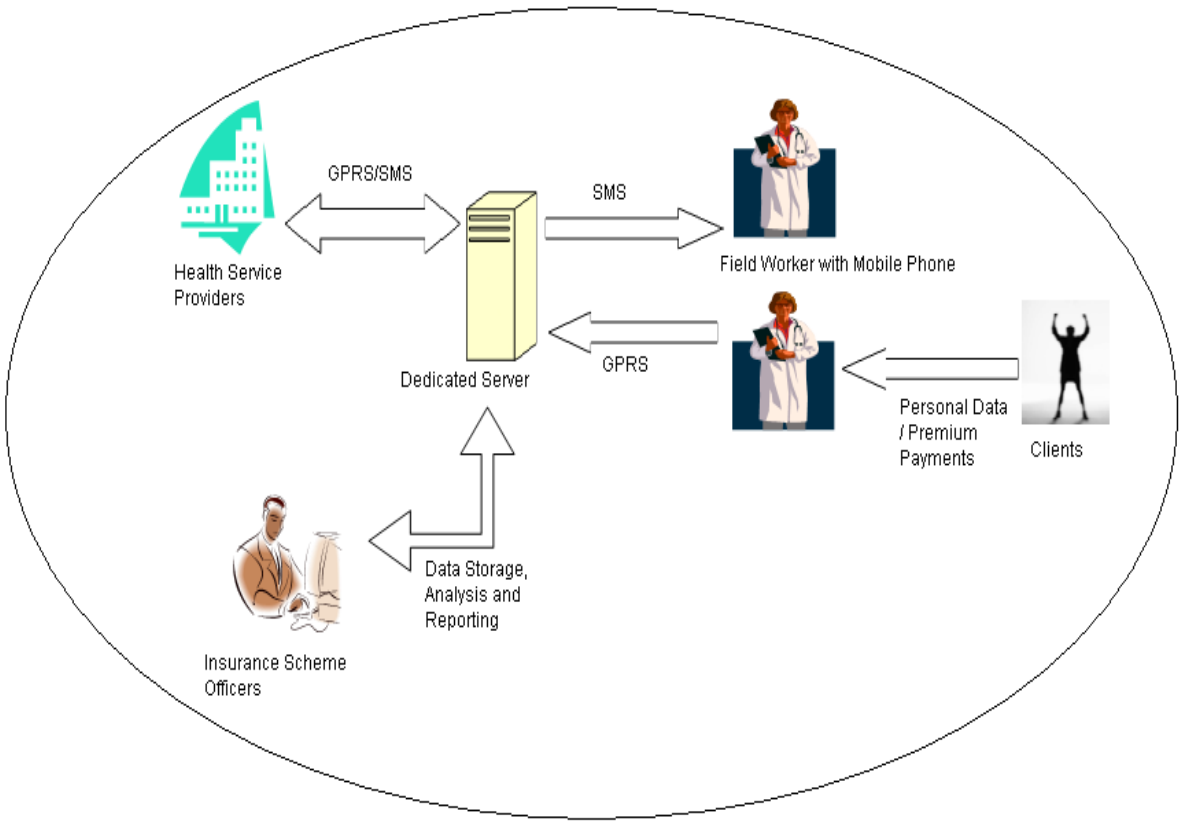


Figure 6.1: Main flows of data within the proposed information system

As shown in figure 6.1, field workers with mobile phone applications can capture personal data and premium payments from clients and send them by GPRS to the

dedicated server. Health service providers can also share information with the insurance scheme office using mobile phone technology via GPRS and SMS to the dedicated server. In turn officers at the insurance scheme office can query the data sent to the server and respond using mobile technology either through GPRS or SMS or both.

6.5 Narrative of the proposed model

The way in which the proposed system will work in light of the main processes undertaken by the scheme are as follows:

6.5.1 Membership registration

A client can still be registered either in the field (outside the office e.g. their homes or work places) or at the scheme office.

When registering at the scheme office, the current registration procedure will continue to be followed. To do this the potential client fills a form (the condensed form) and pays the required premium either partially or in full. After this the potential scheme member's information is then entered into the computer system and then has their picture taken (this is for those registering for the first time). The client's information from the district offices are then sent in batches to the national headquarters (after clients fully pay up their premiums) where identification cards are issued to enable the client begin using health services as a member of the scheme. The waiting period for a client to obtain a card lasts about 3 months.

To counteract the delays and potential issues previously stated to be associated with registering clients in the field, mobile phone technology is suggested as an appropriate means of registering clients, recording payments and transferring the information to the scheme offices. When a potential client makes contact with a field worker, their personal information will be captured on the mobile phone application and the information immediately sent to the server at the district health insurance office by GPRS. Workers at the office will then immediately be able to work on the

information sent as soon as it is accessed via computer. Any request for further information can be sent by SMS to the field worker who can then obtain that information from the potential client, and send it back to the district office. This will result in a significant reduction in transportation costs and time, as well as to speed up the data capture process. Any payments made by a potential client will also be immediately relayed to the district office by GPRS, as such enabling client payment records to be swiftly updated. Any outstanding fees can also be sent via text message to the field worker to enable them update clients on their financial position. This will also help in maintaining up to date records and reduce data error. Upon completion of paying their premium, a client's application will then be forwarded by the scheme office using GPRS, to the national head office for a valid membership card to be produced for the new member. Each newly created membership card has a period of validity attached to it; a start date and an end date.

6.5.2 Membership renewal

For a client's membership to be renewed for a further period (usually one year), they would first have to have no outstanding balance on their premium payments. Clients in areas located close to the district scheme office may have no problem going there several times if they have to pay in instalments. For those located far away from the scheme offices, and especially those in remote rural areas, making several trips to the office to make payments in instalments on their premiums, before their membership is renewed is not realistic.

To counteract this, when a client's membership is 3 months from expiring, the database will generate a message that can be sent to the field officer responsible for the area in which the client resides for the necessary action to be taken to renew membership. Field officers could be trained to verify their documents, and in addition send the details of any payments made to the district office by GPRS. When the client is fully paid up, a message will then be relayed to the field worker to ask the client to come to the office to have their membership identity card updated with the appropriate hologram sticker. This will reduce the number of times clients have to travel to the

scheme offices when they want to get their membership renewed, and also enhance record-keeping. There is also the potential of this keeping clients interested, as the prospect of making several long journeys just to get ones membership renewed may seem a bit too much for some members.

6.5.3 Provider management

After a potential provider goes through the necessary checks to ascertain the validity of their license and as to if they meet the qualification criteria, they will have to make a registration payment before being added onto the network. As previously stated, public urban-based health service providers are connected to their district insurance scheme offices via an electronic network. This allows for fast and easy flow of data and communication between them. The network is however not available to private health service providers and rural-based health service providers. This is due to the high cost and lack of the necessary infrastructural capacity to operate the networks especially in the rural areas.

To mitigate this, mobile phone technology can be employed. Mobile phone applications dedicated to managing registration fee payments, claims processing and any other relevant communication that may exist between the service providers and the insurance scheme offices can be developed in place of the network. For providers in rural areas, this will greatly enhance the speed and the accuracy with which information is exchanged between them and the scheme offices.

6.5.4 Claims processing

In the urban areas where public (government ran) health service providers are joined by network to the insurance scheme offices, claims forms can be completed online and sent immediately to the insurance scheme offices for the claims payment process to be initiated. In the rural areas and with service providers who are not connected to the scheme's electronic network, mobile phone technology can be employed to bridge this gap.

Claims forms on mobile technology platforms can be completed by the service providers and sent to the dedicated server at the scheme office via GPRS. Officers at the scheme office will then be able to access the completed forms and continue the claims reimbursement process. Any queries to submitted forms can be quickly communicated to the health service provider either via GPRS or SMS, thus reducing the time spent in processing claims.

6.5.5 Premium collection

For clients not able to make payments directly at the scheme offices, payments can be made to field officers, but instead of waiting to present details of payments on paper forms at the district scheme offices, they can be recorded on mobile phone applications and sent via GPRS to the dedicated server at the district scheme office. Information about any outstanding payments can be sent via the same method to the field officers who can in turn relay it to the clients.

6.6 Conceptual model index

To illustrate the application of NCML in developing the proposed system, an index of graphical models developed with the modelling language is presented here to illustrate the operation of the various modules within the proposed system.

6.6.1 National health insurance authority regulations

The district health insurance schemes (HIS) operate in accordance with the National Health Insurance Authority (NHIA) regulations, which control membership, service provision and claims processing within the schemes.

Semantic equivalence – membership, service provision, claims processing = processes. At the district level the HIS operates in accordance with the NHIA regulations which control the various processes within the nation-wide scheme.

Syntactic normalization – preposition elimination
“the processes within the scheme”

The district HIS operates in accordance with the NHIA regulations which control scheme processes.

Semantic equivalence – verb nominalization
Certain NHIA regulations control DHIS processes.
NHIA regulations = district HIS process regulations – The district HIS operates in accordance with the NHIA regulations.

Semantic equivalence – operates in accordance with = complies with
The district HIS complies with the NHIA regulations
Semantic implications
The district HIS is a part of a national scheme.
The district HIS operates the processes.
The NHIA regulates the national HIS.

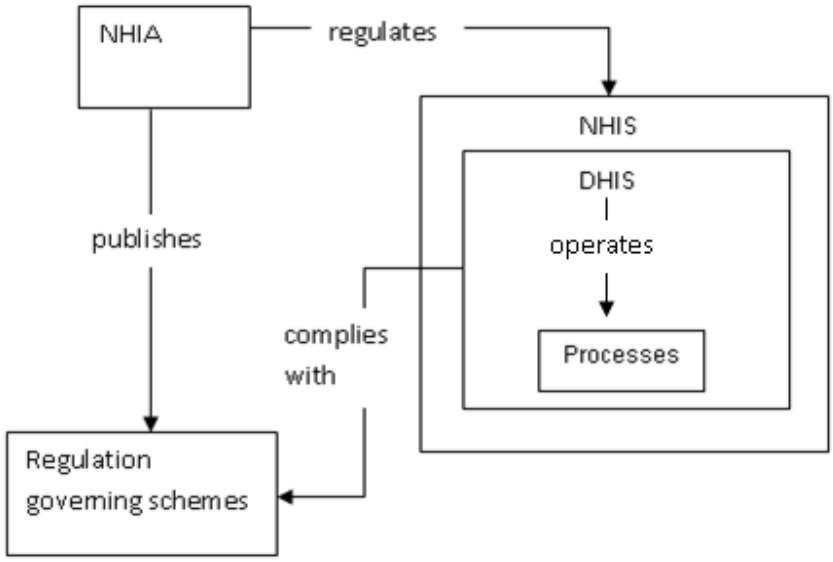


Figure 6.2: NHIA regulations

6.6.2 District health insurance scheme

Every district health Insurance scheme is licensed to operate a number of types of processes including membership registration, membership renewal, provider

registration, premium payments and claims processing. These processes are operated by officers located in the field using mobile phone based applications and condensed and updated versions of the current forms, and by officers at the scheme offices using computers as well as condensed and updated versions of the current forms. The introduction of a mobile phone based information management system for field officers is expected to improve the management of the various processes within the scheme.

Syntactic Normalisation convert verb to active voice
“District Health Insurance Schemes are licensed....”
Syntactic Normalization - convert subject to singular
“A District Health Insurance Scheme is licensed .....”

Syntactic Normalization – verb isolation
“licensed to operate a number of types of processes including membership registration, membership renewal, provider registration, premium payments and claims processing.”
The District Health Insurance scheme operates processes as a process type.
The District Health Insurance scheme process type = membership registration, membership renewal, provider registration, premium payments and claims processing
The District Health Insurance scheme is licensed to operate types of processes.

Semantic equivalence – “officers at the scheme offices” = office operative
“and by office operatives using computers”

Syntactic Normalization - convert subject to singular
A process type is operated by both field officers and office operatives.

Semantic Implications
A District Health Insurance Scheme has field officers and office operatives.

A field officer uses a mobile phone application and a condensed and updated version of a current form to operate a type of process.
An office operative uses a computer based application and a condensed and updated version of a current form to operate a type of process.
The same process types can be accessed by mobile phone based information systems and computer based information systems.
The database at the district insurance office is capable of accepting input from mobile phone based applications and computer based applications.

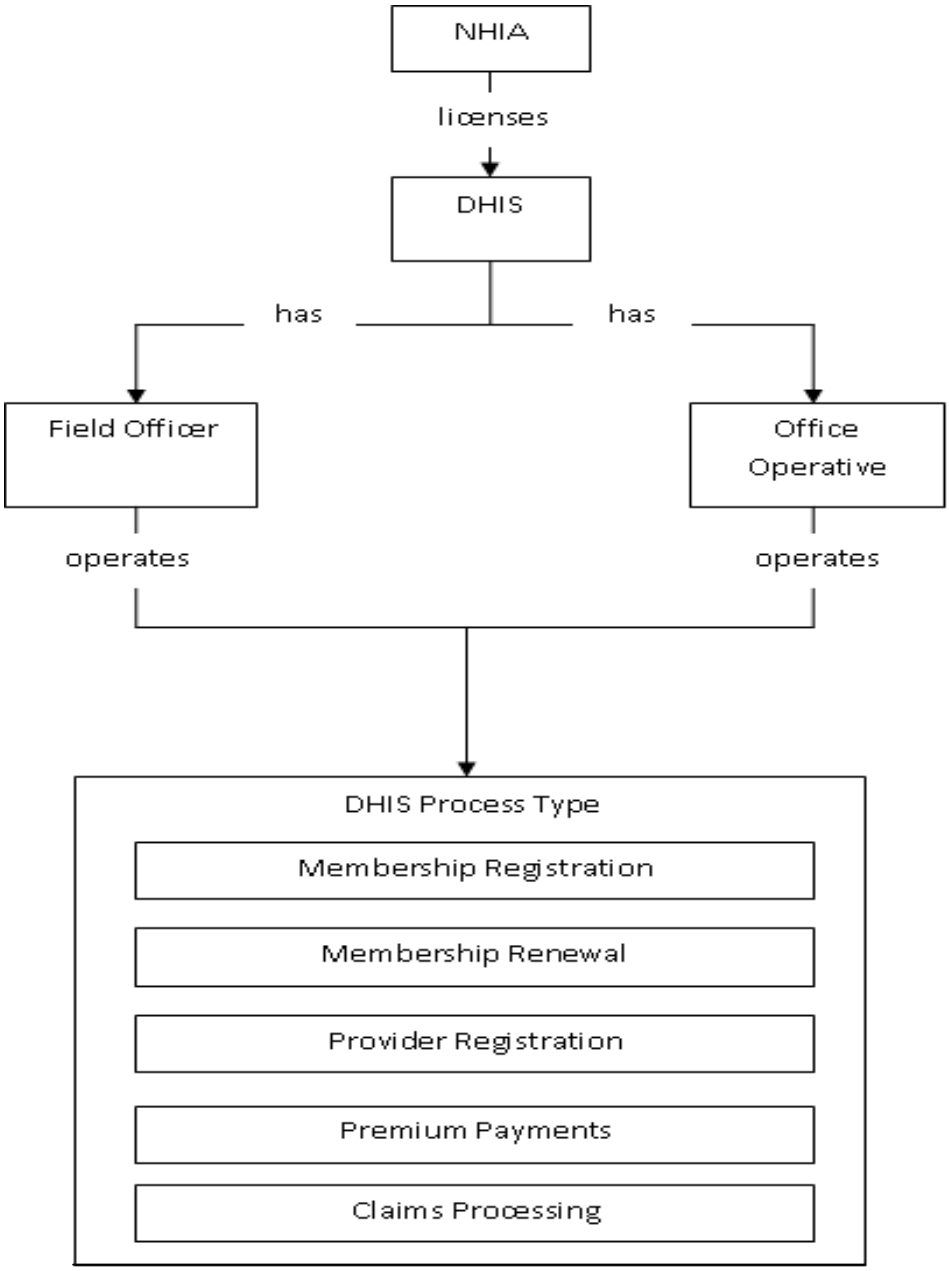


Figure 6.3: District health insurance scheme

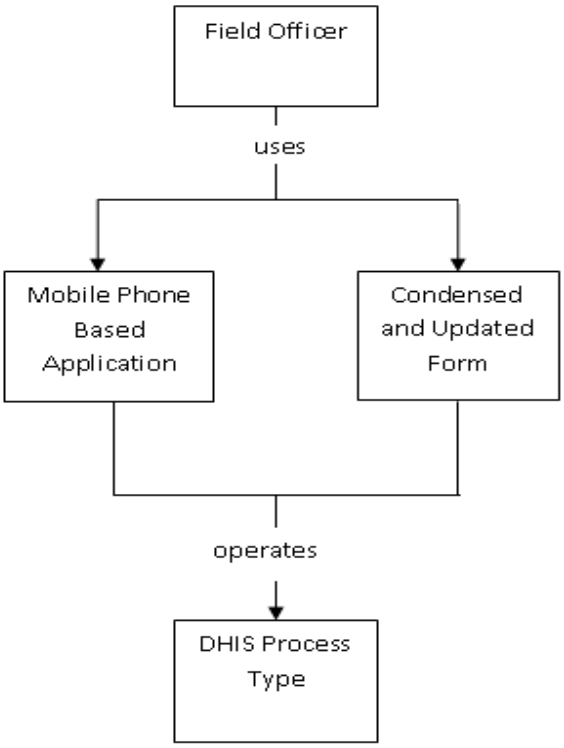


Figure 6.4: Field officer

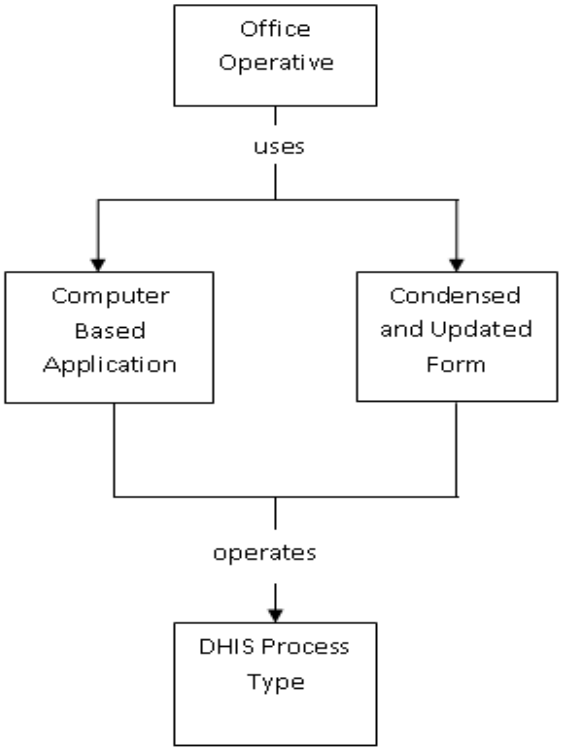


Figure 6.5: Office operative

6.6.3 Database server

The proposed information management system will involve the installation of a database server at the scheme offices to manage and control membership registration and other processes in the district health insurance schemes. The system will record the personal details and premium payments of potential clients, notify field officers of changes in client status, and will not allow the scheme to forward client information to the national head quarters for a membership card to be produced without full payment of the premium. Another function of the server will be to receive completed Claims Forms from health service providers, validate them, and have them sent off to the national headquarters for the claims to be reimbursed.

Semantic Equivalence = verb nominalization

A database server to manage and control membership registration and other processes = a process database server

Syntactic Normalization – active verb

The DHIS installs a process database server

Syntactic Normalization – active verb
The system records the details (personal details and premium payments) of potential clients,

Syntactic Normalization – active verb
The system receives completed claims forms.

Semantic Equivalence – “will not allow” = prevents
The system ……. prevents them..…….

Syntactic Normalization – active verb
The system records the details of potential members and prevents the scheme from forwarding them to the national head quarters for membership cards to be produced without full payment of the premium.

Semantic Equivalence - “full payment of the premium” = full premium payment..without full premium payment.

Semantic Implications
System records personal details
System monitors premium payments
Premium can be paid in instalments
System can be queried
Client’s details are held on an electronic form
Scheme forwards client details to HQ after full premium payment
Scheme forwards completed Claims forms to HQ
Scheme notifies field officers of changes in client status
HQ produces membership cards and reimburses claims.

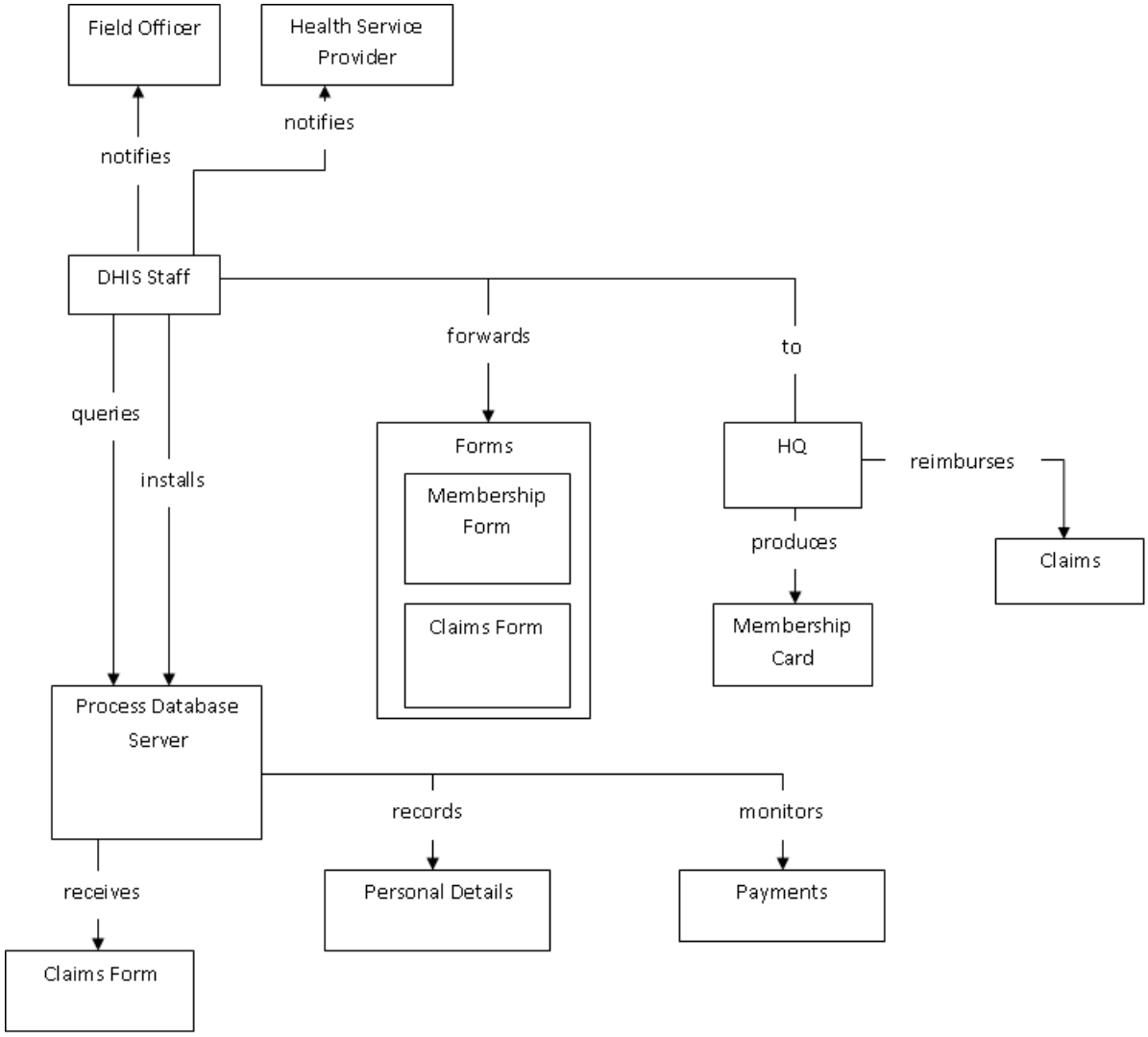


Figure 6.6: Process database server

6.6.4 Client record

Client records contain personal and health data, as well as a record of all premium payments.

Syntactic Normalization - convert subject to singular

A client record contains personal and health data, as well as a record of all premium payments.

Semantic Equivalence – “personal and health data” = personal information

Semantic Equivalence – “record of all premium payments” = financial record

A client record contains personal information and a financial record

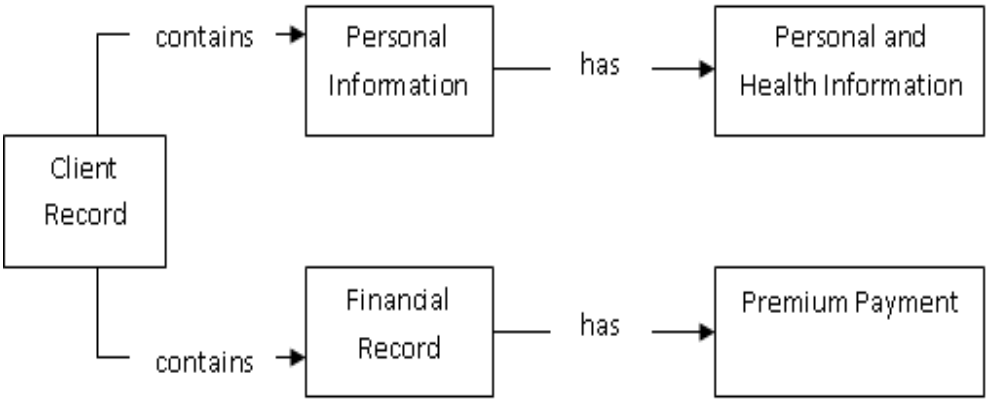


Figure 6.7: Client record

6.6.5 Field officer inputting client record

For each client registered in the field, a field officer enters the clients’ information into the Process Database Server. Each client has a unique identifier.

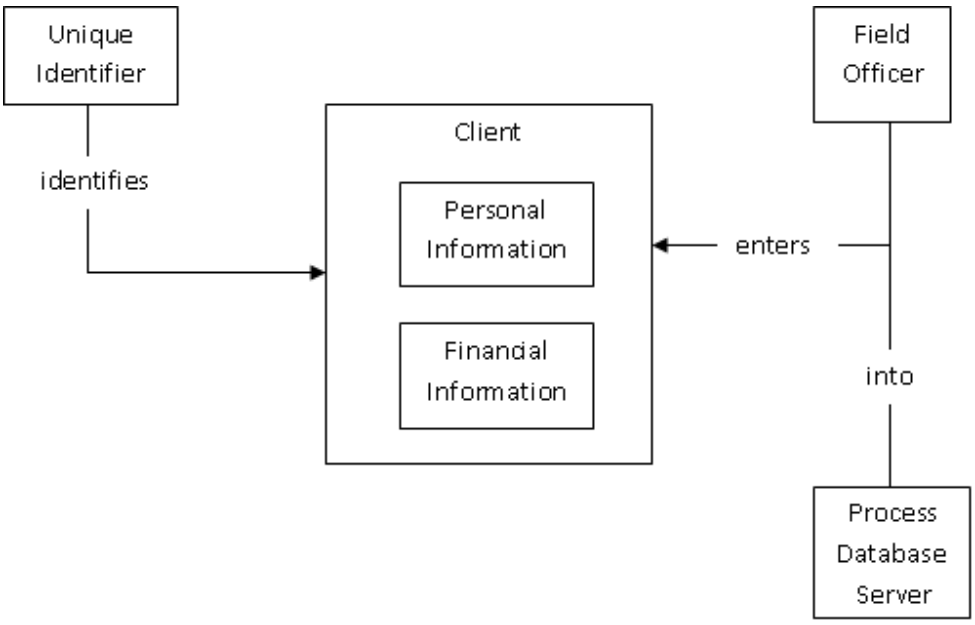


Figure 6.8: Client data entry

6.6.6 Account update

Anytime a payment is entered the financial records of the client is updated, with a notification being sent to the field officer to inform the client.

Semantic Implication

A payment entry triggers an account update

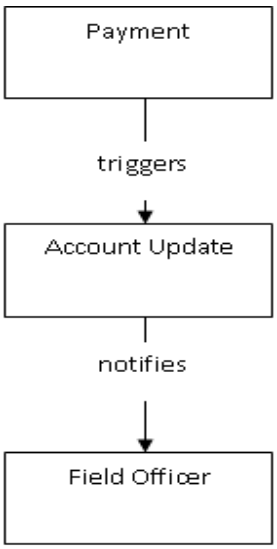


Figure 6.9: Account update

6.6.7 Checking arrears

The entry of any payment into the system triggers a check which determines if the client has either completed payment, or is still in arrears. The field officer is then notified of the check to take appropriate action.

Semantic Implications

There is a running total of all payments made by a client.

There is a maximum amount that the running total must equal if payments are not to be in arrears.

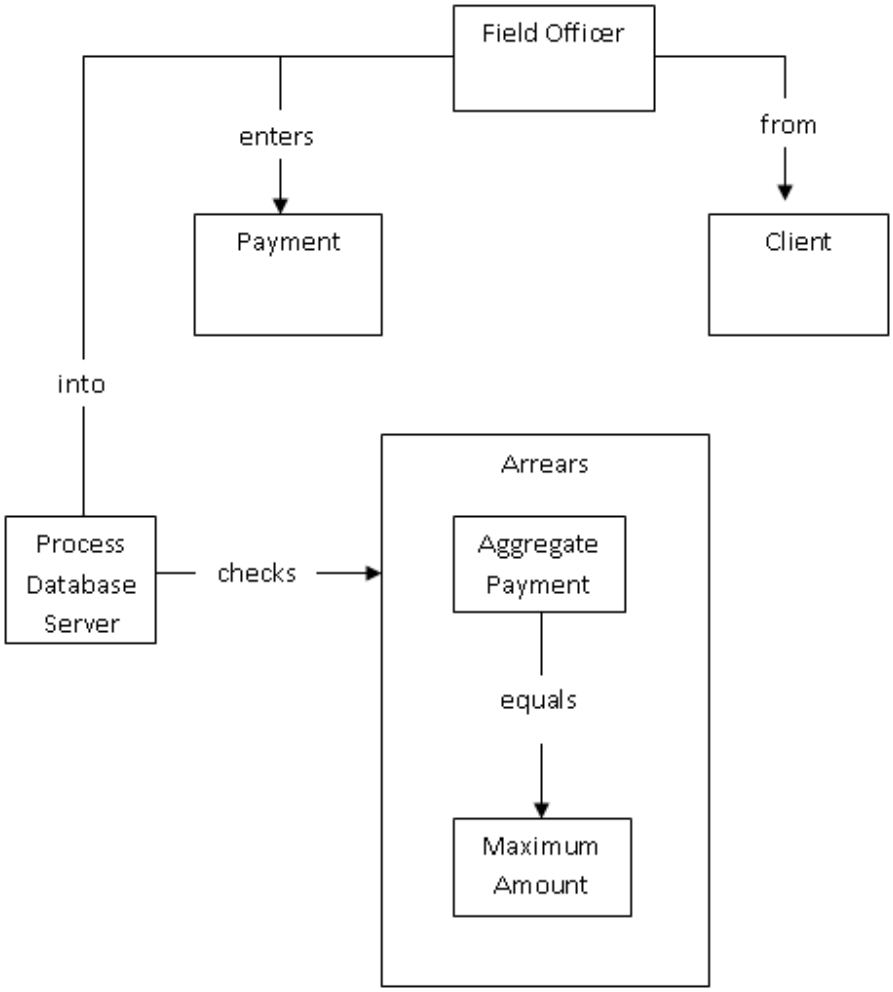


Figure 6.10: Procedure for checking arrears

6.6.8 Membership registration

A field officer inputs the client's personal details and premium payments into the database server. Office staff can then either notify the field officer of any further information required or premium arrears of the client. If satisfied with the information provided and if the premium is fully paid, the client's details are sent to the head office for a membership card to be made for the client.

Semantic Equivalence – personal details and premium payments = record
A field officer inputs the client's record into the database server.

Semantic Implications

Office staff can query the database server.

Office staff can notify a field officer.

Office staff forwards client details to head office.

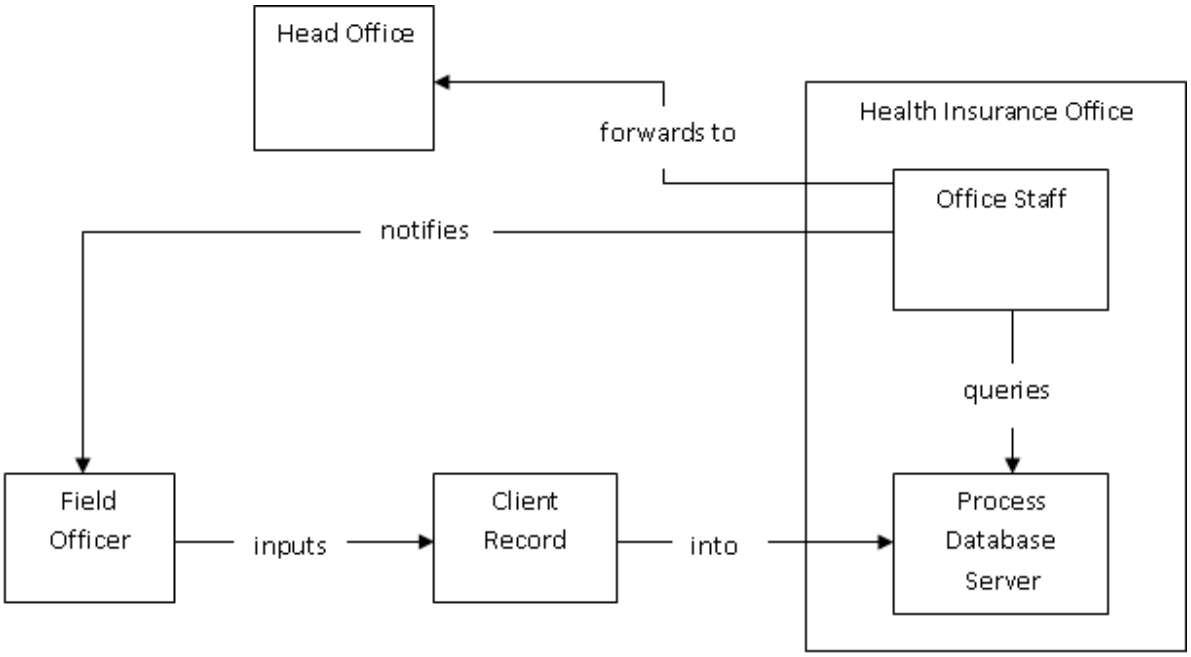


Figure 6.11: Procedure for membership registration

6.6.9 Membership renewal

Semantic Implications

The process database server generates a membership renewal report.

Office staff notifies field officers who in turn inform clients when to come into the office to have their membership cards renewed or if membership cards are due to expire in three months.

Clients make payments to field officers, who in turn input the payments into the process database server.

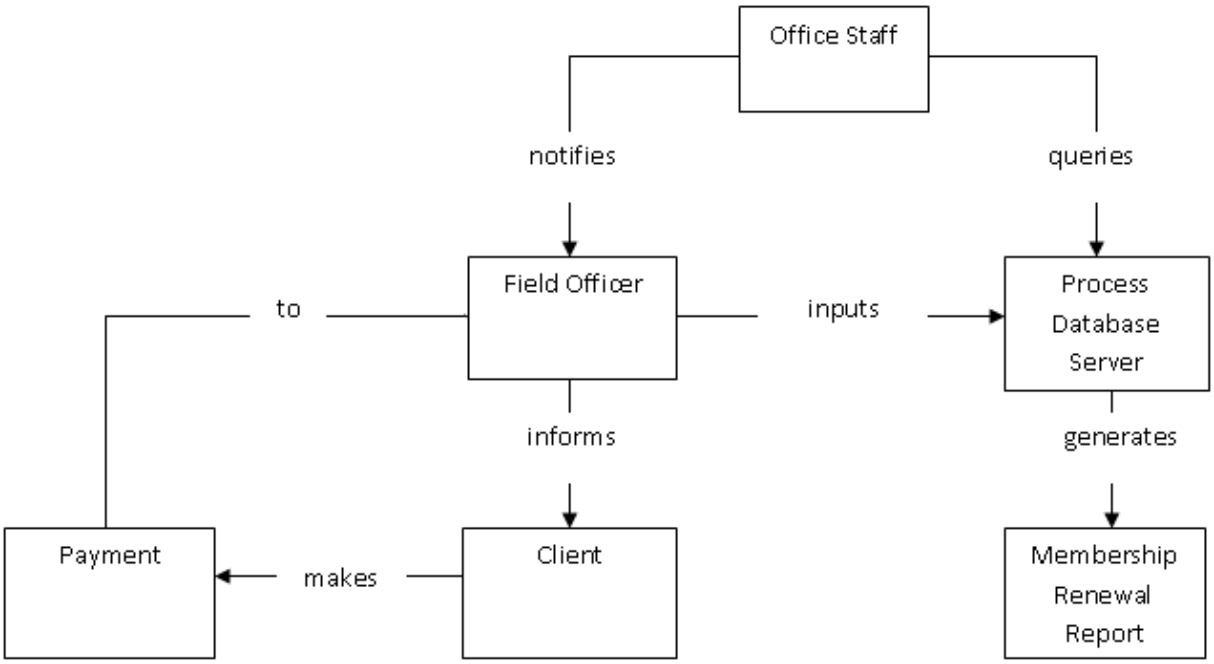


Figure 6.12: Procedure for membership renewal

6.6.10 Claims processing

Health service providers submit claims forms via mobile phone applications to the database process server.

The submitted forms will be analysed by the office staff, who will then transfer them to the head office if they have been deemed to have been adequately completed.

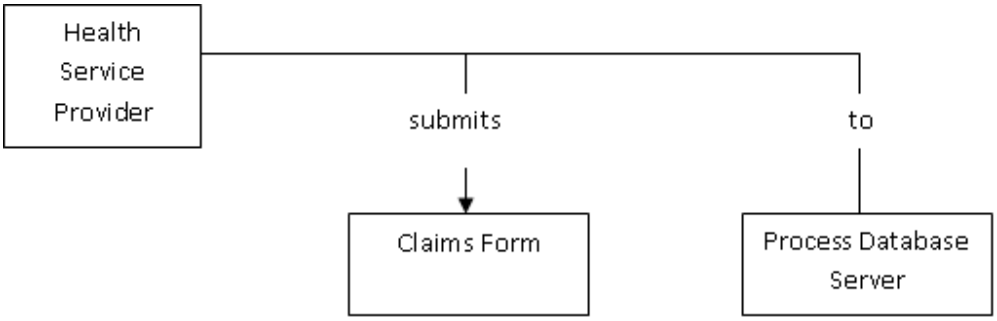


Figure 6.13: Claims submission

6.7 Answering the second research question

The graphical model that has been developed will now be examined in relation to the literature, and the degree to which it has addressed the second research question stated at the beginning of the study which is:

- What model of information management will be best suited to the management of health insurance in Ghana given the technological constraints?

The discussion will be centred on how the information model developed surmounts the mitigating issues experienced by the HI schemes with regards to information management, particularly in rural based schemes, where the issues adversely affect the schemes' operations.

6.7.1 What model of information management will be best suited to the management of health insurance in Ghana given the technological constraints?

According to Braa & Blobel (2003), the implementation of information systems in the healthcare sector in developing countries tends to be skewed towards the urban areas where the infrastructure and the expertise required for the successful deployment of such systems are based. Within the HI scheme in Ghana, the findings of the survey have confirmed this, in that the systems implemented to manage information in the HI scheme, work differently according to the location of the scheme. Reponses to the questionnaire, interviews and the results of observation carried out revealed that urban based schemes had access to the appropriate infrastructure needed for the operation of the information system, whilst rural based schemes, adopted parts of the scheme depending on the availability of the infrastructure available to them. It was also discovered from the survey that the differences in the information systems used in the rural and urban based schemes, resulted in differences in the efficiency in which information was managed. An information management model that enables the HI scheme to adequately overcome the constraints and issues confronting the organization's information management function, and improve service delivery will be very well suited to the scheme.

In employing mobile phone technology to manage the information within the HI scheme, the features and advantages of this technology will be discussed here. Crespo (2008) identified six features that made the adoption of mobile phone

technology very appropriate for developing countries. They include low infrastructure investment, ease of use, low energy consumption, affordability of services and devices, the ability to surpass unfavorable geographic structures, and less vulnerability to vandalism and natural disasters than other technologies. The following have also been listed in the literature as benefits that accrue to the organization with the adoption of mobile phone technology in managing information in developing countries. They include: Improved accuracy, reduction in time, reduction in cost and the potential for real time authentication and receipt of data (Anantraman et al, 2002; Blaya et al, 2009; Forster et al, 1991; Galliher et al, 2008; Tegang et al, 2009; Blaya & Fraser, 2006; Buck, Rochon & Turley, 2005; Escandon et al, 2008; Safaie et al, 2008; Mechael et al, 2010). The literature has also revealed the availability and dominance of this method of communication within the Ghanaian context, and the application of this technology in managing health related information within rural areas in various parts of the country (Chapter 2).

Given the constraints discussed in the first section of this chapter, the discussion in this section will centre on how the information management model developed in Chapter Six, solves the issues raised concerning the current information system, in light of the above-mentioned features and benefits of employing mobile phone technology.

The discussion will be centered on the following topics:

- Improved accuracy
- Reduction in time
- Reduction in cost
- The potential for real time authentication and receipt of data
- Low infrastructure investment and energy consumption
- The ability to surpass unfavourable geographic structures

6.7.1.1 Improved accuracy

Previous research (Bhalla & James, 1988; Braa & Blobel, 2003) has shown that within rural communities, traditional paper based systems are still of value in data collection and reporting, with technological innovations being integrated to the extent that they are coherent with the scale and culture of local activities. Within rural based HI schemes, analysis from the responses to the questionnaire and interviews, as well as that gleaned from observation, showed that paper forms were used in recording the details and payments of clients in the field before being sent to the scheme offices where they were inputted into a computer database. Due to the dispersed nature of the settlements and their remoteness, field workers tended to keep the forms on them to make sure that clients had completed payments of all their premiums before being sent to the offices to be recorded in the database. This was done to prevent the field officers from having to complete unnecessarily long journeys to and from the settlements just to complete the records of one person.

Whilst this combination of paper based and computer based technologies was being practised in the rural areas, it was however evident during the survey that one of the main issues working against the current information system in the rural areas was duplication and data redundancy. This occurred either as a result of delays in transferring the data gathered in the field to the databases at the HI scheme offices, or through the different points at which a client's data are collected (Chapter 5). Completing various forms by clients, all of which extracted similar details from the clients led in many instances to duplication of data. The inputting of the numerous paper forms that are eventually presented by the field workers also presented the risk of making erroneous inputs of data into the database.

Within the urban areas, clients mostly went to the district scheme offices to conduct their business, whether it was the renewing or registration of membership, or the payment of premiums. Where it was done outside of the scheme office, the relatively good road and transportation network meant that field workers did not have to keep information on them, but could easily make their way to the scheme offices to input data into the scheme databases. Thus the incidences of duplication and redundancy

were reduced. Errors committed as a result of the huge workload of inputting large numbers of records were also minimised.

In the urban districts where service providers have access to electronic claims forms, the validation procedures on these forms help to reduce the incidence of errors in the claims process. In situations where these claims forms have to be completed manually, there is an increased likelihood of errors in completing the forms, especially when the huge increases in the number of clients of the scheme and the resulting claims have to made are taken into account.

It is concluded that the proposed system provides a single point of entry for data gathered in the field and immediately transfers the data to the main database at the scheme office. Any clients' details taken during membership registration or when making a payment can be inputted into the database and added directly to their records, reducing the incidence of error. Since a client has a record which is also just being updated, there is the potential for a reduction in incidences of data redundancy. In addition to this, data validation procedures in the system, prevents the entry of wrong data during data capture and input into the database, and should ensure that the information kept at the scheme office with regards to clients, is accurate. The adoption of mobile phone technology by the proposed system will also enable rural based schemes to reduce the number of errors made during the claims process.

6.7.1.2 Reduction in time

Another feature of the current information system evidenced by results of the survey is the length of time taken by the manual paper based systems in completing processes. Processes that are undertaken manually include the registration of members, payment of premiums, claims processing and provider registration. The tendency of rural based HI field officers to keep the information of clients registering or making payments in the field greatly increased the comparative time taken to complete the registration process, when measured alongside that of clients either registered at the scheme offices or in urban based HI schemes. There were also marked differences in

the time taken by both rural and urban based schemes in receiving premium payments made by clients in the field and updating their records at the scheme offices.

When completing claims forms, evidence from the survey showed that healthcare providers with access to electronic forms were able to complete their forms and send them over the network quicker than service providers that did not have access to the digital forms were able to. Forms that were received in electronic format, could be easily verified and sent onto the national head office for the claims to be reimbursed.

Rural based service providers on the other hand, completed paper forms and aggregated them to be sent to the district HI scheme at the end of each month. The result of this is a huge number of paper forms arriving at the end of the month at HI scheme offices, which would then have to be verified and then converted to electronic format before being sent to the national head office for the claims to be reimbursed. Processing claims manually therefore increased the time taken for the claims to be reimbursed. In situations where completed forms were found to have errors in them, it was also much quicker for electronic forms to be corrected and resent, than it was for paper forms.

The proposed information system it is concluded, makes it possible for forms in either the registration or claims process to be completed electronically, and sent to the HI scheme offices almost instantaneously, irrespective of the location of the client of health service provider. This eliminates the need for field officers in rural areas to wait before presenting data gathered from the field to the scheme offices. It also eliminates the need for service providers to complete and send their paper forms to the scheme offices at the end of the month. The adoption of mobile phone technology in managing the processes of the HI scheme will therefore reduce the time taken to undertake these processes.

6.7.1.3 Reduction in cost

One of the reasons given by Bhalla & James (1988) and confirmed during the interviews regarding the continued use of paper based systems in rural areas in developing countries, is the high cost of ICT equipment. The ICT infrastructure needed to operate the current information system includes computers, high speed networks, satellite receivers, the application software, and the skilled personnel required to operate and manage the system. The inability however for these vital components to be available throughout the entire country however is mainly due to the high cost associated with them. Low governmental revenues coupled with the large recurrent expenditure in the country means that there is very little money for the expansion of the rural technological infrastructure in the country (Chapter Two). According to Dholakia & Kshetri (2001) the set-up costs as a proportion of per capita incomes are much higher in developing countries than they are in advanced countries. Fixed telecommunications networks require infrastructures to support cables, wires, poles and ducts. Operating and maintenance costs also make up a significant proportion of the total costs. And these costs increase with the increase in the distance to be served.

Any investments made therefore are usually done in the urban areas creating a rural/urban digital divide. As evidenced from the survey, urban areas tended to have modern infrastructure, whilst rural areas lagged behind. For the current information to be adequately operational in the rural areas as well as it is in the urban areas, there would be the need for massive investments in infrastructure and personnel, which would not be possible given the economic situation in the country.

As opposed to the investments required for the operation of the current information system, it is concluded that the introduction of mobile phone technology will be taking advantage of a technological resource which already has a strong infrastructural base in both rural and urban areas, and would require very little training for users, given the widespread use of the technology. The introduction of the proposed information system therefore would reduce the total cost of managing the information system.

Cost reduction in the management of information would also be realised in the reduction of transportation costs for field workers, and in intangible costs such as the cost of transporting, loosing or mistakenly destroying completed forms, as well as the cost of communication between the HI scheme, healthcare providers, scheme members, and other interested parties.

6.7.1.4 The potential for real time authentication and receipt of data

Within the current information system, data sourced outside the scheme offices is mostly done on paper based forms which are then inputted onto the scheme database, when the field officers bring the forms to the scheme offices. Within urban based schemes the road and transportation network make it relatively easier to transfer the data to the scheme offices, enabling clients' data to be updated quickly. As mentioned previously however this is not the case in the rural areas where the poor transportation infrastructure, coupled with the dispersed and remote nature of the settlements results in delays in updating the records of clients contacted in the field. Further to this therefore is the inability to correctly authenticate clients either making contact with a service provider, or making contact with the scheme to renew membership. The use of paper based forms also means that data obtained in the field cannot be communicated in real time to either the scheme offices or other relevant recipient.

The proposed information system makes it possible for data to be updated in real time from the field, and as such allows also for the authentication of clients in real time. It is therefore concluded that information obtained from the field can be quickly relayed to the scheme office or any other recipient using GSM technology. This quick and effective means of transferring and receiving data will greatly enhance information management within the HI scheme.

6.7.1.5 Low infrastructure investment and energy consumption

Another conclusion of the study in implementing the proposed IM model is that it

would require a low infrastructural investment and consumption of energy to operate the system. As previously mentioned, the infrastructure needed to operate the current information system includes computers, high speed networks, satellite receivers, the application software, and the skilled personnel required to operate and manage the system. Any investment needed to upgrade the system for the registration of members and paying of premiums, as well as in the registration of service providers and in claims processing investment will have to be made on a nationwide basis to ensure equity in the efficiency of services, and this will require a huge investment of technical resources that cannot be borne by the authorities considering the economic condition of the country (Chapter Two). The current information system will also require a vast improvement in the power supply to the rural areas if there are to be any positive changes made with regards to the quality of services provided by all parties in the current information system.

According to Fyson, Gomer & Nurmikko (2011),significant efforts have been made to reduce the power consumption of mobile phone based technologies, and the low power consumption of these technologies make them ideal for use in developing countries which have a less reliable and undeveloped electrical supply infrastructure.

The proposed information system will be taking advantage of mobile telephony resources and infrastructure which is available right across the country, even in the remotest settlements and towns. As previously stated in Chapter Two, 70% of the entire country was covered by mobile phone signals as at December 2011 (NCA, 2011), a figure that is rapidly rising. The energy required to also operate the mobile devices to be used in the field, is much lower when compared to the energy that would be required to operate the computer, satellite receivers and networks across the rural and urban areas.

6.7.1.6 The ability to surpass unfavourable geographic structures

The geographical structures of many developing countries including Ghana are characterised by mountains, thick forests, deserts and swampy grounds. This in

addition to the scattered and distant communities which are mostly in the very low income bracket make it very time consuming and very costly to install fixed telecommunications networks in such areas Dholakia & Kshetri, (2001). According to Dholakia & Kshetri, (2001: p. 8) “mobile networks are the most effective alternatives for communication in places with unfavourable geographic structures such as rugged mountains, wet and swampy ground, deserts, etc.”

It is therefore concluded that the adoption of mobile phone technology in the proposed information system for the management of information in the HI scheme, will greatly improve the efficiency of the scheme, particularly in the rural areas where the geographic structures are a contributory factor to the lack of the technological infrastructure needed to operate the current information management system.

The research objectives discussed below also illustrate the inadequacy of the current system to appropriately manage information within the NHIS due to the rural-urban digital divide, and detail how the introduction of mobile technology can improve the management of information within the scheme, especially in the rural based schemes.

6.8 Meeting the objectives

6.8.1 Review of health insurance schemes

The first objective of this study was to review and analyze the concept of the HI scheme. As discussed previously in Chapters Two and Three, due to the increasing costs of healthcare delivery, a number of developing countries are increasingly turning to HI schemes to finance healthcare delivery. HI schemes function by spreading the cost of healthcare delivery amongst a large number of people. Within this method of healthcare financing, funds are mobilized and risks pooled together to deliver the healthcare service. It was also found out that the HI scheme required the collaboration of a number of separate organisations that needed to work together and share information for the effective and efficient delivery of the healthcare service. Survey questionnaire, interview responses and data obtained from observation showed that for the HI scheme in Ghana to be operational, there was a need for collaboration

between scheme members, healthcare service delivery organisations, the district HI office and personal details of members, premium payments, claims information and provider information. Each HI scheme also undertook five main processes which included membership registration, membership renewal, provider management, claims processing and premium collection.

6.8.2 Information management systems employed in the scheme

The second objective of the study was to identify the IM systems employed in the HI scheme. The main sources of information used to achieve this objective were from the interviews with staff of the HI schemes, and from the information gleaned by observation. The information concerning the IM systems currently in use obtained by observation greatly augmented that which was received through the interviews with the staff of the scheme. It was discovered that there was a mixture of manual and computerised components of the IM system. An Oracle based computer software system for the membership registration and claims processing functions of the scheme, was used together with paper based systems for other functions of the scheme. The nature of these information systems and their differences in rural and urban settings are discussed in Chapter Three.

6.8.3 Types of information used in the health insurance scheme in Ghana

The third objective of the study was to identify the types of information used in the HI scheme, and to map the flow of this information within the scheme. The literature, questionnaire and observation were the principal sources of information used in achieving this objective. The literature (see Figure 2.2, p. 14) revealed that the types of information and resources in the scheme consisted of the premium payments of members, information about health services provided, drugs and maintenance, as well as regulations from governmental bodies. There was not much difference between the views expressed between literature and what was obtained through the questionnaire and observation, but an addition to what was in the literature. Other types of information in the scheme include information about claims, provider details and the

personal details of scheme members. Chapters Two, Three and Five presented the evidence for this objective.

6.8.4 Barriers to information management within the health insurance scheme

The fourth objective was to discover the barriers that mitigate against the effective management of information within the HI scheme. The principal source of information used to achieve this objective was the literature, responses to the questionnaire as well as the responses to the interviews. It was discovered that the barriers to IM were largely dependent on the location of the HI scheme. HI Schemes, like any other organisation located in urban areas in developing countries, had access to technology and resources that most rural based organisations (HI schemes) did not have access to. The literature and the responses reveal the following barriers: lack of funding, lack of appropriate staff and training, old and failing infrastructure, the lack of appropriate technology, unfavourable geographic structures, and the rural-urban technological divide.

6.8.5 Methods for developing information models

The fifth objective involved looking for an appropriate method for developing a possible information management model that would be more effective than the current one in managing information within the HI scheme. To achieve this objective a number of possible tools for information modelling were discussed. They included DFDs, ER diagramming, ST diagramming, IDEF techniques, UML and ORM. Each of them was briefly examined and discarded due to their inability to adequately define all the functions involved in the HI scheme. NCML was finally chosen for developing the proposed information management model. The NCML and the advantages of using this modelling tool were discussed in Chapter Four.

6.8.6 The Proposed model

The sixth objective was to propose a conceptual model from which information could be more effectively managed given the constraints restricting the management of information within the HI schemes based in rural districts. This was achieved by using

a mixed methodology that provided rich data and information to provide an appropriate platform to build on. A comparative analysis to determine differences between the current IM model and the real world situation to bring forth possible recommendations for change was also undertaken. The changes identified to improve the problem situation were obtained from analysing the five main processes within the scheme namely: membership registration, membership renewal, claims processing, provider management and premium payments. From the changes identified, a conceptual model index was developed for the processes mentioned above and other subsystems within the HI scheme using NCML, with mobile phone technology being identified as the major technological component that will enhance the effectiveness of IM within the HI schemes.

6.9 Summary

Given the data obtained from the questionnaires and the interviews, as well as the data obtained through observations made by the researcher during the field work, Chapter Six demonstrated the application of NCML to develop an information systems model that improves the operation, efficiency and speed with which the current information system operates. Beginning with a diagrammatic description of the application of mobile phone technology to the health insurance process, the chapter continues with a narrative of the proposed model, and progresses with a description of problems with the current processes and how the application of mobile phone technology to the processes will improve their efficiency and effectiveness. The chapter continued with an analysis of the processes and subsystems involved in the proposed information system, and the production of graphical conceptual models to illustrate these processes and subsystems. The chapter concluded with a discussion of the model put forward in light of the research questions, and the issues raised in literature and survey responses.

The next chapter will present the contributions, recommendations and suggestions for future research brought about as a result of the work carried out in this study.

Chapter Seven - CONCLUSION

7.1 Introduction

There are inequities in the delivery of services within the HI scheme in Ghana. The poor and vulnerable who live in the rural areas, are at a disadvantage with regards to the effectiveness and efficiency of healthcare services received from the HI scheme due to the lack of the infrastructure and technology needed for uniformity in the delivery of services in both rural and urban areas. Addressing the problem with the current information management model and technology currently in use is not feasible, not only due to the scarcity of the appropriate technology and human resources, but also the terrain and dispersed locations of some of the rural populations. This concluding chapter will begin with a brief review of the study, and continue with presentations of the contributions and recommendations derived from the study. The chapter concludes with some suggestions for future research.

7.2 A brief review of the study

The study was motivated by the need for the development of a system to manage information in the Ghana NHIS that would minimise the resource and technological constraints prevalent in rural parts of the country, which results in marked differences in the quality of service delivery in the HI scheme. The initial literature survey listed the lack of funding, old and failing infrastructure and the lack of staff and appropriate training as being the main barriers to effective information management in developing countries (Ferris, Burns & Liatsopoulos, 2007; Heeks, 2002). Tabor (2005) and McIntyre, Gilson & Mutyambizi (2005) stated amongst others that weak management and administrative capacity, and poor data handling were some of the main issues affecting health insurance schemes in developing countries. The literature review also revealed mobile phone technology is widely available and has the ability to counteract many of the problems working against the optimum efficiency of the current technology in use.

On the basis of these findings in the literature, the study aimed to find empirical data to ascertain if this was the case in the Ghana HI scheme and if so, to develop an

information management model to offset the imbalances in service delivery due to the location of the schemes. Employing a mixed methodology, data was collected using questionnaires, interviews and observation. The data collected provided in-depth and valuable information, which became the basis of the analysis and discussion of the issues affecting the current IM model.

The conclusions drawn from this led to the development of a mobile phone technology based IM model which will overcome the problems affecting the current IM model.

7.3 Contributions, recommendations and suggestions for further research

7.3.1 Contributions

This research study provides the first study of the differences in the management of information due to the rural-urban digital divide in the Ghana HI scheme. It draws on studies examining the causes and effects of the digital divide on the management of information in organisations in developing countries (Rao, 2005; Mosse & Sahay, 2003), as well as literature on organisations, including those in the health sector, which have employed mobile phone technology to bridge the digital divide in rural areas (Thomas, Christian & Narayan, 2012; Mecheal et al, 2010; Crespo, 2008; Vital Wave Consulting, 2009; Grameen Foundation, 2011).

Another contribution of the study is the provision of data from Ghana detailing the issues surrounding the management of information within the country's HI scheme. The literature on the HI scheme in Ghana has emphasised the implementation of the scheme and the uptake of membership, provision of services, financial management and the sustainability and the viability of the scheme (Aiken, 2003; Atim, Grey & Apoya, 2002; Hsiao & Shaw, 2007). In contrast no literature was found that examined the digital divide and its relation to the information management within the HI scheme. By analysing the data obtained during the survey, this study has provided valuable insights into how information is managed practically in HI schemes located in rural and urban areas. This will fill in the current gap in knowledge with regards to this area, and enable other possible solutions to be developed to counteract the issues raised.

In addition to the quantitative insights obtained by the questionnaire, the study also drew out the perspectives of stakeholders within the scheme to reveal factors peculiar to them which could ultimately affect the management of information within the organisation. Crucially, the information and perspective also obtained through observation be the researcher shed some more light on the issues at hand than would have been obtained otherwise.

Another contribution of the study is the use of a mixed methods approach in investigating the issues surrounding IM and the rural urban digital divide. The research also presents the first time a comparative analysis between a current IM model and the real world situation have been employed in any study looking at the information management system of the NHIS in Ghana. The use of the comparative analysis and the mixed methods approach, enabled the researcher to compare the real and conceptual world situations, and also enabled the researcher to gain a deeper understanding of the problem issues. This was very important in helping to ultimately develop the proposed IM model to improve the existing system. The combination of methods employed in this study has gone further than any in the available literature on HI schemes in Ghana to present a more complete picture of the issues regarding information management within the organisation. The use of the mixed methodology in addition to the comparative analysis employed in this study points to the possible application of a similar methodological approach in studying other parts of the NHIS or similar organisations in Ghana. It has also extended the conventional boundaries of mixed methods research in investigating health related organisations in Ghana.

7.3.2 Recommendations

The first recommendation is for mobile phone technology to be adopted for managing information in the HI scheme in Ghana. Adopting this technology will require the formation of a task force drawn from HI scheme and the Ministry of health, to secure the necessary funding, champion its implementation, and to draw up the budgets needed to fund such an undertaking.

Secondly, it is recommended that the government enact policies that will promote the use of mobile phone technology in the health and ultimately health insurance sector. Given the ability of the technology to reduce the digital divide, providing incentives such as tax rebates for telecommunication providers who expand their coverage and invest in providing technology to support the HI sector will greatly aid in improving IM in the HI scheme. To implement any such legislation within the scheme, it is recommended that a committee be constituted comprising individuals from the Health Insurance, Finance, Public Health, ICT and the government to champion the implementation of these policies.

Another recommendation will be for the necessary infrastructure to be established to manage the information systems. Establishing the infrastructure will involve extending current hardware and software platforms to accept data from mobile sources, as opposed to only data input through the keyboard. This would mean the linking of the mobile devices of field workers, healthcare providers and that of any interested party to the HI scheme's database at the district level, and for all district schemes to be linked to national head office using the same technology. This would enable the smooth seamless flow of information within the scheme, no matter the location.

It is also recommended that the skills of personnel within the HI schemes should be upgraded. One of the findings of the study is the generally low level of skills including ICT skills available in the rural areas. The recommendation therefore is for the technological skills amongst staff of the HI schemes to be cultivated to enable them to make the most of mobile technology. This will involve training programs tailored to the needs of staff depending on position and role, to enable staff to make the best use of the technology.

Finally it is recommended for a retention and destruction policy for records within the scheme to be implemented. Such a policy would have to include how the vast amounts of paper records which contain both routine and sensitive information, and

are openly stored in huge rooms, will be dealt with. Any such policy would also have to include guidelines for the use of mobile equipment, procedures for protecting the confidentiality of scheme members, as well as the security of any data collected.

7.3.3 Suggestions for future research

Four directions for future research are suggested. Since the study focused on one (Ashanti) out of the 10 regions in Ghana, and further still on nine out of the twenty-seven districts in the selected region. Further research is suggested to extend the study to all ten regions to enable a more comprehensive nationwide picture of the problem situation to be built. A nationwide analysis of data, to complement that which has been presented in this study, would provide an additional robust evidential base of the differences in IM within the HI scheme, and ultimately help to improve the system.

Secondly, with regards to security the effectiveness of the proposed IM model would have to be investigated to evaluate its impact on the confidentiality of both patient and organisational records. Investigations would have to be carried out to develop appropriate data security procedures to protect data confidentiality.

Thirdly there is also a need for further research to be carried out that explores the perspectives of employees of the health insurance scheme, with regards to the impact the proposed IM model has on their work.

Finally, the implementation of the proposed IM model should be followed by an impact assessment, to determine the tangibility of increases in the level of effectiveness and efficiency of IM in the HI schemes in both.

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Appendix A

INFORMATION MANAGEMENT WITHIN THE NATIONAL HEALTH INSURANCE SCHEME

This questionnaire has been designed with your precious time in mind. All responses will be kept in the strictest confidence.

Check the appropriate boxes or write your answer where indicated.

Demographic Data

Gender

☐ Male ☐ Female

Age

☐ Below 30 ☐ 31 - 40 ☐ 1 - 50 ☐ 51 and over

Position

.....

Work place

.....

Do you deal directly with external agencies? Yes ☐ No ☐

Information Management System

What kind of data/information do you deal with?

☐ Administrative ☐ Financial

☐ Medical ☐ Other .....

What is/ are the source(s) or origin of the data you deal with?

☐ Scheme member's ☐ Healthcare providers

☐ Health Insurance Scheme ☐ Other .....

How is the data acquired?

☐ Manually ☐ Electronically ☐ Other .....

☐ Verbally

What do you do with data? (Tick as many as applies)

☐ Record for storage

☐ Data analysis

☐ Forward to internal department

☐ Forward to external department

☐ Produce reports

☐ Inform management decisions

☐ Other .....

How is the data transmitted?

☐ Manually ☐ Electronically ☐ Other .....

How is the data stored?

☐ Manually ☐ Electronically ☐ Other .....

Are there appropriate data validation procedures in place?

☐ Yes ☐ No

Does system allow you to interface or communicate directly to external agencies within the scheme?

☐ Yes ☐ No

Do you have exclusive use of the information system?

☐ Yes ☐ No

The advantages of the present system include-

☐ Ease of use. ☐ Security

☐ Speed ☐ Reliability

☐ Accuracy ☐ Other .....

Disadvantages of the present system include-

☐ Slow ☐ Insecurity

☐ Connectivity ☐ Other .....

Do you use a computer? ☐ Yes ☐ No

If Yes,

Is the computer essential to your work? ☐ Yes ☐ No

For what purpose is the computer used? Tick as many as are applicable.

☐ Word Processing ☐ Report Creation

☐ Data Processing ☐ Analyse Data

☐ Financial Program ☐ Other .....

How satisfied are you with the current information system? Please choose one.

Very Satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Very Dissatisfied
☐	☐	☐	☐	☐

Is the system updated regularly? ☐ Yes ☐ No

What software do you employ in doing your work? Tick as many as are applicable.

☐ Microsoft Word ☐ Microsoft Access

☐ Microsoft Excel ☐ SQL

☐ Other

What improvements if any, would you like to see in the current system?

.....

Would you be prepared to partake in a follow on interview? ☐ Yes ☐ No

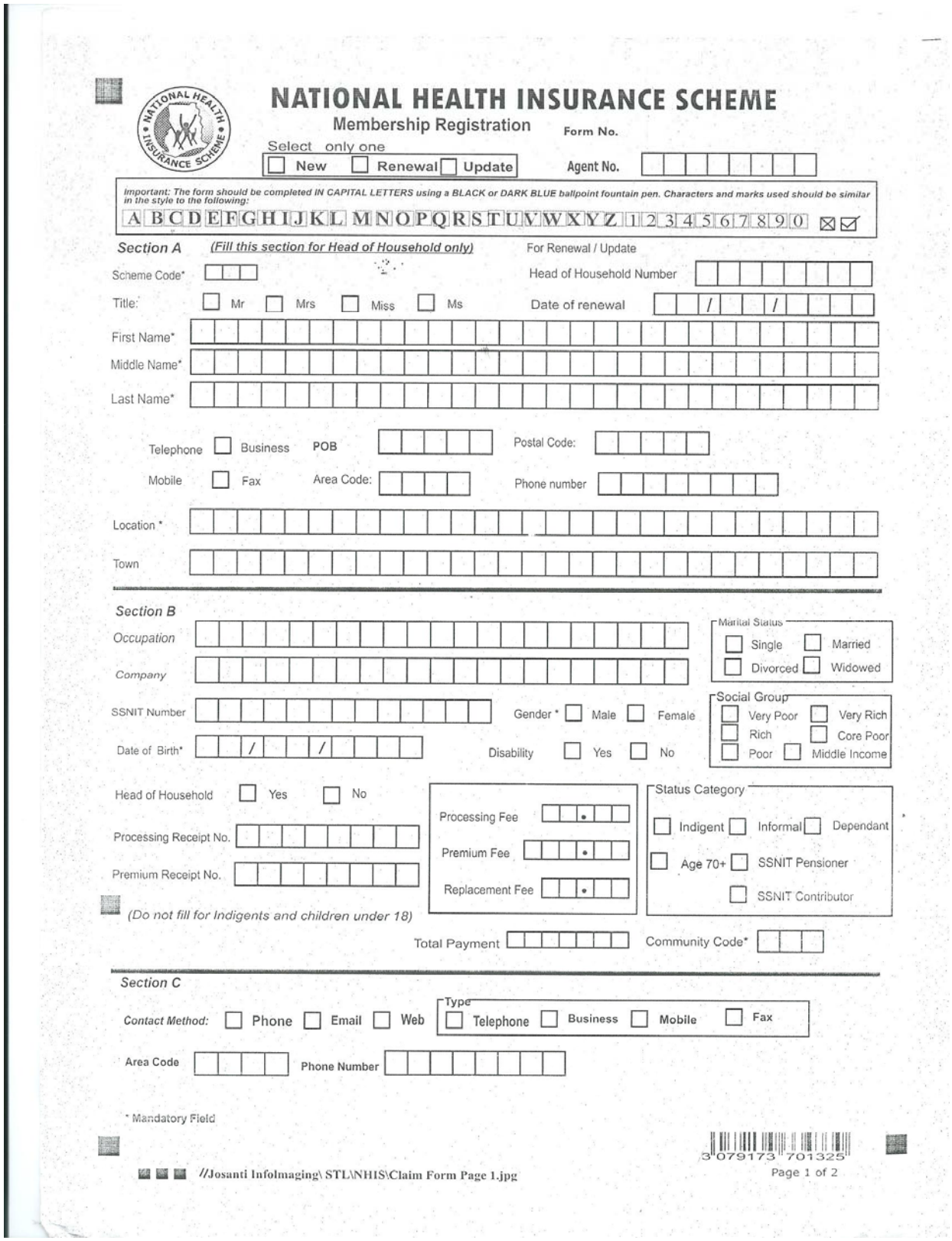
Appendix B

Interview with staff handling information at health service stations, insurance scheme offices, district administration.

1. What media is used in sharing information with other organisations within the scheme?
2. What gaps do you feel exist between the information needed and what you have?
3. What are the problems related to data management (access, storage, manipulation, transfer) in your organisation?
4. In what way can the information management system and the use of information be improved?
5. Who provides the systems used in information management?
6. Are the systems manageable given the available technology, resources and expertise?
7. How is information generated at this facility used for decision making in your organisation or at the district level.
8. In your opinion, what are the barriers and obstacles the organisation faces in managing information?

9. What improvements, if any would you like to see in the information management system.

Appendix C: Sample membership registration form



NATIONAL HEALTH INSURANCE SCHEME

Membership Registration

Form No.

Select only one

☐ New ☐ Renewal ☐ Update

Agent No.

Important: The form should be completed IN CAPITAL LETTERS using a BLACK or DARK BLUE ballpoint fountain pen. Characters and marks used should be similar in the style to the following:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z 1 2 3 4 5 6 7 8 9 0 ☒ ☑

Section A *(Fill this section for Head of Household only)*

For Renewal / Update

Scheme Code*

Head of Household Number

Title: ☐ Mr ☐ Mrs ☐ Miss ☐ Ms

Date of renewal

First Name*

Middle Name*

Last Name*

Telephone ☐ Business POB

Postal Code:

Mobile ☐ Fax Area Code:

Phone number

Location *

Town

Section B

Occupation

Company

Marital Status: ☐ Single ☐ Married ☐ Divorced ☐ Widowed

SSNIT Number

Gender * ☐ Male ☐ Female

Social Group: ☐ Very Poor ☐ Very Rich ☐ Rich ☐ Core Poor ☐ Poor ☐ Middle Income

Date of Birth*

Disability ☐ Yes ☐ No

Head of Household ☐ Yes ☐ No

Processing Fee

Premium Fee

Replacement Fee

Status Category: ☐ Indigent ☐ Informal ☐ Dependant ☐ Age 70+ ☐ SSNIT Pensioner ☐ SSNIT Contributor

Processing Receipt No.

Premium Receipt No.

(Do not fill for Indigents and children under 18)

Total Payment

Community Code*

Section C

Contact Method: ☐ Phone ☐ Email ☐ Web

Type: ☐ Telephone ☐ Business ☐ Mobile ☐ Fax

Area Code

Phone Number

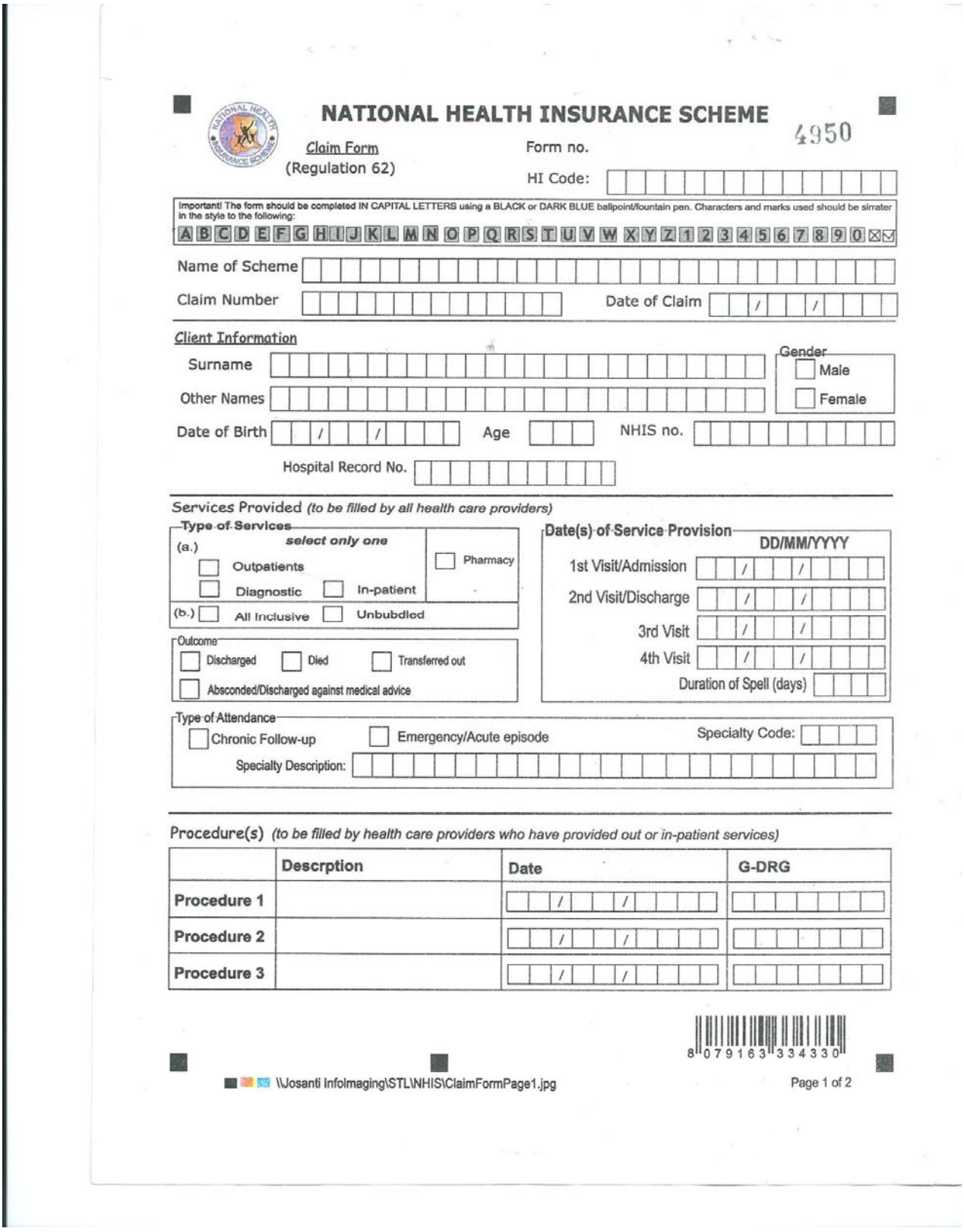
* Mandatory Field

3 079173 701325

Page 1 of 2

//Josanti Infolmaging\ STL\NHIS\Claim Form Page 1.jpg

Appendix D: Sample Claims form - Page 1



NATIONAL HEALTH INSURANCE SCHEME

4950

Claim Form
(Regulation 62)

Form no.

HI Code:

Important! The form should be completed IN CAPITAL LETTERS using a BLACK or DARK BLUE ballpoint/fountain pen. Characters and marks used should be similar in the style to the following:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z 1 2 3 4 5 6 7 8 9 0 ☒ ☑

Name of Scheme

Claim Number

Date of Claim / /

Client Information

Surname

Other Names

Gender
☐ Male
☐ Female

Date of Birth / /

Age

NHIS no.

Hospital Record No.

Services Provided *(to be filled by all health care providers)*

Type of Services

(a.) *select only one*
☐ Outpatients
☐ Diagnostic ☐ In-patient
☐ Pharmacy

(b.) ☐ All Inclusive ☐ Unbubdled

Outcome
☐ Discharged ☐ Died ☐ Transferred out
☐ Absconded/Discharged against medical advice

Date(s) of Service Provision DD/MM/YYYY

1st Visit/Admission / /
2nd Visit/Discharge / /
3rd Visit / /
4th Visit / /
Duration of Spell (days)

Type of Attendance
☐ Chronic Follow-up ☐ Emergency/Acute episode
Specialty Code:
Specialty Description:

Procedure(s) *(to be filled by health care providers who have provided out or in-patient services)*

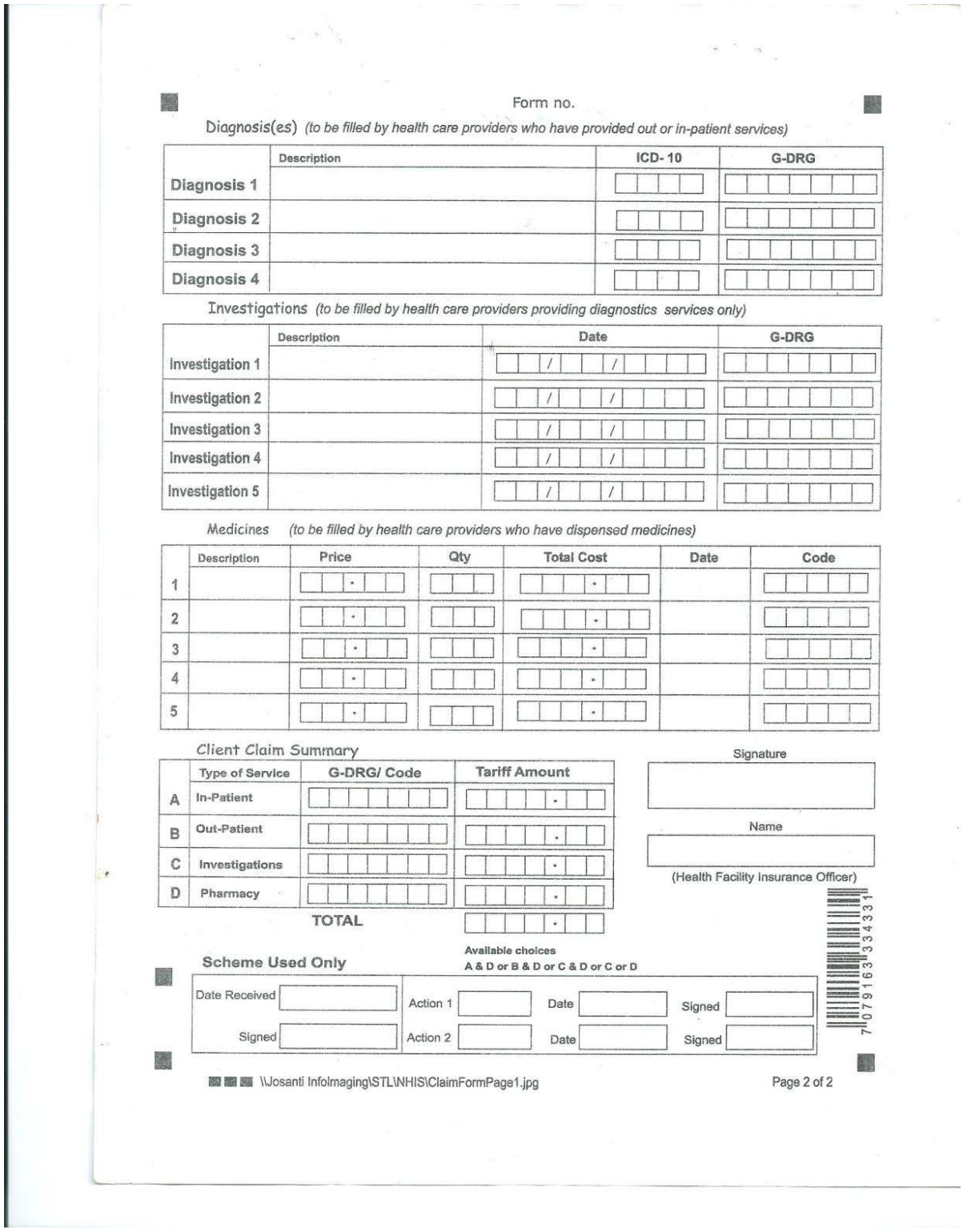
	Descrption	Date	G-DRG
Procedure 1		/ /	
Procedure 2		/ /	
Procedure 3		/ /	

8 079163 334330

\\Josanti Infolmaging\STL\NHIS\ClaimFormPage1.jpg

Page 1 of 2

Appendix D: Sample Claims form - Page 2



Form no.

Diagnosis(es) *(to be filled by health care providers who have provided out or in-patient services)*

	Description	ICD- 10	G-DRG
Diagnosis 1			
Diagnosis 2			
Diagnosis 3			
Diagnosis 4			

Investigations *(to be filled by health care providers providing diagnostics services only)*

	Description	Date	G-DRG
Investigation 1		/ /	
Investigation 2		/ /	
Investigation 3		/ /	
Investigation 4		/ /	
Investigation 5		/ /	

Medicines *(to be filled by health care providers who have dispensed medicines)*

	Description	Price	Qty	Total Cost	Date	Code
1		.		.		
2		.		.		
3		.		.		
4		.		.		
5		.		.		

Client Claim Summary

	Type of Service	G-DRG/ Code	Tariff Amount
A	In-Patient		.
B	Out-Patient		.
C	Investigations		.
D	Pharmacy		.
	TOTAL		.

Signature

Name

(Health Facility Insurance Officer)

Available choices
A & D or B & D or C & D or C or D

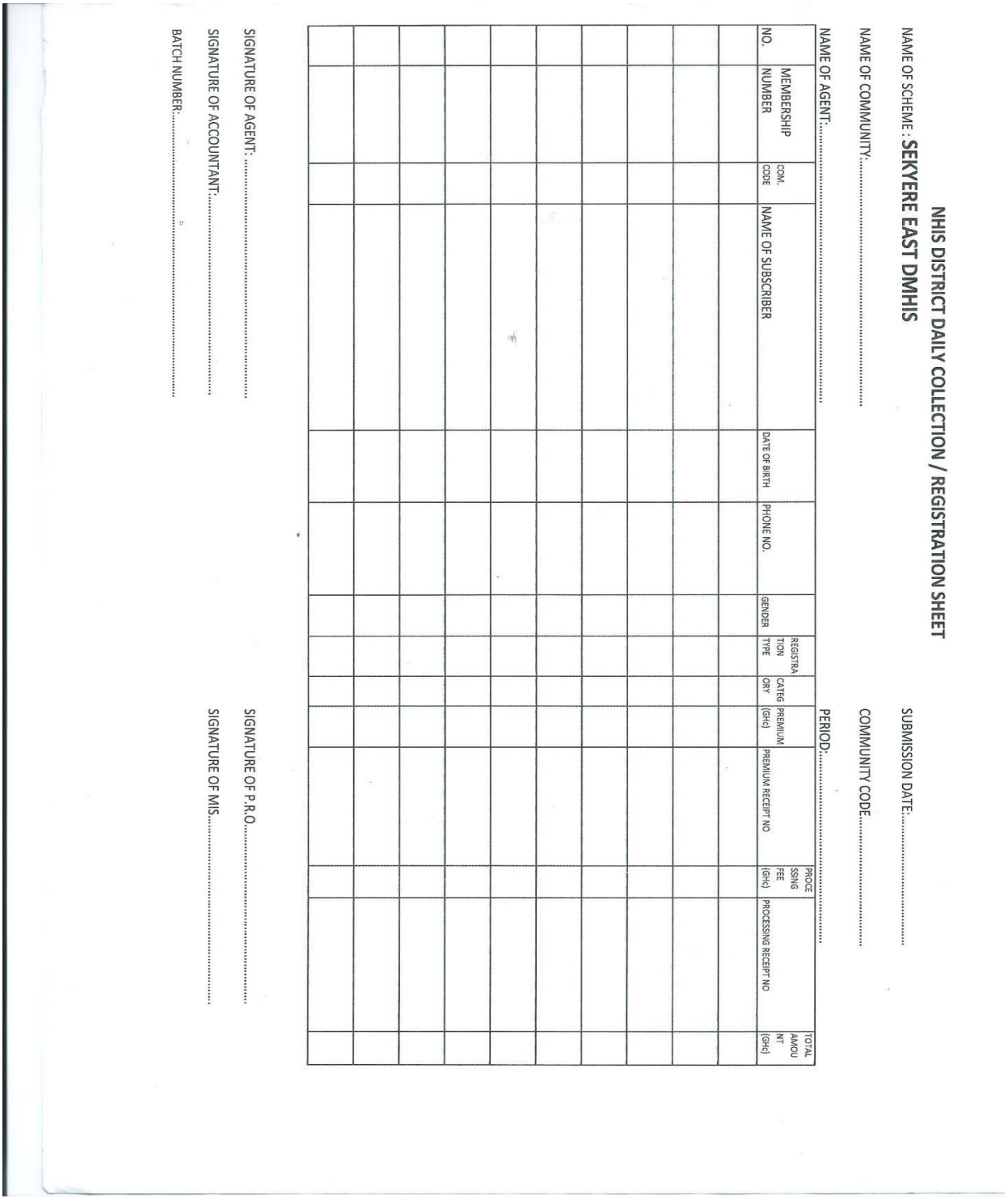
Scheme Used Only

Date Received		Action 1		Date	Signed
Signed		Action 2		Date	Signed

\\Josanti InfoImaging\STL\NHIS\ClaimFormPage1.jpg

Page 2 of 2

Appendix E: Sample Daily Collection / Registration sheet



NHIS DISTRICT DAILY COLLECTION / REGISTRATION SHEET

NAME OF SCHEME : SEKYERE EAST DMHIS

SUBMISSION DATE:.....

NAME OF COMMUNITY:.....

COMMUNITY CODE:.....

NAME OF AGENT:.....

PERIOD:.....

NO.	MEMBERSHIP NUMBER	COM. CODE	NAME OF SUBSCRIBER	DATE OF BIRTH	PHONE NO.	GENDER	REGISTRATION TYPE	CATEGORY	PREMIUM (GHc)	PREMIUM RECEIPT NO	PROCESSING FEE (GHc)	PROCESSING RECEIPT NO	TOTAL AMOUNT (GHc)

SIGNATURE OF AGENT:.....

SIGNATURE OF P.R.O.....

SIGNATURE OF ACCOUNTANT:.....

SIGNATURE OF MIS.....

BATCH NUMBER:.....

Appendix F: Letter of Introduction

Department of Information Science
Loughborough University Leicestershire LE11 3TU UK
Switchboard: +44 (0)1509 263171 Department: +44 (0)1509 223052

Loughborough University

29 September 2011

Letter of Introduction for Kwasi Owusu-Asamoah

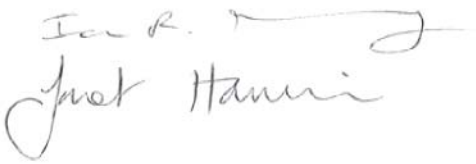
We kindly request for permission to be granted to Kwasi Owusu-Asamoah to enable him study the Information Management systems of your organisation.

Kwasi Owusu-Asamoah is a research student in Information Science at Loughborough University, United Kingdom. As part of his PhD thesis, Kwasi is doing a research project on developing a conceptual information management system model for the National Health Insurance Scheme (NHIS). The research will focus on studying how information is collected, processed, reported and transferred within the different organisations that interact to make the NHIS work. Kwasi will need to be granted access to employees dealing with the management of relevant information, asking for their respones to a questionnaire about their work. In addition to this, Kwasi will need to observe and study how information is handled and to interview staff.

Even though the research is basically for academic purposes, it is hoped that the conclusions drawn from it would be of value to your organisation and the health sector in the country as a whole.

The research is being supervised by myself and Janet Harrison.

Kind regards,



Appendix G: Membership Renewal and Update Form

DMHIS-F11

.....

SUB-METRO/DISTRICT MUTUAL HEALTH INSURANCE SCHEME

RENEWAL & UPDATE FORM

Please print all information in CAPITAL LETTERS and use BLACK INK only

PARTICULARS OF MEMBER/ HOUSEHOLD HEAD		
Surname	**First Name**	**Other Name(s)**
NHIS ID NUMBER	**MARITAL STATUS** (If different from previous)	**OCCUPATION** (If different from previous)
	☐ Single ☐ Married ☐ Widowed	
RESIDENTIAL ADDRESS/LOCATION (if different from previous):		
TEL. NO.1:	**TEL NO.2:**	**E-MAIL:**
MEMBER STATUS: ☐ SOCIAL SECURITY MEMBER ☐ INFORMAL ☐ 70+ ☐ DEPENDANT ☐ INDIGENT		
SOCIAL SECURITY MEMBER STATUS: ☐ CONTRIBUTOR ☐ PENSIONER	**SSNO:**	
NAME OF CURRENT EMPLOYER & ADDRESS (If different from previous):		
TOP-UP PREMIUM CATEGORY (if any): ☐ NONE ☐ GREEN ☐ BLUE ☐ GOLD		

ADDITIONAL INFORMATION ON DEPENDANTS (If any)

I hereby declare that the person(s) mentioned below are my Dependants.

NAME	AGE/DATE OF BIRTH	GENDER	RELATIONSHIP TO APPLICANT	DISABILITY (If Any)	RECEIPT NO.	PICTURE/PICTURE NO.

Please note that deliberately furnishing (or causing to be furnished) false information on this application form is a crime punishable by a fine or imprisonment or both under the Health Insurance Act 650 of the Republic of Ghana.

DECLARATION:

I CERTIFY that the facts stated above are to the best of my knowledge true and accurate

Signature of Applicant

Date

LEFT THUMB PRINT	RIGHT THUMB PRINT

FOR OFFICE USE ONLY

STATUS CATEGORY (Informal Sector ONLY)	
☐ CATEGORY A ☐ CATEGORY B ☐ CATEGORY C ☐ CATEGORY D ☐ CATEGORY E ☐ CATEGORY F	
NUMBER OF VALID DEPENDANTS:	**ASSESSED PREMIUM AMOUNT PAYABLE:**
PAYMENT DETAILS	
TOTAL PREMIUM AMOUNT PAYABLE:	**TOTAL AMOUNT PAYABLE:**
TOP-UP PREMIUM AMOUNT PAYABLE (If any):	**RECEIPT DETAILS:**
TOTAL REGISTARTION FEE:	

Appendix H: Provider Registration Form (Page 1)

NHIS-F2 SERIAL NO…

ACCREDITATION OF HEALTH CARE FACILITY APPLICATION FORM

1. Name of health care facility ----------

2. Type of Facility. Tick the appropriate box:

a) □ CHPS Compound
b) □ Maternity Home
c) □ Health Centre
d) □ Clinic
e) □ Polyclinic
f) □ Primary Hospital
g) □ Secondary Hospital
h) □ Tertiary Hospital
i) □ Pharmacy
j) □ Chemical Shop
k) □ Laboratory
l) □ Ultrasound Scan Centre
m) □ Other

3. Facility Ownership. Tick the appropriate box:

a) □ Government
b) □ Mission
c) □ Quasi-Government
d) □ Private

4. Category of Application. Tick the appropriate box:

a) □ New Application
b) □ Renewal
c) □ Upgrade
d) □ Re-accreditation
e) □ Other……

5. Registration of company with Registrar General's Department:

Business Registration Number	Date Registered	Date Last Renewal

6. Registration of health facility with appropriate regulatory body/bodies:

Regulatory Body	Registration Number	Date Registered	Date Last Renewal

Appendix H: Provider Registration Form (Page 2)

7. **Address:**

Street address/Location	
Postal address	
Town/City	
District	
Region	
Tel number	
Cell phone number	
Fax number	
Email	
Website	

8. **Chief Executive/ Administrator/ Proprietor:**

i. Name ----------

i i. Position----------

iii. Contact number (cell phone) ----------

vi. Qualifications

Institution	Qualification	Date

9. **Services offered tick the appropriate box:**

i. ☐ Out-patient ii. ☐ In-patient (24hours) iii. ☐ Maternity

iv. ☐ Surgery v. ☐ Ophthalmology vi. ☐ Dental

vii. ☐ Pharmacy viii. ☐ Chemical shop ix. ☐ Laboratory

x. ☐ Ultrasound scan xi. ☐ Diagnostic X-ray xii. ☐ CT scan

xiii. ☐ Pathology (Specialist) xiv. ☐ Orthopaedics (Specialist) xv. ☐ Other

9b. **If xv. above is applicable, please specify:**

……
……
……

Appendix H: Provider Registration Form (Page 3)

10. Details of Bank Account

a. Bankers……. b. Branch……..

c. Account Name……

d. Account Number……..

11. Key Professional Staff

Type of Professional	**Number**
Medical Practitioners	
Nurses	
Midwives	
Nurse-Midwives	
Pharmacists	
Dispensing Technicians	
Laboratory Technologist	
Laboratory Technicians	
Radiographers/X-ray Technicians	
Medical Assistants	
Doctor Anaesthetist	
Nurse Anaesthetists	
Dentists	
Ophthalmologists	
Other (Please specify)	

Appendix H: Provider Registration Form (Page 4)

12. Attachments

Please attach copies of the following to your completed Application Form:

a. Certificate of Registration of your facility with the Registrar General's Department
b. Certificate of Registration of your facility with appropriate regulatory body/bodies
c. Proof of retention of your facility with regulatory body/bodies
d. Certificate of qualification of heads of departments/units
e. Proof of retention of heads of departments/units with regulatory body/bodies where applicable
f. PIN of nurses/midwives where applicable
g. List of names of all professional staff, indicating whether they are full-time or part-time. Please use the format shown below.
h. Receipt of payment of applicable Accreditation Application fee.

13. Format for listing names of professional staff (See g. under 12 above)

Please use the following format to list your professional staff.

Name of Professional	Rank / Position	Please tick whether permanent or temporary		If temporary /locum, permanent place of work
		Permanent	Temporary/locum	

14. Declaration

I, ……..……., the Chief Executive/ Administrator/Proprietor of ……. hereby declare that the information given above is correct and that I will be responsible for any falsehood provided.

Signature ……..…… Date ……

OFFICIAL USE ONLY

Received by……..

Receipt No……..

Signature of Officer…… Date…….