

**Mobile Phones in Rural
Papua New Guinea:
A Transformation in Health
Communication and Delivery Services in
Western Highlands Province**

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Declaration of Authorship

I, Henry Yamo, declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or higher learning institution.

Signed: _____

A handwritten signature in dark ink, appearing to read 'Henry Yamo', is written over a horizontal line. The signature is stylized with a large initial 'H' and a long, sweeping tail.

Date: 25/02/2013

Keywords

Tele-hausline

In neo-Pidgin English, hausline means a tribe or village under a tribal chief. Hence, tele-hausline may mean a telecommunication concept targeted at village communities.

TokPisin

The second most common language spoken in PNG along with English and Police Motu

Abstract

Broadband telecommunication services are growing rapidly and spreading at a remarkable pace. Globally, mobile phones are one of the most universally available technologies today that have most affected people's lives, both in developed and developing countries. This mode of communication has spread at such an astonishing rate that it has leapfrogged certain stages of communication in some developing countries. The introduction and use of mobile phones in Papua New Guinea (PNG) is a new phenomenon. Many people, both in rural and urban parts of the country, have come to embrace this wholeheartedly. The mobile phone has become a necessity in every home and can be found almost everywhere in the country, whether in urban centres or the most isolated parts of the country. In rural areas where basic government services have progressively ceased to exist, people perceive the mobile phone as a beacon of hope that keeps them in touch with the outside world, giving them a new lease of life. The mobile phone has in a remarkable way lessened the ever increasing 'digital divide' between the haves and have-nots in a country where computers and fixed-line telephones were viewed as luxury items affordable only by the well-to-do and working people. Research shows that mobile phones are useful for people both in developed and developing countries. It is a means of conducting business and a potential tool for delivery of basic services.

This development communication case study is based around the Closed User Group (CUG) service, a telecommunication product introduced to the country by Ireland-based mobile communication transnational, Digicel. This CUG service was introduced to the provincial health sector by the Western Highlands Provincial Health Authority (WHPHA), by equipping health care workers (HCW) with mobile phones to enable ease of communication among the workers and between health facilities in the province. This study using, phenomenology as part of the research framework, was undertaken to discover if the flow of communication through mobile phones can assist to meet the unique challenges of delivering health services to the rural areas.

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Abbreviations

AusAID	Australian Agency for International Development
CHW	Community Health Worker
CUG	Closed User Group
EH	Environmental Health
EHO	Environmental Health Officer
HEO	Health Extension Officer
HS-c	Health Sub-centre
HC	Health Centre
HCW	Health Care Worker
ICT	Information & Communication Technology
MTDG	Medium Term Development Goals
MTDP	Medium Term Development Plan
NHD	National Health Department
NHP	National Health Plan
NO	Nursing Officer
NRI	National Research institute
OIC	Officer-In-Charge
OSF	Oil Search Foundation
PHA	Provincial Health Authority
PHD	Provincial Health Division
PNGDSP	PNG Development Strategic Plan
PNG	Papua New Guinea
PNGTEL	PNG Radio Communication and Telecommunication Technical Authority
SMO	Specialist Medical Officers
SIM	Subscriber Identifier Module
SOE	State Owned Enterprise
VAS	Value Added Service

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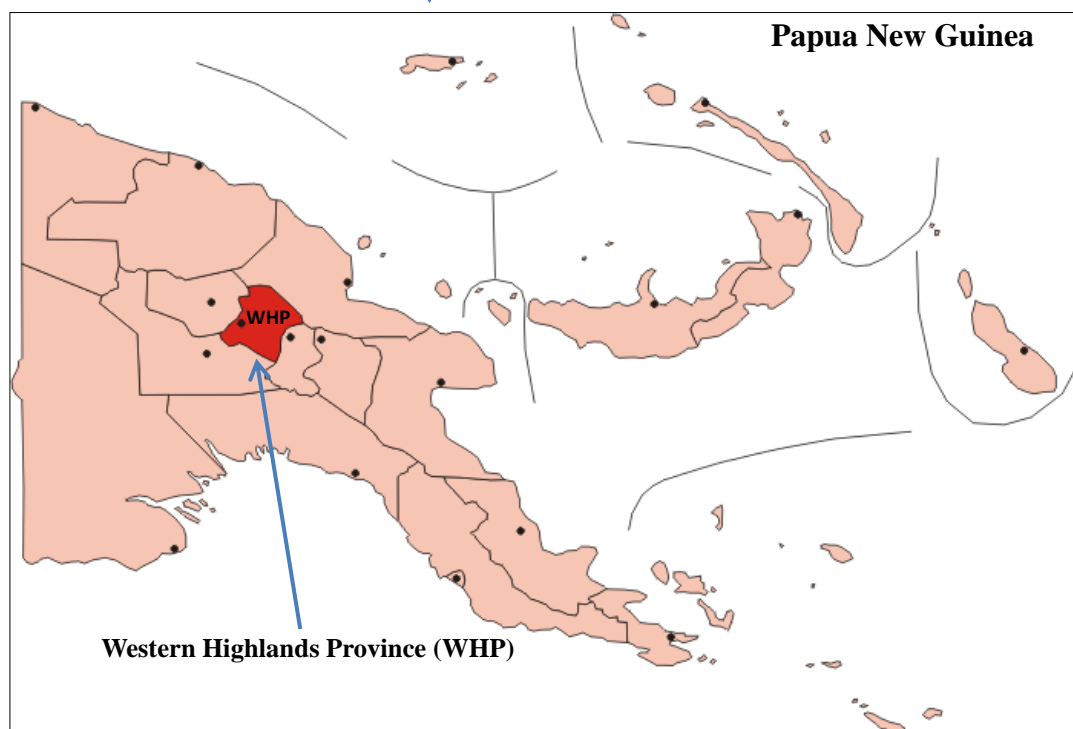
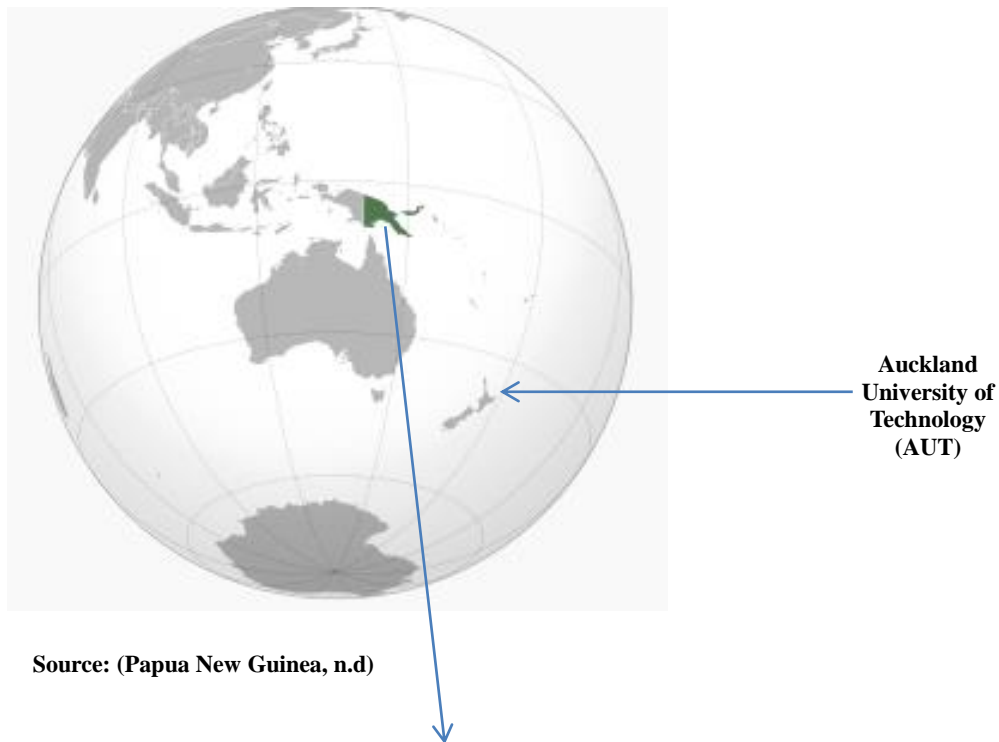
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Research location



Source: (Western Highlands Province, n.d)

CHAPTER 1: Introduction

1.1: Introduction

“If I did not have a mobile phone when that health worker needed advice to deliver the second child, that child in the transverse position would have died”

- *Health worker 5, South Wahgi, July, 2012.*

In the last decade, Papua New Guinea (PNG) has seen a massive transformation in telecommunication and the way people communicate on a daily basis. Part of this change has come about with the introduction of mobile phone communication into the country. The mobile telecommunication sector has leapfrogged PNG from being in an era of no phone communication to one of mass communication in this information age, leaping over some stages of the telecommunication process. For many Papua New Guineans, this has been a major life transforming phenomenon, thanks to competition in the mobile telecommunication sector, which has opened up mobile communication coverage and narrowed the communication “digital divide” between telecommunication users and non-users.

While the impact of mobile phones on society is not a clear cut, there is strong synergy among mobile users, families and friends keeping in touch, and drastic cuts in travel time has been experienced by rural people who would often have to travel for hours to reach the nearest available phone. It is quite clear today that the mobile phone is becoming a remarkable tool for the exchange of ideas over a distance and for managing daily life, whether personal or professional.

Although there is the upside of economic productivity and other benefits with the use of mobile phone communication, on the flip side, the mobile phone has been used in coordinated crime and has possibly contributed to escalating family violence, among other things. However, these things are not so common and are yet to be measured. There is a certain amount of uncertainty that accompanies any new technology and can be blamed on the systemic social phenomenon of wanting life to remain as it is and not to embrace the new technology with its social and economical opportunities and benefits. The recent changes in the telecommunication process in PNG have created a unique opportunity for this research to study the potential of mobile phone services including the Digicel Closed User Group (CUG) service used by both public and private organisations. Mobile communications in Papua New Guinea was first launched in 2003

by state owned telecommunication provider Telikom PNG. This was done through its subsidiary, Pacific Mobile Communication Company Ltd under the trading name 'bemobile'. However, services provided by bemobile had a very limited network targeting only some major centres in the country and the service was expensive although the quality of reception was poor in many areas.

Then in mid-2007, Ireland-based Mobile Communication company, Digicel launched its services and rolled out a wider communication network signing up a record 60 000 customers between July 2007 and March 2008. It has now developed a world class network throughout PNG, offering Voice, SMS and Internet coverage to more than 4.5 million of the 7.5 million Papua New Guineans. Bemobile also continues to provide mobile communications.

This research studied the use of mobile phones registered within a Digicel Closed User Group (CUG) service and how the communication process assisted the delivery of health services in one province. The findings suggest possible lines of successful intervention where lives were saved with use of mobile phone communication. The information made available also makes a unique contribution to knowledge about the potential of mobile phone communication and its capability to assist with the delivery of basic services in PNG. Being amongst the most recent work studying mobile phone communication, this research can assist development specialists to understand its impacts and potentials. Practical problems associated with use of mobile phone communication in rural communities as reflected by the findings can be resolved based on information and recommendations provided. This will then allow for increased and balanced delivery of services in provinces where mobile phones are deployed for service delivery purposes.

Some limitations encountered, included officials from Digicel PNG Limited ignoring interview requests which constrained the extent of this research. The information uncovered shows that there clearly remains significant potential to do more in the public sector, to enhance service delivery by utilising the growing mobile coverage in the country. It importantly shows that what was previously impossible within the health sector in terms of information and skills transfer among staff through mobile communication is now very practical.

1.1.1: Research question

The uptake of mobile phones in the country has grown rapidly, bringing about substantial change in the telecommunication sector that allows information to be gradually available for many people, notably the rural sectors which are being connected by mobile networks. This has resulted in social and economic changes that have influenced and affected people's daily lives. With the widespread coverage and continuing penetration into the most isolated areas, the mobile phone is potentially a vehicle to revive some of the dwindling basic services that have not been meeting the needs of the people so far. Hence this study that is within a development communication framework will endeavour to answer the question: Can the use of mobile phones assist the delivery of much needed health information and services in rural PNG? This research intends to answer this key question, and further expand on the issues surrounding it.

1.2: Significance of research

Much of the research on the introduction of mobile communication into certain countries has been carried out in Western developed countries. Some research has been done in developing countries, especially Africa, South America and parts of Asia where governments are more focused and committed to using mobile communication to advance their development services and intention to deliver services where necessary (Donner, 2008; Froumentin & Boyera, 2011; Gough, 2005; Heeks & Kanashiro, 2009; Kenneth, F. G. M., Kamugisha, R., Mowo, J. G., Tanui, J., Tukahirwa, J., Mogoi, J., & Adera, E. O. (2010); Lin, 2012). PNG is a country in which the introduction and uptake of mobile phones has been experienced on a mass scale for less than a decade – since 2007.

However the extent of its use and the benefits derived, along with the disadvantages encountered, are yet to be documented. The use of mobile phones for service delivery is a relatively new trend that is yet to be explored throughout the country. Its use and the resulting outcomes have still to be reliably researched and documented. The introduction of mobile phones by the Western Highlands Province Health Authority (WHPHA), for which this research has been undertaken, is at the pilot or 'proof of concept' stage. However, Etzo and Collender (2010) in their study show that the founder of Celtel (now Zain), one of Africa's largest mobile operators was one of the first to invest in mobile telecommunications, but he did not predict its exponential rise.

With such results it is anticipated that this study will contribute to understanding the dynamics of mobile phone communication relating to service delivery in the local Papua New Guinea context, and to identify avenues that can be tapped into for future work in other areas also. An earlier doctoral study on mobile phones in PNG by Watson (2011) shows that there is little or no research on mobile communication available in the country. The research by Watson was conducted at a stage when mobile communication was at its infancy in the country. This current research, however, was conducted in 2012 when mobile penetration had reached almost 95 per cent through continued network expansion by service provider Digicel (Joggy, 2011). The lack of research-based information about the uptake and use of mobile phones in PNG calls for appropriate research to be conducted and empirical data made available for possible planning purposes. Information derived from research can then be potentially useful for policy formulation on the use and incorporation of mobile communication and Information Communication Technologies (ICT) in service delivery because such technology demonstrates potential for social and economic benefit.

Furthermore, information revealed by this research can be used by other provinces to guide their planning, implementation and sustainability processes if they wish to emulate m-health services. The research will shed light on how mobile communication is being used to deliver health services in Western Highlands Province (WHP), the hardships encountered and how it has been managed. This research studying the use of mobile phones in service delivery can be used as a baseline study for other research within the health sector, or in other areas. Importantly, it will contribute to the pool of academic literature on mobile communication and its use which may gradually build up as more research is undertaken in this area. Without research and documentation, there will not be any realisation of the possibilities of mobile phone communication or how this can be used for development purposes (Etzo & Collender, 2010).

This highlights the importance and need to document innovative approaches taken by organisations such as the WHPHA, one of the first public sector service providers to procure and distribute mobile phones among its health facilities to facilitate the flow of information through verbal communication among its workers. Since technology is the engine of change, information flowing from mobile technology in action is also the engine of change. Knowledge and information are now recognised as key drivers of any type of development and advancement (Cornish, 1982). Thus, information and communication technologies are seen to be responsible for knowledge flow and innovation (Kenneth et al., 2010).

Therefore, it is possible that the findings of this research can be used for decision making and programme improvement within the area being studied or in other areas as well (Patton, 2002). This research is up-to-the-minute as Papua New Guinea is at a crossroad in terms of mobile communication and service delivery. Papua New Guineans need to see the opportunities available and use them to their and the country's advantage, based on these research findings. In a country where computers and other forms of technology continue to remain a luxury - even among the middle class, mobile phones are ever-present. In a country where the geographical terrain is rugged and inaccessible, basic services have almost come to a standstill, so it stands to reason the potential of the mobile phone in service delivery is immense and worth further exploration (Duncan, 2011).

CHAPTER 2: Literature Review

2.1: Introduction

This chapter provides a review of relevant literature on the introduction, spread, adaptation and use of mobile phone communication and technology in various societies around the globe. It also includes some background information on the attributes and geographical location of PNG, and the various stages of administration when colonised by different countries. It will then look at the country's eventual political governance and how communication has been the mainstay of development since its early introduction and inception. More will be discussed on the phenomenological aspect of this research and how phenomenology fits in. This will be followed by the concept of communication for development and how that has contributed to the development of the country. Changes in communication technology will be discussed taking into account the 'digital divide' between the haves and the have-nots and how mobile phone communication goes some way to fill that gap.

The spread of mobile technology and how it out-paces already established means of communication will also be looked at. This chapter will also include an overview of communication including the spread and uptake of the mobile phone, and the importance of communication, highlighting various mobile phone related studies – looking at its impact, both positive and negative. It provides a focus on the literature underlying the relevance of this study and the role and impact of the mobile (phone) in altering and reflecting complex social ties that support society. Uses of the mobile that underpin the focus of this study will be discussed in order to understand mobile use as part of the distinctive and changing communication dynamics and how it contributes to shape the wellbeing of societies. Finally, the potential of the mobile which has been given very little attention or touched on only very briefly by the respective studies will be discussed, a gap in the literature this thesis aims to fill.

2.2: Social and political landscape

To understand the nature of this research and what it sets out to achieve, it is important to understand the political and social landscape in which communication continues to play a significant role in the development of PNG. The island of New Guinea is the second largest in the world with more than 1,000 languages, about one sixth of the world's total. Papua New Guinea occupies the eastern half of the island, and some 600 associated islands. Papua New Guinea is considered the most bio-

linguistically diverse country in the world (Tindall, 2009). Geographically it consists of a central mountain range which is dissected, the highest peak rising to 4,350 m (Mt. Wilhelm). The terrain is one of the most rugged in the world. The smaller islands include high volcanic mountains and low lying coral atolls. The environment ranges from mountain glaciers to humid tropical rainforests, swampy wetlands to pristine coral reefs (Kaluwin, Ashton, & Saulei, 2000; Nettle & Romaine, 2000). An incredible wealth of flora and fauna, are abundant in the tropical rain forests that cover almost 80 per cent of the land. These forests are home to “two hundred kinds of mammals, 1500 species of trees and 780 different birds, including 90 per cent of the world’s spectacular bird of paradise, the country’s national emblem” (Nettle & Romaine, 2000, p. 80).

Papua New Guineans are mainly settled villagers, living in a subsistence economy. This is because almost 97 per cent of the land in the country is owned by traditional landowners and not the state (Power, 2001). Even after 30 years of independence and development, a subsistence economy is still the mainstay of the population of which 87 per cent is rural based (Baxter, 2001; Tindall, 2009; Watson, 2010b). Productive activities of the people vary according to the island’s extraordinary vertical ecology and the zones people inhabit (Moore, 2003). The ruggedness of the terrain, characterised by steep gradients, fast flowing rivers and swamps, with some parts of the country subject to active volcanic activities, landslides and tidal waves, makes development a problem (Tindall, 2009).

The country is situated along the Pacific Ring of Fire, bordering numerous tectonic plates, including the Pacific plate. The region is prone to lively volcanoes with frequent recurrence of activity. Earthquakes frequently affect the area accompanied by irregular tsunamis. Records of volcanic eruptions on outer New Britain Island stretch as far back as 536 A.D. and as recently as the 1994 eruption that fortunately caused only three deaths, unlike previous eruptions with death tolls of several hundred people (Moore, 2003). The political and administrative landscape of the country was developed by the early administrative colonisers in their quest for control over this land. The country was divided between and governed by Germany (the north) and the United Kingdom (the south) in 1885. The United Kingdom later transferred the governance of the southern part of the country to Australia in 1902, following its occupancy of the northern part during World War I.

Australia continued to administer the combined areas until independence in 1975 (Evans & Ninol, 2003; Kituai, 1998; Moore, 2003; Tindall, 2009). Evangelisation also started during the same period in some parts of the country. The London Missionary

Society (LMS) missionaries arrived in Papua New Guinea in the 1870s, having settled elsewhere in the Pacific and carried out their work along the Papuan coast (Michael & Heekeren, 2003). Later the Lutheran church arrived in German New Guinea in 1884 and was established in Madang on the northern coast of Papua New Guinea (Brij & Fortune, 2000). Papua New Guinea is a parliamentary democracy governed under the constitution of 1975. Queen Elizabeth II of England is the head of state represented by the country's Governor-General. Those elected to parliament enjoy a five-year term. The Government is headed by the Prime Minister, the leader of the party that wins the most seats during elections (Turner, 1990). This person is often called by the Governor-General to form the next government. There are 109 Members of Parliament from the 20 provinces (Kavanamur, Yala, & Clements, 2003). Two additional provinces were formed in 2012.

2.3: Traditional and modern communication

Early colonisation also saw the birth of trade languages used for communication between people with varying native languages. Tok Pisin evolved from this need and was used as the unofficial administration language in German New Guinea (Brij & Fortune, 2000). Today it is one of the officially recognised and widely used languages (Brij & Fortune, 2000; Tindall, 2009). After World War I, the Australian colonial administration used it as the official language of administration. A simplified version of Motu, a local language in British Papua was then used by Papuans to communicate with early foreign missionaries. This language was later used among the large number of foreigners and subsequently became associated with the expanding police force, whence it derived the name 'Police Motu.' This name was changed to Hiri Motu in 1970. It was later recognised as an official language at independence (Brij & Fortune, 2000; Moore, 2003; Tindall, 2009). All three – English, Motu and Tok Pisin, are now official languages of Papua New Guinea.

Given the linguistic diversity of the country, pre-contact indigenous communication systems in PNG were primarily oral and limited by proximity and mobility. This is partly attributed to the rugged terrain and isolated local settings. Messages were often broadcast by wind and drum instruments or by word of mouth (Brij & Fortune, 2000). These means of communication however varied significantly between highland and coastal communities. In the highlands, communication for traditional warfare was the smoke signal. One warring tribe would signal the enemy by sending up puffs of smoke when ready to take to the battlefield. Shouting from mountain-top to-mountain-top was

another means used to deliver messages or possible warnings. At times, apart from word of mouth, messages were delivered on foot, tracking from one village to the next. On the coast, messages were drummed out by hitting slit gongs or hollowed out wooden drums known traditionally as garamuts or blowing into conch shells (Watson, 2011).

While these traditional means of communication played vital roles in society, early missionaries introduced the Western-style of communication into these indigenous micro communication networks in the early 1800s. Attempting to keep up with the rest of the world, the colonial administrations introduced crude telephone systems in 1878. The turning point of communication in the Pacific and in PNG occurred in the late 1920s with the development of high frequency (HF) radio technology. Administrative systems in the country often used these HF radio systems as an economical means of maintaining contact with government, colonial offices and rural village administrations (Brij & Fortune, 2000).

Other forms of communication, including print and broadcast media, then flourished. Among the earliest were two tabloids that appeared after World War II: *The South Pacific Post* which reported Australian and overseas news from its office in Port Moresby from 1951, followed by the *New Guinea Times* in 1959, published in Lae. The two papers merged into the *Post-Courier* in 1969 (Tindall, 2009). PNG's Tok Pisin language newspaper *Wantok* was founded in 1969, but carried on from a 1935 monthly Tok Pisin manuscript, *Frend Bilong Mi* also had news versions in Tok Pisin (Cass, 2011; Moore, 2003). Radio broadcasting also began in the 1930s with a medium wave station called 4PM in Port Moresby, opened in 1935 and operated by the Australian colonial administration (Papoutsaki, McManus, & Matbob, 2011). Radio has been and continues to be the traditional media leader in the country, knowing no geographical and illiteracy boundaries (Robie, 1995).

Communication through telegrams in Port Moresby started in 1913. The Germans later established New Guinea's first radio telegraph station in Rabaul in 1914. In 1907 they established the first inter-connected local telephone systems between Rabaul and Kokopo. Port Moresby eventually got its first taste of local telephone service in 1910 (Post PNG Ltd, n.d). To enable a wider communication network a plan for a national telephone system was drawn up by the government in 1964 (Brij & Fortune, 2000; Post PNG Ltd, n.d). Since then, telephone communication developed gradually around the country, however much of it remained confined to certain quarters only. A 1989 report compiled by the World Bank, stated that existing telecommunication facilities were concentrated only in urban areas, while most rural areas had little or no access to

telephones (The World Bank, 1989). More than a decade after this report, there has not been much difference in the expansion of communication services which has remained much the same or has deteriorated.

“The lack and absence of essential communication resources also reflects a lack of political will and policies that have failed to recognise the importance of communication as a social process that can help to bring change and development” (Papoutsaki & Rooney, 2006, p. 2).

2.4: Phenomenology

Phenomenology as a body of study will not be delved into in detail. This study will concentrate on the experience of health workers – on their uptake and use of mobiles in WHP. As a discipline, phenomenology is defined initially as the study of the structures of experience, or consciousness. Phenomenology originated from Greek: (‘that which appears’; and *lógos* ‘study’) and is the study of the structure of experience (Woodruff, 2011). Literally, phenomenology is the study of phenomena or the appearance of things as they appear in our experience, or the ways we experience things (Woodruff, 2011). Moran (2000) suggests that phenomenology attempts to get to the truth of matters and describes phenomena in the broadest sense as whatever appears, that is, as it manifests itself in consciousness, to the experienter.

Research also shows that phenomenology is a study on the exploration and description of a lived experience in human beings within the environmental setting (Kakulu, Byrne, & Viitanen, 2009a; Lane, Newman, Schaeffer, & Wells, 2006; Said, Sarofil, & Bakar, n.d.; Seaman & Mugerauer, 1989). A study by Kakulu et al. (2009a) further describes phenomenology as a diagnostic research tool applied within the context of occurrences allowing those who experience a phenomenon firsthand to give perceptions of these experiences before any theorising. Briankle (1996) says a phenomenon is an experience by a person during conscious living in an everyday world. Regardless of the nature of respective studies, and the varying approaches, the bottom-line remains the same; it is to study the lived-experience of people. Thus it is concluded that phenomenology is the study of a phenomenon as experienced by people in any environment.

“Basically, phenomenology studies the structure of various types of experience ranging from perception, thought, memory, imagination, emotion, desire, and volition to bodily awareness, embodied action, and social activity, including linguistic activity” (Woodruff, 2011).

2.4.1: Phenomena as experienced - other studies

Considering the type of experiences pointed out by Woodruff and others, the use of electronic gadgets has been a great phenomenon among people both young and old. Berger (2002) says it is fair to argue that video games in general are a new popular culture phenomenon. His research found that video games were a new entertainment phenomenon that brought on an all-new social, psychological and cultural significance and experience. Video games capture the player physically, mentally and emotionally giving an experience through interaction. The participant has “to act and react” (Berger, 2002, p. 3). These and other advances in technology then create typical mass phenomena and collective behaviour that allows old patterns of thinking and practice to loosen their grip and new patterns to secure their hold (Ginneken, 2003). “Such tides of ebb and flow can be noted all around us where patterns emerge around technologies or organisations and the relative advances play out over time, with rival systems taking over” (Ginneken, 2003, p. 169).

2.4.2: Communication evolution as phenomena

Within the media communication sector the evolution of change has been noted in the form of digital communication which has played a significant part in social and economic advances of many societies. A study by Harvey in 1989, (as cited in Rossi, 2007) points out that digital communication has conquered geographical distances and chronological time through the phenomenon of time-space compression. “Time used to be linear, sequential, measurable, and predictable; time dominated and defined space, because physical space was measured by the time needed to cover physical distance” (Rossi, 2007, p. 334). With the advent of new information technologies, instant ('real') time dominates and displaces sequential time. It is in this environment of lived-experience with space compression, brought about by the advent of modern technology including the introduction and use of mobile phones that this research will be carried out. It is noted that phenomenological studies are done to gain insight on a phenomenon for reasons targeted by specific studies (Kakulu et al., 2009). This study will encompass

the uptake and use of mobile phones within the Western Highlands health sector rather than observe the lived experience of mobile phone users at large.

2.4.3: Mobile phone phenomenon in PNG

The way in which the mobile phone has been introduced on a wide scale into PNG within a very short time, has changed the cultural setting and social structures within some communities (Watson, 2010b). This rapid uptake of mobile phones and the ability of the process to leapfrog certain communication stages is a phenomenon in itself (Cave, 2012). It has dictated the course of certain human activities including daily patterns of lifestyle and human behaviour in many communities (Duncombe & Boateng, 2009; Etzo & Collender, 2010).

Notably, a mobile phone call invokes all related activities to commence voluntarily. This can often be observed in the way people use body gesture and behaviour as a resource for framing and organising the talk, e.g. when someone gets a call when among friends, he/she steps away or frantically uses body gestures when on the phone (Kakulu, Byrne, & Viitanen, 2009b). In ordinary conversation this would not have occurred for some people. “The context of the moment provides the behavioural environment that is intricately and reflexively linked within a larger pattern of social activity involving the mobile phone” (Duranti & Goodwin, 1992, p. 7). In Africa, the rapid uptake and adoption of mobile phone technology has been described as “staggering a remarkable phenomenon and a revolution because it was largely unanticipated by the business or research communities” (Etzo & Collender, 2010, p. 1). Similar trends are possible for PNG given its extensive spread within a very short time.

2.4.4: Phenomenon related to mobile phone use by health workers in WHP

The experiences of work-related mobile phone communication among health workers for 24 hours, seven days a week, is assumed to be the first for most, and also for the province. Bearing in mind phenomenology’s vast definitions, it is considered that the experience of mobile phone use encountered by health personnel in WHP is a phenomenon, a lived experience (both passive and active) resulting from the distribution and use of mobile phones among health workers. According to Woodruff (2011), phenomenology is the study of structures of consciousness as experienced from the first-person point of view, ‘as it is’, an experience of or about some object.

On this basis, this study will portray the experiences of rural and urban health workers highlighting their positive and negative encounters with using the phones. The

study is a means of conquering their understanding attained through their experience consisting of emotions, feelings, convictions, adopted work cultures, relationships forged and jobs performed with use of mobiles (Patton, 2002). The fact is that for most, if not all, especially those serving in the rural sector, it may be the first time they are aided by any form of telecommunication to execute their duties in a country with severe health care resource constraints (Aylward, 2011). It is about feeling connected and being able to access information; the achievements experienced or the disconnectedness that results from lack of mobiles.

The highs, the lows and the hopes placed on the phone may be the ultimate answer to their hardships in the line of duty. Though the nature of this research does not allow for the acquisition of a complete single experience from each individual, it attempts to connect phenomenology to the experiences of health workers in WHP. The results of the study will highlight experiences of the health staff who have been part of the transition from working without any form of communication technology to working with verbal communication on the mobile phone (Lane et al., 2006). The results of this research should help to find lasting alternate solutions to traditional means of delivering health services which do not work anymore (O'Neill to commit K3 billion to fix Highlands Highway, 2012).

2.5: Change in communication technology

Development is a process of social and economic transformation through information, empowerment and participation in which communication plays a significant role. Communication therefore, is seen as a solution to some of the problems faced both in developed and developing countries. Thus achievements attained through communication can be attributed to advances in the development of communication technology such as mass media- both print and electronic. To date, radio has been the leading medium of communication for the purposes of development due to its wider coverage in transmission and is comparatively inexpensive in the rural areas. Advantages of radio are that it overcomes illiteracy and it can be used where there is no electricity (Mda, 1980).

However, with the inclusion of other media, and changes in transmission trends, communication is the basis of development and progress. Cornish (1982) argues that there is no area of human endeavour today that offers solutions to so many problems as does communication with new technology. The digital revolution during the 1990s has become a solution to some problems within the communication for development context

faced around the world (Hamil & Lasen, 2005). Advances in communication technology have now made it possible to look away from regular modes of communication for development and to focus on alternate opportunities provided by this change.

With technological changes, communication and information can now be beamed around the world in the form of invisible electronic waves, bouncing from earth stations to satellites and back. Serious challenges are now offered to postal services and news organisations worldwide by electronic mail and social media (Cornish, 1982). These changes have also allowed mobile phones to gradually provide solutions to some of the communication difficulties faced in the world. However, its ability to be used as a communication tool for development is quite hazy and is subjected to further research. While its potential to be used as a tool for development may hold true for developed countries as shown by Julsrud (2005), the question is where does it fit into the lives of the people and their development prospects in developing countries (Watson, 2011)? This will be looked at further in the following chapters.

2.6: Can the mobile phone be a tool?

Unlike the top down development communication process highlighted by Hemer and Tufte (2005) and Mda (1980), mobile phone communication is a two way process which can draw people to proactively seek information that can assist in their work, rather than the information giving or transfer-of-content model used in development communication (Mda, 1980). This is because mobile communication can originate from either end and terminate at the other end. It is interactive and can provide the basis for information to be shared for purposes of empowering individuals and can allow for one-to-one feedback from recipients. Today we are already seeing the emergence of many new circles of communication made possible by new technology, bound together by common interests, through services such as the internet (Dennis 2005). This then provides opportunities for people to talk and listen to others, identify problems and decide on a course of action (Vijayan & Lyle, 1995). From this perspective, mobile phone communication among workers in the various sectors in developing countries is conceived as a strategic link in the information, capacity building and education chain which is a component of comprehensive initiatives to engender transformation in the delivery of basic services where required.

2.7: Communication and mobile phones in the world

The mobile phone phenomenon in the world is an area that has been somewhat well-researched and documented. It is claimed to be the technology that has diffused faster than any other communication technology, becoming a global phenomenon (Castells, Fernandez-Ardevol, Qui, & Sey, 2004; Curwen & Whalley, 2006). Although it is pretty much an established method of communication predominantly used in developed countries, “it is quite a new trend that has spread at an astonishing pace in many developing countries” (Miller, 2007, p. 321). Historically, the first mobile phones were launched in the United States in 1947 (Dunnewijk & Hultén, 1996). Eventually, the first generation (1G) of mobile telecommunication technology emerged in the 1950s in Europe and parts of Asia and has since been developed in successive second generation (2G) technology. Today the 2G technology is commonly used for mobile communication; however, it is closely challenged by the latest innovation, the third generation (3G) (Yamauchi, Chen, & Wei, 2005). More so the 3G is likely to be overtaken by another innovation, the fourth generation (4G) mobile device with internet access and faster than home or office broadband connections (Ofosu-Asare, 2011).

Mobile phone diffusion took off worldwide in the mid-1990s. By 2003 mobile phone subscriptions had overtaken mainline subscriptions for the first time (Castells et al., 2004). It has now moved from being the technology of a privileged few to an essentially mainstream technology (Pulli & Klemmer, 2008). However, mobile phone diffusion has occurred at very different rates in various parts of the world. Uptake and use of mobile phones in developed countries has outpaced that of developing countries, creating a digital divide. But this gap is gradually being narrowed with the spread of mobile phones around the world.

2.8: Mobile phones in developing countries

Mobile communication is now the fastest growing technology in the developing world (Duncombe & Boateng, 2009). The total number of mobile phones used worldwide exceeded the number of landlines in 2002 and the projections were that use of mobile phones in the world will continue to increase both in developed and developing countries (Donner, 2008; Kalil, 2008). Research by Heeks and Kanashiro (2009) shows that communication technology including mobile phones has had significant social impact in poor countries through virtual connection of physically remote locations. Mobile phones are increasingly becoming part of everyday life for most people, including the poor (Yi-Bing, Ai-Chun, & Rao, 2005). Given its uptake and

widespread use, some researchers argue that it has the potential to serve the required purposes of the poor by assisting with the delivery of some basic services needed in many developing countries, apart from its intended purpose (Duncombe & Boateng, 2009; Kalil, 2008).

Studies by Kalil (2008) and Thompson & Garbacz (2011) found that telecommunication plays a major contributing role towards all development aspects of society and the use of the mobile is one way development can be extended beyond fixed lines. Lately, studies around the world in developing countries (Ofosu-Asare, 2011) in Ghana, (Heeks & Kanashiro, 2009) in Peru, (Watson, 2011) in Papua New Guinea and (Miller, 2007) in Jamaica show that mobiles have contributed one way or another in affecting peoples' lives in ways not considered in this context before, both in positive and negative ways. This relates to cultural, economic and regulatory factors that play a role in structuring the use of a billion handsets in the developing world (Donner, 2008).

2.9: Empirical studies on use of mobile communication

Almost all research has focused on mobile phone adoption, particularly in developing countries. The studies encompass issues surrounding the impact of cell phone use and the consequent interrelationships between users and technology in which there are some similarities relating to mobile phone use in different countries (Watson, 2011, Silva, Sutko, Salis & Silva, 2011, Arminen, 2007, Dixon, 2009). For example, most people in developing countries prefer to use prepaid credit to top up their cell phone, given that most people have little or no daily income. Others resort to getting friends or family members to pay for the call by calling and hanging up after one or two rings so the other party hopefully calls back. This method is useful during emergencies, but frustrating perhaps when used for social purposes (Silva, Sutko, Salis, & Silva, 2011; Watson, 2011).

The mobile phone, initially created for voice communication has now evolved into a multipurpose device. Mobiles have increasingly become platforms for commercial and service activities, not just social ones. On-going improvements that increase the capacity of mobiles to host various functions make it one of the most sophisticated and widely available gadgets around. The mobile can be used for transmitting any form of information so long as it has the capacity and software necessary for the required purpose. In developed countries and some developing ones, mobiles are now being used to diagnose patients remotely (Klasnja & Pratt, 2012). Other research has concluded that mobiles have made a big positive impact on economic activities. According to

Duncombe and Boateng (2009), mobile-finance (m-finance) technology has flourished since 2006 and the mobile is being used for rural banking or m-finance services. Based on a review of 43 research articles on m-finance, Duncombe and Boateng (2009), argue that most research has neglected the impact of m-finance while giving greater attention to design and adaptation of the application used for m-finance. Their findings suggest that the poor are in need of a broader range of micro-financial services that could be delivered via mobile phone. This has been driven by the expansion of mobile networks into previously unserved regions in developing countries (Duncombe & Boateng, 2009).

In PNG, the biggest bank in the Pacific, Bank South Pacific (BSP), launched a new mobile banking service targeting rural farmers in 2012. The SMS based technology allows organisations buying farmers' produce to remit payments directly to their bank accounts via mobile phones (Bank South Pacific, 2011). This form of payment minimises the risks of farmers taking cash to banks or returning with money after selling their produce. Given the rapid change and adaptation of mobile technological advances it is presumed that similar services may likely join mobile phone banking, and e-health not long after.

2.10: Communication, information and empowerment

The notion of technological advances also spreads a habit of dependency because all advanced technology is imported from the developed world. Transfer of technology does not break the bonds of underdevelopment in the villages where the vast majority of the world's population live in developing countries (Mda, 1980). Perhaps one of the most promising attempts to find commonalities is the idea that social change is the ultimate goal of development communication (Mda, 1980). Likewise, the use of mobile phones within the health sector reflects an interest in exploring different paths to bring about much needed health services. The goal with using mobile phones within this sector is to reduce the lack of service and enhance service delivery through information sharing. Research has shown that mobile phones with specific software are now being used to collect health data, support diagnosis and treatment and disseminate health education in poor areas of developing countries (Etzo & Collender, 2010).

In some developing countries including PNG, reports have shown that access to health services is very uneven, and large segments of the rural population are not reached. Health facilities and personnel are acutely stretched and concentrated around urban areas (AusAID, 2009; Vijayan & Lyle, 1995). Among the urban population, services are oriented to the middle and upper-income groups, resulting in the peri-urban

poor being neglected. This is often a result from “political considerations that override priorities and little progress can be expected unless there is political commitment to apply resources where the need is greatest” (Vijayan & Lyle, 1995, p. 411). In most societies, geographical isolation coupled with the closure of rural aid posts sometimes due to staff shortage often means that patients from remote districts need to travel extensive distances in poor road conditions to access health care (Asante & Hall, 2011).

During such situations mobile phones can be handy to seek transportation or assistance from relatives (Etzo & Collender, 2010). To alleviate health staff shortage problems in PNG, there has been some support for Community Health Worker (CHW) training to increase staff numbers through the Health Sector Improvement Programme (HSIP). However, the number of health workers trained is insufficient for the country’s stretched needs. Statistics from 2000-2007 show that the average ratio between population: nurse and midwives stand at 5:10,000 people, and the density of doctors: population is 1: 10,000 people (AusAID, 2009). These figures portray a very grim picture of how starved the country is of health workers. Thus some of its objectives can only be achieved with the availability of appropriate technology, adequate and timely delivery of pharmaceutical supplies and the management of other health resources and personnel.

2.11: Digital divide

The world today is very much divided, not by ideology but by technology. The categories in which technology is produced and used can be divided into three sections. First, about 15 per cent of the world’s population provides nearly all the technology innovation in the world. Then, there is the other part that is able to adopt these technologies in production and consumption. Finally, the remaining part of the world’s population is technologically disconnected in terms of not being able to adopt the foreign technology (Mitchell, 2009). This global scenario of a digital divide is marked by countries that have high level of ICT participants and those that do not (Mitchell, 2009). According to Katz and Aspden, 1997, (as cited in Donner, 2008) the term ‘digital divide’ was initially coined to “describe disparities in internet access in the United States. It has since expanded to distinguish mobile and telephone users and non-users” (p.145). This disparity can also be measured by accounting for the level of ICT diffusion between industrialised countries and the least developed countries (LDCs), using the number of phone lines per inhabitant (teledensity) as the yardstick.

Given this scenario, it can be noted that the vast majority of economic activity related to information and communication technology is concentrated only in industrialised countries while developing countries account for very little or nothing of the global digital economy. An example of this is Brazil, a country of 189 million inhabitants. Of this, 79 per cent of the population has never accessed the internet (Hayashi & Baranauskas, 2008). This could mean that Brazil is in the second or third category as per Mitchell's (2009) technological advances and digital divide distribution. But this is not to say that nothing is being done, today there are public and private initiatives to provide technological access within the country (Hayashi & Baranauskas, 2008).

Initially in PNG, mobile phones were confined to certain circles and areas due to cost and limited coverage. This effectively created the digital divide between people who had access to mobile phones and those that did not. However, the digital divide scenario changed dramatically when the telecommunication market was opened to competition, and a second mobile operator, Digicel began operations in 2007 (Watson, 2011). Digicel provided wider coverage and has become the biggest mobile operator in the country since (see Appendix 6). Digicel's mobile rollout programme took the country by storm, spreading and covering almost all the 21 provinces, compared to part- Government-owned competitor Bemobile, which had coverage only in urban and semi-urban centres. Bemobile has now developed a plan to improve reliability and expand its network from main centres to smaller population centres and along major roads. This extended service is anticipated to cover 11 of the 23 provinces and gain more customers to strengthen its position as an alternative mobile phone service provider (Bemobile Limited, 2011). At present the industry is dominated by Digicel with over 80 per cent of the market (see Appendix 6), with Bemobile having the remainder.

After Digicel's mobile coverage rollout, rural communities that had never experienced modern technology or mobile coverage could access mobile telecommunication for the very first time (Watson, 2011). Wider network coverage also saw basic mobile handsets sell like hotcakes among the excited locals. It was a moment when people could not bear the disappointment of not having a mobile phone, although most hardly knew how to operate one. In major urban centres and in learning institutions, those without phones were seen as technologically disadvantaged. For many who did not have access to landlines and computers, having a modern telecommunication gadget was an exciting phenomenon (Watson, 2011). Similar scenarios were also reported in Jamaica where the mobile phone spread at an amazing

rate, even down to the lowest income group (Miller, 2007). While the phone has spread very fast among the people in PNG, those who do not have phones are not disadvantaged either - people can always share the use of mobiles among friends and family (Silva et al., 2011). Potential users often purchase prepaid credit and use a friend's phone to make calls when required, often for free. This strengthens the community cohesion among dwellers. Similar scenarios among people in South Africa and Botswana have been demonstrated, (Gough, 2005) where the mobile was found to be shared and used as a tool for social cohesion and support.

2.12: Leapfrogging

The pace of mobile phone uptake has been astonishing in developing countries with a relatively high number of low-income earners and unprecedented levels of unemployment. The benefits of mobile communication are seen to be overwhelming here and its introduction is 'leapfrogging', i.e. is going faster and overtaking the traditional fixed telecommunications infrastructure (Kalil, 2008). "In Jamaica the mobile phone spread rapidly down to the lowest income earners" (Miller, 2007, p. 321). By the end of 2004 "almost 1.5 million mobile phones had been sold in Jamaica, a country with a population of 2.6 million" (p.322). This was achieved by Digicel, which has 31 operating markets in the Caribbean, Central and South America and the Pacific, including PNG (Digicel, n.d). Millions of people in developing countries are now gaining access to any sort of modern communication for the first time through the use of mobiles (Kalil, 2008; Watson, 2011). The uptake of mobiles circumvents the more extensive and expensive infrastructure required to institute fixed-line phones (Etzo & Collender, 2010). For example, this author could reliably get in touch with his son at school on his mobile from New Zealand, and check on his wellbeing, and talk to family members on a regular basis. Maintaining such contact is reassuring and could not be achieved without a mobile phone, because landlines in PNG are restricted to certain areas and are often unreliable even at the best of times.

For developing countries like PNG, these phone options can be tapped into and used to deliver services lacking in rural areas. This can be done in partnership with organisations as exemplified in most African countries (Dixon, 2009), where locals are trained to modify mobile phones to suit their service delivery needs. Such approaches can be advanced by the PNG government through a private-public partnership to meet the country's unique development and communication needs. Research has established that without government and private-public partnerships, success in one part of the

world cannot be transferred automatically or replicated elsewhere (Etzo & Collender, 2010). Therefore, how communication technology is developed and advanced depends on this partnership and effective government planning with prudent use of resources to deliver requirements that are central to the peoples' needs. In PNG, earlier mobile and fixed line service provider Telikom failed to provide services to the predominantly rural based bulk of the population, having considered that it was unprofitable to its operations (Watson, 2011). However witnessing Digicel reap the benefits of covering rural areas which Telikom had perceived to be unprofitable, Telikom has now expanded its mobile network.

With competition and wider mobile coverage it is assumed that basic information and ideas can be exchanged to empower people to enhance their lives (Cave, 2012). The opportunity can also be used to provide basic health information for prevention and control of major and common diseases and for emergencies as well (Lemay, Sullivan, Jumbe & Perry, 2012). Given the difficulties faced by the government to provide adequate services, investing in mobile communication technology for delivery of vital information and services is essential.

2.13: Advantages, productivity, information and service delivery

Much of the written literature about mobile phones alludes to the many advantages and varied social changes embraced in some developing countries in Africa, Asia, South America and parts of the Pacific. Some research has been conducted by mobile phone companies such as Vodafone in order to highlight the positive aspects of mobile phones in the developing world (Etzo & Collender, 2010; Waverman, Meschi, & Fuss, 2005). The Vodafone research was undertaken to ascertain how the uptake of mobile phones in their African market in five countries was affecting the livelihood of the people in these countries. It was more a response to a literature review which unearthed "little systemic evidence" about positive and negative impacts of mobile phone use. The report was published in 2005 highlighting the economic benefits of mobile phones in Africa (Etzo & Collender, 2010). In his study of the use of mobile phones in the cocoa industry in Ghana, Ofosu-Asare (2011) concluded that the mobile phone was actively used by farmers to meet economic and social needs.

Using the mobile phone, farmers would arrange the sale of their products, share farming information and keep in touch with friends. Duncombe and Boateng (2009) argue that mobile phones have the potential to become a low cost 'accessible' channel for financial information and transactions because they are increasingly becoming part

of the everyday lives of the poor. However, this information is concentrated around African countries where most of the studies reviewed for this research were conducted; therefore it cannot speak for other developing countries which are yet to be explored through empirical research, because mobile communication in respective societies is tied to local circumstances and ways of life (Arminen, 2007). Moreover, Diga (2008) noted that the mobile phone gave people a sense of opportunity. It was an opening through which information could be received or assistance sought during emergencies (Donner, 2008; Watson, 2011). A sense of security and connectedness prevails among people as long as they have a phone. Diga (2007) further amplified that the mobile phone gives a feeling that no other expenditure in a household budget offers. According to Duncombe (2012), the mobile phone has also facilitated some cost saving effects through substitution of airtime and transportation time for most rural dwellers.

In PNG people from rural areas have had to travel for hours to reach the nearest available phone to make a call. However, with Digicel PNG establishing a wider mobile coverage through its extended network, some of these problems have been reduced (see Appendix 6). In countries with mobile coverage provided by Digicel, people have options to send free text messages asking others to either credit their phones or call them. These services known as *'please call me'* and *'please credit me'* are quite useful during emergencies (Donner, 2008). Digicel also provides cheap prepaid rates in PNG (Digicel PNG, n.d). Research shows that there are more positive aspects of the mobile phone that enhances the lives of many people in the rural sectors who otherwise would have very limited opportunities to lay hands on telecommunication gadgets such as fixed lines and computers which continue to remain a luxury in most developing countries (Duncombe & Boateng, 2009; Froumentin & Boyera, 2011).

In many societies today, carrying a mobile phone has become as essential as wearing clothes (Arminen, 2007). Without a mobile, people these days feel disconnected from family and the community at large. In close-knit subsistence communities where most people do not have a daily income, Miller (2007) noted that a household's income is accounted for, not by what you do, but whom you know. So this makes the mobile phone a vital gadget for getting money from friends and relatives. Although similar scenarios are encountered in various societies including PNG, the experiences vary according to local circumstances and ways of life (Arminen, 2007).

In some societies the introduction of the mobile phone has brought about inevitable new ways of communication that contribute to emerging forms of social activity which then have an impact on maintaining social networks. One trend experienced among

people talking to each other on the phone is that communication is limited to only a few words, given that the person's credit may be low (Kalil, 2008). This could bring rise to an emerging trend of communication, suggests Arminen (2007). With the latest innovations and improvements in existing telecommunication technology, the growth rate of mobile uptake in most countries, including Asia/Pacific, is ballooning at a remarkable rate (ICT, 2011). In Africa, the very high growth rate of mobile phones has prompted the World Wide Web Foundation to “create locally relevant mobile services to make people knowledgeable of the operational mechanics of mobile phones and reduce the digital divide” (p. 60; Froumentin & Boyera, 2011) The goal of such initiatives is to teach potential entrepreneurs about existing technologies and business principles specific to the mobile sector. Other organisations in Africa are also looking at increasing rural peoples’ knowledge of mobile phones so they can get services and information previously unavailable to them (Dixon, 2009; Duncombe & Boateng, 2009).

In PNG, introduction of the mobile phone has also allowed a vast growth of technologists and entrepreneurs to experiment with new ideas to forge a living through maintenance and sales of mobile accessories. This trend is common among young school leavers and people living in urban settlements (Etzo & Collender, 2010).

2.14: Disadvantages, social disorders, health, cost and wellbeing

Like with many technological inventions and developments, the introduction and uptake of mobile s in many countries has a flip side as well. There are substantial socio-economic advantages for many countries associated with mobile telephony, but the industry also faces challenges and unintended negative consequences (Etzo & Collender, 2010). Although handy, the mobile is not a solution to all the problems and challenges that may be faced by the millions worldwide who live on less than \$2 a day, like those in PNG villages (Watson, 2011).

“Like any other technology, it has costs and risks as well as benefits and some of the promised benefits will undoubtedly fail to materialise” (Kalil, 2008, p. 1)

Watson (2011) noted that the mobile phone also brought with it social changes which caused concern in the many communities benefited by them. Her findings show that mobiles were sometimes used by both genders for extramarital affairs or phones were used by criminal elements to coordinate their activities. Young people were also using the phone for courtship, a trend that deviates from traditional courtship practices.

Studies have shown that mobile phones can also be a strain on the budget among low-income families in developing countries, where families have to forego some basic necessities in order to buy phone credit (Diga, 2007; Miller, 2007; Watson, 2011). In Vanuatu, workers claimed that it was an added financial burden to have a phone. Also locals in Vanuatu became concerned about the unprecedented increase in the speed of information and communication. Added to this was the fact that rural dwellers could only use the basic calling functions of the phone and nothing else (Pacific Institute of Public Policy, 2008).

The benefits of using a mobile do not trickle down equally among users due to both technological and social barriers, it seems. How phones can be adequately utilised depends on whether the user is literate or illiterate. Other changes may include strains on family budgets. Diga (2007), in her study predominantly among African subsistence farming societies, found that mobile phones did have financial implications on family budgets, resulting in families reducing the amount of food purchased. Her findings however, revealed that households were happy to cope with the short-term food sacrifices, hoping that the mobile would improve their long-term income and job opportunities. Suspicion of saved data in mobile phones is yet another area that has become the basis for gender-based conflict among families and ethnicities in some developing countries (Duncombe, 2012; Watson, 2011). Experiences in PNG reveal women smashing husbands' phones after finding text messages from other women. In other instances there have been all-out tribal clashes resulting in people being either injured or killed (All out brawl on islands of love, 2012; Watson, 2011). Ownership of the mobile and how it will be controlled and financed within a household can become an issue. Mobile use and ownership among young people is also rearing its head in the education sector in PNG, with students allegedly taking part in prostitution and crime. Some have even been expelled for using mobile phones at schools where it is against the rules (Poya, 2012).

A notable event was the London riots in 2011, where the mobile phone was used to coordinate events for simultaneous raids. The messenger service on BlackBerry mobiles was an instant, cheap and secure form of communication, being encrypted, which helped looters communicate across London (London riots, 2011). Other findings show that during the aftermath of the Kenyan election in 2007, mobile phones were used as a 'weapon of war' to circulate destabilising reports and to send abusive messages (Etzo & Collender, 2010). Almost all research that has been undertaken looks into the positive aspects of the mobile phone and leaves a gap for studies to be undertaken to ascertain

how mobile phones can affect and destabilise societies and upset cultural norms, especially in small face-to-face communities and developing countries where connections between people are still strong and very much alive.

2.15: Telemedicine with mobile phones

Technological advances within the telecommunication sector have brought about opportunities to provide basic health services to people in all countries, particularly those in the least developed countries (LDC). Telemedicine is a way basic health services can be delivered through the use of advanced and reliable communication instruments and techniques. In their work to map out effective emergency telemedicine and home monitoring solutions Kyriacou et al. (2003) define telemedicine as the delivery of health care and medical knowledge sharing over a distance through telecommunication. Telemedicine can involve communication between the ill or injured in remote areas and doctors in urban areas and allow treatment to be administered by health workers under phone supervision by a doctor located miles away (Cornish, 1982). Thus telemedicine is aimed at providing expert-based advice to understaffed remote sites. The concept was introduced about 30 years ago through the use of common technologies such as telephones and facsimile machines (Kyriacou et al., 2003). In recent years mobile phones have been used increasingly by researchers as platforms for delivery of health interventions (Klasnja & Pratt, 2012). Research into this area also targets the wider subject which includes various health conditions associated with the use of telemedicine, methods and technology used and the interaction of people with computers and mobile phones (Boulos, Wheeler, Tavares, & Jones, 2011; Klasnja & Pratt, 2012; Kyriacou et al., 2003). The mobile phone is widely recognised as an attractive avenue for the delivery of health interventions, given its ability to have a wider reach, even to poor communities (Yamauchi et al., 2005). Features that make it attractive include; fast and widespread adoption, peoples' attachment to their phones and the tendency of people to carry their mobiles everywhere (Klasnja & Pratt, 2012).

However, to ensure desired functionality and outcomes, a host of supporting state of the art technologies like high speed computer networks, high resolution monitors, interactive video and satellites are necessary to enable telemedicine (Kyriacou et al., 2003). This use of technology then diversifies the areas of study into how telemedicine can be delivered employing varied approaches, concepts and methods. According to studies, telemedicine employs concepts and techniques from electrical engineering,

medicine, computer science and biomedical engineering fields in order to decrease the impact of physical boundaries and improve on delivering quality medicine and information (Donner, 2004; Klasnja & Pratt, 2012; Lin, 2012; Yamauchi et al., 2005).

This calls for a concerted and integrated approach from all necessary sectors. When studying the systems developed to facilitate telemedicine, Lin (2012) found that telemedicine involves sending messages over long distances by combining biomedical signals with information technology and communication involving advanced concepts and techniques. However, their use is possible only in countries with equally developed systems and infrastructure. Quite clearly it can be assumed that some of these systems can only be applicable in developed countries. According to Domingo (2006), these and other advanced concepts of telemedicine and e-health care have been trailed in developing countries like Africa and India through pilot projects. In India the concept has been advanced by developing health information systems to monitor patients through the use of mobile phones via wireless application protocol (WAP) and general packet radio service (GPRS) technology. It is obvious that telemedicine and e-health concepts, although using dissimilar applications and technology, have the same objective - to provide a medical service where it was once impossible. With realised and advanced telemedicine and e-health, developed countries are now moving forward to attempting wireless tele-diagnosis systems (Lin, 2012). Advances in the developed world mean a digital divide is created between them and developing countries in the provision of mobile phone supported e-health. It can also be a driving point for developing countries to adopt existing technology and develop systems to suit their local needs.

This is exemplified by a project developed in the Philippines called Community Health Information Tracking System (CHITS). It was developed by the medical informatics unit of the University of the Philippines College of Medicine. It is an open-source based health information system which transmits health statistics through short message service (SMS). The SMS was chosen as the preferred technology to transmit information because its use is almost universal and also to ensure the technology is applicable to other developing countries (Domingo, 2006). As shown by research, the mobile landscape continues to change dramatically with the growth of initiatives to support development, including telehealth (Etzo & Collender, 2010).

Studies by Boulos et al. (2011) and Yamauchi et al. (2005) show that there are significant economic benefits where mobile communication is employed in the provision of remote healthcare advice and e-health, but how it is utilised depends on the

commitment and the determination of the respective developing country governments. Chandrasekhar and Ghosh (2001) in their study of information and communication technology in low-income countries point out that in order to successfully implement e-health, there has to be collective effort from all stakeholders including governments. They highlight the 1994 Indian Healthcare Project (IHP) as a collaborative effort in which the government of India and Apple Computers committed themselves to undertake the project in the state of Rajasthan.

Likewise the Rwandan government also illustrates commitment in a country where 8-14 per cent of its eight million population are living with HIV. It has begun a process to rapidly increase delivery of treatment, incorporating e-health (Donner, 2004). Studies have now shown that e-health has gradually been adopted in many least developed countries. Most of these innovative approaches have been in African countries, parts of Latin America, and Asia. Among the integrated systems employed for telemedicine programs, SMS in e-health seems to be the most available technology, importantly for developing countries before they are able to use other applications that may be customised to meet local requirements. Some studies have highlighted the successful use of mobile phones to support e-health and remote health care in developing countries. These include off-site medical diagnosis and treatment through communication and HIV treatment in isolated rural communities (Boulos et al., 2011). According to Donner (2004) developing countries require a new level of information and communication processing. There is a need to build upon experiences of mobile technology used for rural health in some countries which can then be customised to make it optimal for local challenges through research and technology development. It is possible that the CHITS application developed in the Philippines will be made free for download for interested groups to deploy in their own telemedicine systems cost-effectively (Domingo, 2006). This should be a bonus for developing countries considering telemedicine for their population.

2.16: Gaps in the literature

As far as communication technology is concerned, there are various interesting topics for exploration in the developing world, where the distinct forces of cultural variability and economic constraint will enrich our understanding for years to come (Donner, 2008). Material reviewed for the purposes of this study (Arminen, 2007; Curwen & Whalley, 2006; Donner, 2008; Duncombe, 2009; Thompson & Garbacz, 2011; Yamauchi et al., 2005) reveal that much of the written work is fairly new and on-

going, however it is also fair to say that it is concentrated. Firstly, most of the research undertaken is situated around South Africa (Etzo & Collender, 2010; Froumentin & Boyera, 2011; Kalil, 2008; Ofosu-Asare, 2011), Latin America (Miller, 2007; Silva et al., 2011), India (Sanchez & Desmond, 2004) to name a few and some parts of Asia - like the Philippines and China. Secondly not a lot of research has been undertaken in other developing countries, particularly those in the Pacific Region. This could be for reasons such as late adoption of mobile telecommunication services and researchers having interest in specific areas. The dimensions considered in the work undertaken have been to the detriment of mobile adoption, access and the impact of mobile use and interrelationships between mobile technology and users (Donner, 2008). These studies show how mobile phones have been adopted, experienced and appropriated in ways that differ significantly from other technologies. Daily life studies illustrate ways in which users in developing countries experience the many joys and frustrations as people elsewhere on the globe (Donner, 2008).

In their review of literature on mobile phones in developing countries classified as 'low income' by the World Bank, Waverman, Meschi, & Fuss, 2005, (as cited in Donner 2008) report that higher levels of mobile penetration leads to higher rates of domestic gross product (GDP) growth among low-income developing countries. While this information is true for countries that have been studied, it may not be the yardstick to measure mobile phone technological development and innovation in all developing countries. This is because studies are unique to respective settings, and to get an actual understanding studies have to be conducted within these areas. In his work, Donner (2008), clearly points out that there is a striking lack of research about social appropriation of mobile phones in the Pacific for the obvious reasons. The late introduction of mobile phones into the Pacific may be the most influential factor. More studies are called for in this region to contribute to the body of knowledge on mobile phone penetration and utilisation.

Researchers are interested in the possibilities of mobiles for promoting or enabling economic growth (Sridhar & Sridhar, 2006, as cited in Donner, 2008). They echo earlier work on telecommunications and economic development and identify its positive effects. This has left a gap for new research to be undertaken on the negative aspects of the mobile phone and how it has contributed to social disharmony or to further the digital divide among factions within communities if not countries. There remains the need to document the different needs and motivations of countries that have adopted

mobile telecommunications recently to help illustrate ways in which mobile technology can be used for social and economic advancement (Donner, 2008).

2.17: Summary

At the broadest level, all research studied helps to capture a representation of a still evolving communication technology that makes it even harder to remember what life was like without it even just a few years back (Donner, 2008). As noted from the various studies, the value most reported of the mobile in developing countries is that it has more or less become a substitute for the landline, which was often only affordable by the most prosperous urban dwellers. The introduction and uptake of the mobile across the globe has been well documented through studies of various types; however there is still much more to be done. The mobile can also be seen to reconstruct urban space and social interaction in both developed and developing countries. According to studies by Donner, 2008; Ling and Donner, 2009, (as cited in Silva et al., 2011), there is scholarly attention given to the use and appropriation of mobiles in the developing world. However, more research has to be done in developing countries.

There is evidence however that programmes that work in other countries cannot do the same in PNG, given its unique conditions that are unmatched by any other country. If the government is not able to provide enabling infrastructure to allow services to operate then, investing in mobile telecommunication may be an alternate positive approach. PNG can learn from other countries' experiences and adopt research and software programming to suit its needs. Donors can contribute enormously by providing much needed technology that can be used in these areas to benefit the vast majority of PNG people. With the mobile phone's potential to contribute to meaningful development that will make a great impact and allow for greater economic and social growth, PNG needs to have more entrepreneurs, programmers, researchers, government agencies and non-profit organisations that are capable of designing and implementing mobile applications that meet and suit its unique requirements (Kalil, 2008).

CHAPTER 3: Purpose of the Research

3.1: Purpose

This chapter will briefly outline the basic purpose of this research giving a general view of mobile technology's potential and how it can be used to meet specific requirements. It will endeavour to illuminate the inherent qualities of mobile technology available. The adaptation and use of mobile communication and technology in PNG is at its infancy, thus it is necessary to identify its potential through research. This chapter will highlight earlier ICT projects undertaken within the PNG health sector and how the private sector has adopted mobile technology, and conclude with a brief summary. Research bears out the fact that mobile phones are very handy for people both in developed and developing countries. It is a means of communication, for conducting business and a potential tool for service delivery (Donner, 2008; Duncombe, 2012; Duncombe & Boateng, 2009; Heeks & Kanashiro, 2009). The value of mobile phone communication extends beyond roads or fixed lines and other forms of communication.

This study examines how telecommunication innovation can be used to the people's benefit by finding ways to harness its potential to deliver services needed by those in rural communities. This research is done specifically to ascertain how the introduction and incorporation of mobile phone communication into the WHPHA's organisational framework can be useful as a support mechanism for the WHPHA to achieve its health service delivery objectives. In late 2011, the WHPHA took delivery of 80 mobile phones registered within the Closed User Group (CUG) service from Mobile Communication Company Digicel worth K10, 000 (NZ\$5,875) (see Appendix 4). A CUG is a post-paid service provided by Digicel in the country under its business category. In this group talk or CUG service, people with phones that have Subscriber Identifier Modules (SIM) registered within a group can communicate without call time cost. The costs are paid as arranged during inception of the service (Post paid Digicel business, n.d). The chief executive officer (CEO) of the WHPHA, Dr James Kintwa, said that introduction of mobile phones into the health sector allowed communication regarding patient treatment to flow between specialists at the hospital and rural health staff. Lack of adequate manpower, skills and information had meant that regular referrals from remote locations were crowding the main hospital. It was thought that the exchange of information on mobiles could ease some of the health service delivery problems faced in the province (see Appendix 4). A leading oil and gas company in the country, Oil Search Ltd, recently established the Oil Search Foundation (OSF) to

inaugurate a Reproductive Health Training Unit that will address maternal mortality issues by providing health workers in-service training with support from AusAID (Oil Search introduces health foundation,2012). OSF is also looking at leveraging off the increasing mobile communications infrastructure and penetration to pilot e-health and tele-medicine projects which may help overcome the challenges faced in delivering health care to remote locations (Wingti lauds health delivery in WHP,2012).

3.2: Mobile communication in health care delivery

A study by Kenneth et al. (2010) shows that mobiles are recognised widely as a potential transformative technology platform for developing nations. Research by Kalil (2008) shows that the benefits of mobiles are profound, because this system of communication can leapfrog traditional fixed communications systems and infrastructure. The potential of mobile communication has long been recognised by many developing countries around the globe and they have put in enormous efforts to reap the benefits of its use. Studies by Kenyon, Poropatich and Holtel (2011) find that greater access to mobiles in rural areas can improve health care delivery at a very minimal cost. Despite some obvious challenges and negative outcomes that accompany the introduction of mobiles as pointed out by Kenneth et al. (2010) and Watson, (2011), it is one of the most appreciated modern gadgets that is seen as an easy, fast and convenient way to get answers to problems. Above all, it has the potential to transform lives and the way people and organisations conduct their activities. A study by Nchise, Boateng, Shu and Mbarika (2012) shows that in developing African countries, mobiles have been used for telemedicine - the delivery of health care and the sharing of medical knowledge over a distance. In these resource-poor settings, the approach to using mobile communication is a low-cost, low-tech and more accessible approach to healthcare (Nchise et al., 2012).

Such approaches to undertake tele-health in developing countries potentially open new avenues to address and fill the existing gap created by lack of infrastructure and inadequate human resources. These too are common in PNG (Waima, 2012b). High costs associated with health care delivery induced by non-existent or ailing infrastructure can be reduced proportionately through communication. Major disease and incidence of epidemics can be controlled if detected and reported before it reaches uncontrollable proportions. Given that Tele-health has the potential to overcome most prevailing geographical and infrastructural difficulties common to many developing countries including PNG, it has great potential to change the landscape of health service

delivery, expanding health information reach to frontline health workers in remote areas (Lemay et al., 2012). Findings from the study by Lemay et al. (2012) indicate that in the health care delivery context, SMS messages and phone calls are cheaper and more efficient in getting feedback than traditional and common methods of communicating which often involves travelling. However, while health programmes with a mobile component are on the rise, Lemay et al. (2012) also show that many of these tele-health projects and applications are piloted with limited measures of programme effectiveness, efficiency or effects on health outcomes. This means they either succeed or do not succeed. One means of determining the strengths and weaknesses of the outcomes is through research as this study is endeavouring to do, in relation to the WHPHA CUG service initiative.

3.3: Earlier ICT initiatives in the PNG health sector

Several projects involving ICTs within the PNG health sector were initiated earlier in order to improve service delivery with ICT technology support. One such project was the Goroka General Hospital (GGH) website launched in September, 2008. The project was then hailed as a major milestone in which GGH was taking a giant step forward into the information age and e-health revolution by being the first hospital in the country to set up a website (Nalu, 2008). However to date, that project with this site address www.ggh.org.pg/ is no longer functional. The project, when launched, was seen as one that would assist the facility to keep up to date electronic information such as laboratory results, applications, medical stores applications, attendance registers and various statistical reporting tools to assist internal departments with their reporting requirements. The project would also allow internet access and enable staff to access electronic information and research data from avenues such as the Health Inter-Network Access to Research Initiative (HINARI). HINARI provides free or low cost online access to major journals in medical and related social sciences to local and not-for-profit institutions in developing countries (HINARI access to research in health programme, n.d).

Figure 3.1: A screenshot of the GGH website



Source: MalumNalu, used with kind permission, 2013.

Australian volunteer Robert Schilt, the Information Technology (IT) Manager who set up the website said at the time that both the internet and access to the HINARI service was a first for hospital staff in Papua New Guinea. (Nalu, 2008). When launching the project the CEO of the hospital Dr Joseph Apa was quoted as saying;

“Goroka General Hospital is committed to embracing Information Technology (IT) as part of its overall strategic direction, which is to enhance and improve the delivery of effective Health Services to people of the Eastern Highlands Province of Papua New Guinea.”

(Post in Malum Nalu’s blog, Thursday, September 18, 2008)

Similar to the Western Highlands CUG initiative, the website for the hospital was seen as one that would enhance staff skills through research and other means and enable staff to provide better services to the people. However attempts to access the website during this research were unsuccessful. Information from a reliable source about the website indicates that it does not operate anymore.

“The Australian who did that has left and it's no longer functional.”

(Blogger, December 10, 2012)

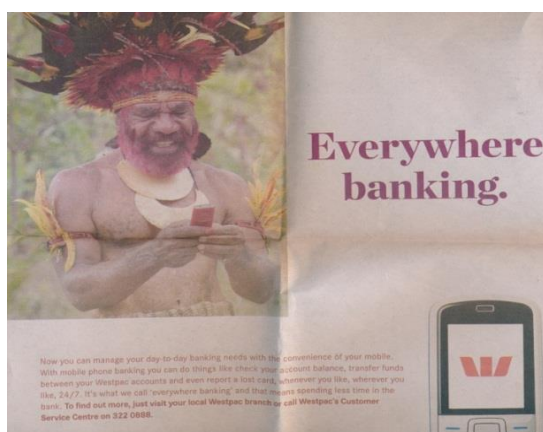
Another ICT initiative known as the Tele-hausline project was undertaken by the PNG Radio Communication and Telecommunication Technical Authority (PNGTEL) in 2006.

“Telehausline” in neo-Pidgin English means a tribe or village under one tribal chief. The tele-health projects were carried out in Kundiawa, Chimbu province, and in Kupiano, Central province. Au (2009) in her study found that these projects were used as pilots in which PNGTEL installed basic telecommunication equipment required for tele-health applications. This would allow for effective delivery of health services assisted by communication. But to date, Au (2009) shows that the services are no longer in use due to shortage of funding and lack of skilled manpower to staff the facilities. Efforts ushered in tele-health signify its importance and the requirements necessary in PNG, given the country’s rugged topography and the need to serve the rural based majority. However, the single overriding factor is that resources are not committed to these priority areas as necessary, resulting in an information and communication service collapse.

3.4: PNG business sector adopting ICT to deliver services

Since the introduction and wider rollout of mobile services by service providers, the business sector has realised its potential to expand business and has taken advantage of it and introduced mobile communication related services to the masses. Notably all major banks in the country (Tainda, 2011; BSP’s mobile banking in Cocoa-land, 2011) have embarked on mobile banking, targeting rural based customers which they refer to as the ‘unbanked’. Private sector organisations have also gone into partnership with banks to deliver more services to the people. One bank has partnered with mobile communication service providers and the sole power company in the country, PNG Power Ltd, a state-owned enterprise (SOE), to enable consumers to purchase electricity using their mobile phones (Robby, 2012). Obviously, private sector investment in mobile communication in PNG is growing and will continue to flourish in the future. Given the affordability of mobile phones and expansion of the mobile network into parts of the country that were previously never reachable by any other form of service, it is important that methods be found to maximise the ability of this communication technology. In his study, Kalil (2008) shows that developing countries fail to leverage on mobile communication for public purposes such as ensuring fair elections or helping health workers to save lives.

Figure 3.2: Use of mobile banking and payment in the PNG Business sector, 2012.



Source: Post-Courier



Source: The National



Source: The National

Although the idea may be new to PNG, research by Kenyon et al. (2011) shows that it can be done. Mobiles can be a source of remote consulting among health workers. It is even better to have phones equipped with cameras to get and transmit images to specialists for specific instructions during emergencies. Hence this research is done to highlight the potential of mobile phone communication in health service delivery in the country through the Western Highlands experience. While the WHPHA has embarked on using mobile phones for its health service delivery needs, the information available and approaches by the business sector illustrate that mobile communication can be used to the advantage of both private and public sectors in the country. All it requires is sound research, commitment and appropriate allocation of resources to needy areas. This study will therefore endeavour to ascertain how mobile phones have assisted the WHPHA to deliver health services, minimise referrals, accommodate for emergencies through communication and maintain a robust communication link allowing information to transact freely among health workers and between them and the WHPHA. Having an organisation networked through communication can translate to

increased time in actual delivery of required services, equating to an increased amount of services delivered.

3.5: Summary

Research and the experiences described have illustrated the potential of ICTs and mobile technology to be a driving force that can contribute immensely to development prospects through communication and information sharing. Its potential has long been recognised and capitalised on in various developing and developed countries both in the private and public sectors. It is gradually being made available in PNG, and its potential has been capitalised on by the private sector. Equally it ought to be recognised and harnessed in the public sector through appropriately planned and resourced approaches, given the pitfalls experienced with earlier projects. Past experience should be a learning curve for better and committed approaches, most importantly within the public sector which has a role to serve the interest of the greater population.

CHAPTER 4: Theoretical Perspective

4.1: Introduction

This chapter sets out to explain the background of mobile technology as it was and is now for this study's theoretical perspective. A look at the mobile phone as a communication tool, considers how it has been used in other places and how it can be used. Finally the significance of communication will be discussed looking at the importance of maintaining communication by both old and new means, and whether or not that is essential.

4.2: Early communication methods

Studies have shown that communication is as old as humanity and information was communicated in written, visual or verbal forms depending on its purpose (Hamelink, 1995; Muller-Brockmann, 1971; Rogers, 1994). The spoken word is considered as the first means used and has remained indispensable to the present day. Through this mode man was able to voice his inwardness, giving expression to himself. Other means such as cave painting or written communication evolved later including the formulation and use of signs and symbols (Muller-Brockmann, 1971). As man's thinking and ability developed, these means of communication evolved to the current stages spurred by innovation. According to Coser and Rosenberg (1957) communication serves to inform, motivate, establish authority and control, and allows for emotive expression.

According to Miller (2005) a theory is a perspective of explaining how and why something happens the way it does or why something is the way it is. In science, theories are speculations supported by observational and experimental data from research (Severin & Tankard, 1997). In the field of mass communication, much of the theory in the past was implicit. Mass communication was guided by common sense and practice depended much on folklore and traditional wisdom. Much of the practice was never written down and would have been beneficial if the practices were tested through research (Miller, 2005; Severin & Tankard, 1997). According to Miller, "theories help us understand or explain phenomena we observe in the social world. They are the nets with which we catch the world or the ways in which we make sense of social life" (Miller, 2005, p. 22). It is a means of observing and making sense of the world.

4.3: Mobile phone as a communication tool

Some areas where the phone can be used are health, education and agricultural services, taking into account the communication aspect of mobile phones in the context of communication for development. Some researchers suggest that a theoretical perspective guides a research and determines what will be measured and what statistical relationships will be sought (Gawerc, 2006; Kim, Heshmati, & Park, 2009; Mead, Hilton, & Curtis, 2001). An example of this is the study by Kim et al. (2009) in which, established theories from other studies were used to support the study's claim and prove the deceleration of the agricultural society. Research states that mobile phone communication, whether to provide health or other services is useful. However, challenges and constraints may accompany the use of phones. Constraints can relate to access and cost of use or to maintain the phones in order to achieve the desired outcome. The challenges can relate to commitment by the government to continue funding and enthusiasm by health administrators to adopt and use communication technology to assist service delivery.

While the potential of mobile phones for health service delivery remains to be tapped into, there is need for carefully planned and sustained approaches (Chandraeskhar & Ghosh, 2001). This study has taken into consideration that mobile phones can play a development related role on the premise that mobile communication has the potential to bring about development. A study by Chandrasekhar and Ghosh (2001) shows that mobile phone communication is useful to provide health or other services. In developing countries telecommunication has become a vital part of life to maintain social contact, for emergency relief, health and education as reflected by Banerjee (2011). However, there are many noteworthy challenges and constraints that accompany the deployment of mobiles. Constraints can relate to access and cost of using and maintaining the phones in order to achieve the desired impact.

While the potential of mobile phones to introduce opportunities into health service delivery and overall developmental goals remain, there is the need for careful, well planned and sustained approaches (Chandraeskhar & Ghosh, 2001). Studies show that, there is a good amount of researched information relating to positive and negative impacts of mobile communication both in developing and developed countries (Castells et al., 2004; Chandraeskhar & Ghosh, 2001; Duncombe, 2009, 2012 ; Froumentin & Boyera, 2011; Gough, 2005 ; Hamil & Lasen, 2005; Kenneth et al., 2010; Kenyon et al., 2011).

While this study is focused around the positive impacts on the premise that mobile phones can be the solution to developmental challenges, there is always the potential for negative effects to surface at some point. According to Ogan et al. 2009 (as cited by Asiedu, 2012), more than 50 per cent of research articles published in communication and development journals between 2004-2007 highlighted information communication technologies (ICTs) as the media focus. While that may be the trend, the scenario differs between countries as shown by Watson (2010b) in her study on mobiles in Papua New Guinea. Her study relates that all media research literature in PNG is focused on print media and training. Nothing exists on mobile phone technology. Thus it is concluded that research is done into available means of communication in particular localities. But the studies into use of ICTs cannot be denied either. Research by Arminen (2007) shows that there is emerging research interest in this area in the attempt to find ways to harness the potential of new communication technologies for developmental purposes. All studies undertaken are from different perspectives, attempting to contribute information and knowledge that can potentially assist within the different scenarios. Thus making comparison of studies from distinct localities with varying features and challenges is less sensible. What is possible in some countries may not be in others. While the general trend of research is into ICTs Asiedu (2012) states that research should also take into account traditional communication methods which seem to work fairly well for some countries but not for others.

4.4: Maintaining communication systems-is it a must?

Sharma (2011), in her study on the impact made by community radios in developing countries in Asia and South America states that maintaining communication systems is a must. Benefits of such communication media have a similar nature across developing countries, but recognition of its potential differs from country to country. In the Pacific, findings from a survey by Duffield, Hayes and Watson (2008) between two countries (Papua New Guinea & Tuvalu) shows that maintaining traditional and embracing new media can be challenging for many reasons. Most if not all, are induced by lack of governments acknowledging the importance of media through adequate funding. This makes maintenance and upgrade of both traditional and new media equipment including accessibility to modern technology discouraging. This scenario is compounded further by poor support infrastructure such as reliable electricity and better roads. However Pacific countries should continue to work towards embracing new media as a

productive and rewarding resource that can be exploited. A study by Banerjee (2011) shows that in some developing countries ICT communication is used to disseminate daily information to rural farmers and the population, but in other developing countries it is neglected. In Papua New Guinea successive governments have over the years allowed traditional media (radio) to fall into disrepair and ineffective performance. The government owned national radio network, NBC, like other government-supported institutions, remains highly vulnerable due to the erosive damage from decades of decay and lack of adequate funding (AusAID MDI report, 2012). While radio is inarguably the best medium of communication in PNG where oral culture is strong and diverse, it has been progressively neglected by governments and not considered a priority. Bad management and budgetary cuts indicate the government's inability to appreciate the importance of information in the country's development, thus impairing the operations of a string of provincial radio stations that to date operate on an ad-hoc basis (Rooney, Papoutsaki, & Pamba, 2004).

The role played by media and communication in developing countries is important and has an overwhelming potential that is overlooked consistently (Chib, 2009; Domingo, 2006; Miller, 2007). Chib (2009) points out that if associated problems are addressed, ICTs have the potential to help developing countries achieve ultimate goals of improving development and provide services including health care in many areas. Unlike other developing countries, Papua New Guinea has no academic literature pertaining to telecommunication, particularly mobile communication, let alone its use for development purposes. This is portrayed by Rooney et al., (2004) who state that new technologies have yet to make an impact in the country, although it has been argued (AusAID MDI report, 2012) that ICTs can help overcome the country's difficult geographical terrain. According to studies (Chib, 2009; Watson, 2010b) mobile phones have been the most interactive medium to produce immediate results. In her study Watson (2010b) portrays that in the absence of other forms of media, a mobile phone can make a big difference in the flow of communication and information. This provides the opportunity for research into the uptake and use of mobile phones as a tool for development, relating specifically to provision of much needed services. This research will pursue her recommendations to explore the concepts of information, knowledge and communication, concentrating on the health sector rather than on the villagers (Watson, 2010b).

Studies in other countries portray that two means are used to provide service through mobile phone communication (Broens, 2005; Chib, 2009; Domingo, 2006; Froumentin

& Boyera, 2011). Some phones have software created to meet specific needs, while others use basic functions allowing only for voice calls and text messaging. Deployment of advanced means including software for mobile phone communication portrays how communication is valued and undertakings are employed to fully utilise its potential. When studying the capacities of Pacific countries to provide effective and efficient means of communication for their population, Duffield et al. (2008) show that information poverty among the people is experienced due to lack of funding for the communication and information needs of the people. However with the interactive nature of mobile phone communication access to information for specific purposes can be more affordable. Mobiles are seen as the appropriate technology for gathering and using information where and when necessary regardless of a user's illiteracy levels (Watson, 2010b). In his study among midwives with mobile phones in Aceh Besar. Chib (2009) shows that there are many aspects that makes the mobile a potential tool for service delivery. He states that the mobile is a social enabler, which enhances existing social and professional networks; it produces opportunity for the less experienced health worker to get information from experienced staff and is a knowledge generator and capacity enhancer through information feeds. While the outlined studies in one way or another acknowledge the importance of communication through any means available, the evolution of communication media necessitate its use and ascertain their potential and capacity through studies. Thus this study is concentrated on whether mobile phones can assist with delivery of health services in Papua New Guinea.

4.5: Summary

Communication through the various simple forms has evolved over time to what it is today. Of course, it is anticipated that it will change again in the future. Noting mobile technology trends and developments it is obvious it has become the latest widely used and most accessible technology that is able to push information beyond geographical barriers. Thus it makes it a most promising technology that can be used as a tool to deliver and exchange information in many development related areas.

CHAPTER 5: Mobile Communication as Development Communication

5.1: Introduction

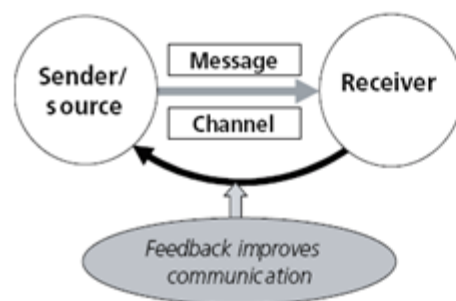
This chapter will focus on some aspects of social change in Papua New Guinea (PNG) through use of media and communication technology. It looks at the telecommunication industry relating to introduction, uptake and use of mobiles and mass media communication. It intends to explore how communication by mobile is being used in private and public sectors including service delivery organisations to transmit vital health care and other information to rural parts of the country. The intention is to show how mobile phone communication can be used in the context of mass media communication to assist service provision in PNG.

5.2: Media used for communication and development communication

The word communication according to Barker (1990) means to share. “It focuses on sharing ideas, feelings and concepts across different levels of human interactions” (p. xi). Communication is a vast area with two main categories, verbal and non-verbal communication. All means of communication; written, oral, visual, intentional, unintentional and many more, fall under the two categories (Barker, 1990). Being a vast area of study on its own, concentration of this research will focus solely on the oral or verbal communication with use of mobile phones among health workers in WHP. The study is primarily concentrated on whether ‘communication’ as a means of ‘sharing’ as portrayed by Barker, has the potential to assist or not in the delivery of health services in the province. In many parts of the world including PNG, mass media that has driven development initiatives, traditionally have been print media, television and radio. Among them, radio has been the notable medium used because of its wider, instant reach, and its efficiency in disseminating development-relevant information (Papoutsaki et al., 2011). Robie (1995) in his book ‘*Nius Bilong Pasifik Mass Media in the Pacific*’ also showed that in most Pacific nations, radio had been the widely used medium and would be for a long time. However, like all other services in the country, the geographically isolated today have little or no access to media. This means the media, through lack of communication, is failing to provide support to the social process that can bring about change and development (Rooney et al., 2004). According to Choudhury (2011), use of information communication and technology (ICT) can overcome geographical difficulties, but this has yet to be fully realised in PNG.

Development communication according to Choudhury (2011) is used for three notable purposes; to inform and instruct or get the people's participation as necessary requirements for the development of any country. It is also seen to come in two forms, the top down or one-way model, and the two-way or dialogic model. The one-way model is purposely used to provide information targeted to promote skills that can enhance self-reliance among recipients. It is sometimes used for content transfer of certain information that can flow only one way from the source to the receiver (Mda, 1980; Papoutsaki et al., 2011). The information from this method of communication has the potential to magnify the impact of development initiatives by involving and engaging locals to solve problems to drive development, but the recipients do not have any input into the content and therefore are mere consumers (Asante, 1997; Papoutsaki & Rooney, 2006). The other is the two-way communication model, also known as participatory or dialogic communication. Here the message can emit from any point and be added to, questioned or responded to, from any other point. It allows for more participation on an equal footing between benefactors and beneficiaries, thereby allowing needs and concerns of society to be raised and met through sharing ideas (Mda, 1980).

Figure 5.1: Two way communication model showing the feedback and dialogue process



Source: (Community Eye Health Journal, 2006).

5.3: Origins of development communication

The role of development communication in modernisation was based on the Western hypodermic-needle or bullet conceptualisation, which was popular during the 1920s and 1930s and designed to be a quick and efficient answer to social ills (Asante, 1997; Mda, 1980; Servaes, 1999). The idea was to use media to inject or diffuse information into societies for consumption. Most often the message and the methods of dissemination would be determined by the purpose of the message (Asante, 1997). This further came about following World War Two when the United States decided to export development

and technology into the developing world. The motive was to enable the developing world to discard unconditionally their 'primitive ways' and embrace the technologies which had shaped progress in the countries of the north. The idea was to bring about change in the traditional lifestyles of people in developing societies to that of modern lifestyles of advanced industrialised societies (Asante, 1997). Thus a one-way model of communication places emphasis on communication media for their 'persuasive powers' to change beliefs, attitudes and behaviours. This is what is witnessed in daily organisational propaganda, whether it is advertising, marketing or public relations for public consumption (Asante, 1997).

5.4: Benefits of development communication

Development, according to Moemeka (1989), is "a matter of increased knowledge and skill, growth of a new consciousness, expansion of the human mind, the lifting up of the human spirit and the fusion of the human confidence in individuals" (p. 4). These forms of development can be attained by individuals from communities, local authorities, organisations and governments. The achievement of any of those aspects of personal development is very much tied in with the circumstances of the society. So a society develops when its members increase their capacity for dealing with the environment they are in (Asante, 1997). Communication is the exchange of ideas; it is not about talking to people, but an interactive process that works in a circular dynamic and on-going way (Salmon, 1989). It is a two-way process where messages flow both ways (Choudhury, 2011). Development communication can ideally mean that the flow of communication among people allows for the increase of knowledge and the expansion of the human mind. It boosts confidence and leads to appropriate use of those skills and knowledge within society as and where required. Although the use of traditional communication may not be the reality for Papua New Guinea, the scenario provides an option for alternate means of communication to be sought and used to fill the vacuum.

5.5: How it fits into the research

Taking into account the perspective of communication for development, the provision of information has the potential to resolve most of the development issues in the country (Cornish, 1982). Transferring this perspective to the health sector in PNG, it can go to say that although the country faces a chronic staff shortage with available specialists confined mostly to main centres, more can be achieved. The health sector can

provide substantially more benefits to the communities from what is available in terms of staffing with varied levels of qualifications if only individuals and organisations know how to organise better and use the resources available to them. In PNG, more lives can be saved with improved health practices enabled by the provision of information without the need to add staff or build additional facilities (Cave, 2012). The assumption here is that current behaviour from people in positions of responsibility adapt poorly to the existing environment. That is, their behaviour does not produce the maximum benefit from available resources; there has been a decline in the provision of health services nationwide (National Health Plan Secretariat, 2010). In PNG, common human ignorance has been central in much of communication for development (Salmon, 1989). Hence this study acknowledges that innovation and use of available communication resources to allow information flow can bring about much needed benefits to the rural sector.

5.6: Summary

Overcoming the information divide by identifying appropriate ways to access information that addresses the needs of people in rural areas needs to be prioritised (Rooney et al., 2004). Information communication technologies (ICTs), including using mobiles for the development of the nation is at least known about and discussed in Papua New Guinea. But using mobiles in this way is relatively uncharted and yet to be explored in a country where the mobile coverage has existed for less than a decade (Ofa, 2008). While mobile communication may not be so effective to amass information, the phone can be a medium of great potential. Its potential to reach the formerly unreachable and penetrate into the most remote parts of the country is an opportunity that needs to be embraced. Crucial factors that make mobile communication a medium for development is the reality that an overwhelming majority of PNG's population still live in rural settings now being gradually covered by mobile network coverage (Turner, 1990). Research and documentation of the present communication trends of mobile phones can be the basis to understand how this form of communication can suit our developmental needs and challenges faced with factors such as a manpower shortage and limited basic infrastructure and social services.

CHAPTER 6: Background, Population and Health Services in WHP

6.1: Introduction

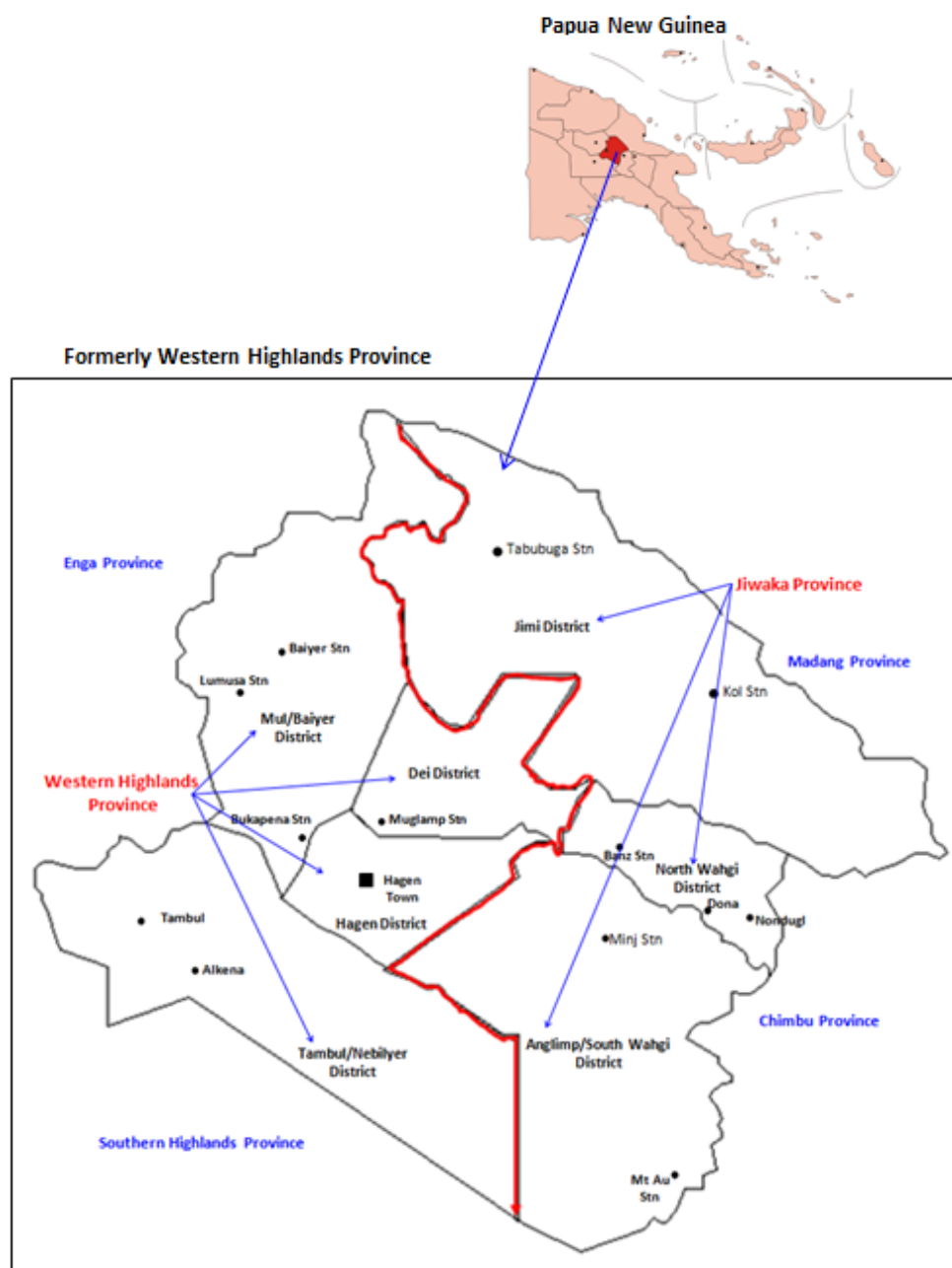
An overview of the province's political and administrative aspects, as well as its geographical location and makeup that contributes to the strain on its resources such as roads and health facilities will be outlined in this chapter. It will then reflect on the status and availability of health services and resources including staffing and facilities. Information about the population of the province and how that equates to appropriation of health services considering resource constraints will also be highlighted. Finally initiatives taken by the provincial health sector to counter the difficulties faced with resource constraints in order to continue delivering healthcare services will be demonstrated.

6.2: General information

Western Highlands is one of the seven Highland provinces in Papua New Guinea. Part of the Western Highlands province was separated and declared politically and administratively as Jiwaka province on May 17, 2012 (Per & Elapa, 2012). This is the outcome of legislation passed by Parliament in July 2009 to create two new provinces by 2012. One of the provinces was created by removing Anglimp/South Wahgi, Jimi and North Wahgi districts from Western Highlands Province to form the new Jiwaka Province. Jiwaka is a portmanteau merging the first two letters of Jimi, Wahgi and Kambia (Tanos, 2011). Prior to the separation, Western Highland including Jiwaka province had seven districts; Hagen Central, Dei, Mul/Baiyer, Tambul/Nebilyer, Anglimp/South Wahgi, North Wahgi and Jimi districts (MacPherson, 2009). After formal separation, Western Highlands proper now has only four districts, Hagen central, Dei, Mul/Baiyer and Tambul/Nebilyer while the remaining three make up the Jiwaka province. The capital of Western Highland is Mt Hagen, situated within the Hagen district, and Minj in Anglimp/South Wahgi district is the provincial capital of Jiwaka. Western Highland province covers the Baiyer, Kagul and Nebilyer valleys and includes the Hagen and Kubor ranges. It shares land borders with Southern Highland, Jiwaka, Enga and Madang provinces. The province is mountainous, with steep slopes, valleys and rivers. Its geographical location and climate are suitable for growing a variety of vegetables including productive smallholder coffee and tea agriculture with good access to markets in Mt Hagen town (Moore, 2003).

Geographically the province is centrally located making it the most preferred business hub of the Highlands region. The capital is a bustling and thriving commercial centre with people from the surrounding provinces flocking in daily for business and leisure. Although Mt Hagen was declared the country's third city, signs of infrastructure and service improvement are still minimal (Waima, 2011). The regular influx of people from other Highland centres has exerted more strain on available basic services at the provincial capital. This is something the Provincial Government needs to address to ensure its people have access to adequate services. In terms of providing service to the people, the province is one that has embraced several political and administrative changes. It has keenly embraced change and reform in various aspects in its endeavour to improve efficiency and quality of service to the majority (Outcalt, Kewa, & Thomason, 1995). Splitting the province into two is a move that will now allow concentrated and enhanced service delivery in only four districts and for fewer people.

Figure 6.3: Map of Jiwaka and WHP showing areas in which data was collected.



Source: Adapted from (Western Highlands Province, 2010)

6.3: Status of health services in the province

All administrative functions of the two provinces have since been separated allowing for respective provincial governments to take charge of their operational management. Jiwaka's first political representatives were elected to Parliament during the June National Elections in 2012. Prior to the elections all provincial administrative functions were overseen by the Jiwaka Transitional Authority (JTA) (Korugl, 2012; Per & Elapa, 2012). As a fully-fledged province with elected representatives now taking charge of its political and administrative matters, Jiwaka is poised to embrace the development

challenges as a province. Despite the separation, one public service function in Jiwaka province that still remains with the WHP is the health services administration under the auspices of the Western Highlands Provincial Health Authority (WHPHA). This is the result of a decision in 2009 when the Provincial Health Division (PHD) in consultation with the Provincial Governor adopted the Provincial Health Authority Act passed by Parliament in 2007 allowing operations of all health facilities in the province to be managed by one body, the WHPHA (National Health Plan Secretariat, 2010; WHO Papua New Guinea Demographics Report, 2011). The 2007 Act allows provincial health services to be streamlined and managed by one health authority. Prior to that, all public hospitals were managed by the National Department of Health while provincial governments managed Provincial Health Divisions. Some studies show that Western Highlands, Jiwaka included, has very limited health facilities and staff to cater for its increasing population. Staff shortage is a problem faced throughout the country, and Western Highland Province is no exception (National AIDS Council, 2005; National Research Institute, 2010a).

Table 6.1: Health facility and population statistics for WHP, 2000.

Districts	Hospitals	Rural hospitals	Health Centres	Aid posts	Nursing officers	Medical officers	Total health staff	Population
South Wahgi		1	5	11	44	4	59	96,570
Mul/Baiyer		1	3	21	25	2	48	56,686
Dei			4	7	12		19	49,676
Hagen	1		6	7	105	29	141	86,951
Jimi			6	16	16		32	37,385
North Wahgi			6	16	16		32	37,385
Tambul/Nebilyer			4	8	14		22	60,823
Total	1	2	32	77	228	35	340	440,025

Source: National Research Institute PNG from census 2000.

According to the statistics portrayed in Table 6.1, there are only three hospitals, 32 health centres, 77 aid posts and a total of 340 health staff to cater for a population of more than 440,025 people. However, the Western Highlands provincial website claims that the province has 119 aid posts of which only 47 are open. It also claims that there are about 162 health centres in the province contrary to the figures above (Health services, n.d). But the general representation provided by the World Health Organisation (WHO) from its 2011 revised western Pacific regional country health profile is that, in 2008 PNG had 3,883 CHWs with a ratio of 0.6 officers/per 1000 population. It also had 315 midwives with a ratio of 0.05 officers/ per 1000 population and 2844 nurses with a ratio of 0.44 officers/per 1000 population. Also, there were 333 physicians with a ratio of 0.05/ per 1000 population (WHO Papua New Guinea demographics report,

2011). The impression here is that the number of staff in WHP is reasonable, given the shortage of staff across the country, in comparison to the doubling population. Research also shows that Western Highlands is the third most densely populated province in the country (Carlson, Rudland, Lepani, & Andrew, 2011). This information is reinforced by the mid-2011 country census (11-17 July) which shows (Table 6.2) that population in the province increased beyond the 2002 census predictions (Bourke, 2012). The total figures illustrate what the population in WHP would be like if it was not divided into two provinces.

Table 6.2: Comparison of the WHP population between 2002 and 2011.

Province	2002 (census)	2011 (predicted)	2011 (census)
Western Highlands	440,025	593,726	352,934
Jiwaka	(as WHP)	(as WHP)	341,928
Total			694 862

Source: Bourke 2012.

While these figures are provided based on information gathered through research and from national statistics information, the figures cannot be perfect given the margin of error during information gathering and compiling. The National Research Institute (NRI) has noted that flaws in PNG's statistical records often make it problematic to analyse and comment on the country's vital information (National Research Institute, 2010a). The NRI says that the practice of keeping good quality data is dying, and has resulted in social indicator gaps, raising concerns for consistency, accuracy and comparability of data over time. For example, estimates of PNG's population vary widely, and this affects the accuracy of per capita figures (National Research Institute, 2010a). As such, information presented in this research may not correlate to evidence presented in other studies.

It must be noted that the information in Table 6.1 does not include Community Health Workers (CHW) who form the backbone of primary health care services in rural areas. The absence of CHWs in the table (above) is not a portrayal of their absence in the province. Information relating to the number of CHWs is lacking although they form the core of the provincial health workforce. According to the WHO Papua New Guinea Demographics Report (2011), nurses and CHWs are in short supply and this trend has continued over the years. With the reported shortage of health staff and the increase of the population in Western Highland province, health service delivery can be cumbersome. Overall, staff shortages and the closing down of health facilities can constitute a serious constraint in the general implementation of the National Health Plan, including priority programmes. Such circumstances call for and challenge health

policy makers to find cost effective measures entailing accountable use of limited resources. Thus, it is better to adjust in order to deal effectively and efficiently with the increased demand on health services (Kavanamur et al., 2003). Other challenges faced by the WHPHA include doctors being left without places to stay when houses are taken by individuals due to lack of appropriate action by the National Housing Corporation, the government body that looks after all public housing in the country (Kodor, 2012). This can result in doctors leaving their post and contribute to the ever increasing staff shortage in the province.

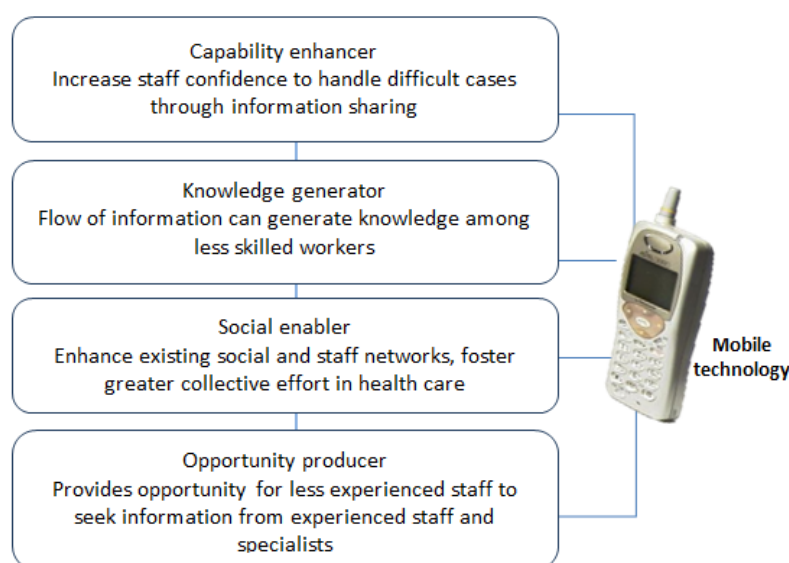
6.4: Initiatives and change in providing health services in the province

Western Highlands has over the years adopted many changes in its health system attempting to increase efficiency and quality of service to the people. In 1990, it decentralised the health services administration to the districts from the provincial headquarters, leaving the provincial office to play an advisory and monitoring role (Outcalt et al., 1995). But to some extent this was seen as a transfer of responsibilities to ill-prepared districts. Some staff elevated to administrative roles had very limited skills in that area. A study by Outcalt et al. (1995) shows that staff being ill-prepared resulted in many things not working to expectation. Staff could not supervise health centres properly, employment in the health sector was not based on objective criteria but by favouritism, and decisions were not based on district needs. Functions transferred from the provincial office to the districts did not arguer with required staff training resulting in poor performance. While the changes associated with staff elevation to higher levels were seen as incentives and motivating factors to hire and retain staff at district level, it occurred at the expense of others. Districts in more desirable locations were able to hire and retain staff while districts in rural areas missed out, causing an imbalance in the implementation of the changes within the division. Therefore it is obvious that the way forward for successful implementation of reforms depend very much on proper training and on-going supervision from the top.

Although decentralisation meant that districts were given sufficient powers to plan and operate health services independently from the national department, the responsibility for policy formulation and health planning remains with the National Health Department (Thomason & Karel, 1994). Thus some top down policies may not work well for all districts. Bossert (1998) in his study argues that there is no evidence which suggests policy packages through directed change from above can maximise the achievement of equity, efficiency, quality in transition and service delivery. Any change

for better delivery of services has to be approached cautiously because change directed from the top can have negative effects on the local health system's reform objectives. Although this has been the scenario with some health reforms in the country, WHP continues to adopt change and reform, the latest being the WHPHA which oversees the operations of health services in the province (National Health Plan Secretariat, 2010). For the WHPHA, providing adequate health services to a population that has doubled over the last decade can be challenging. This is exacerbated further by deteriorating roads and health infrastructure coupled with the diminishing staff numbers leaving for greener fields. This trend is most likely to exert strain on available human and other resources in this sector. An initiative taken by the WHPHA to counter this situation is the introduction of CUG mobile phones among health staff (see Figure 6.5) to enable them share information so that services are provided where required and pressure on specialist staff is reduced.

Figure 6.4: Potential positive aspects of mobile phone use in providing health care



Source: Chib, 2009

Such situations call for appropriate planning and innovation to ensure limited resources are appropriated to the neediest areas, in order to allow for basic health services to continue.

6.5: Summary

The activities associated with the location of the province in the Highlands, have placed considerable pressure on its public amenities and resources. Among them, facilities providing health services are often inundated with patients flocking in from other highlands provinces. Nevertheless the province continues to churn out services but

with the increase in population, other means also need to be identified to ease the stress on resources. On the positive side, the political and administrative separation of Jiwaka from WHP should be helpful, enabling resources to be concentrated for a smaller population and hopefully this will assist and broaden the quantity of services. Innovative approaches taken can assist to ensure services continue to flow. The CUG service, since its introduction by the WHPHA, has brought about great benefits, but how well it continues to deliver good service can only be seen over time.

CHAPTER 7: Status of Health Services in Papua New Guinea

7.1: Introduction

The status of health services and the constraints associated with the PNG government not being able to adequately provide this basic service to the people will be outlined in this chapter. The availability of basic health services in the country and which sectors provide these services to the people will also be examined. Some consideration will also be given to the population of the country and how its increase equates to goods and services being made available by the government to serve the need of the majority in the country. This chapter will then look at the hierarchical structure through which primary, secondary and tertiary health care is provided and who is responsible to provide care at the different levels and the qualification levels that may enable health workers to provide adequate and appropriate services at the various levels. Finally we will consider the government's requirements and inputs to ensure these services are adequately provided. We will also take into consideration if the government has plans to reinvigorate dwindling services and if so through what means.

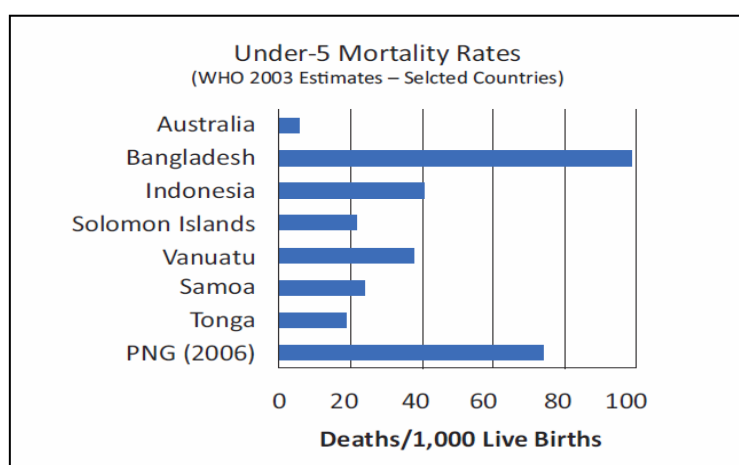
7.2: Availability of services

The 2011 census report showed Papua New Guinea had a population of more than seven million (7,059,653) as announced by the government (Kenneth, 2012). This sees an increase of (1,868,867) people compared to year 2000 which showed (5,190,786) people. With an annual growth rate of 2.5 per cent, these figures represent an increase of 36 per cent of PNG's population in ten years. From this figure, almost 85 per cent of the population live in isolated, rural settings (McBride & Greenhill, 2010; National Health Plan Secretariat, 2010). Getting basic services to this portion of the population over the years has been hard for the government. Health and education services are lacking in most rural areas. According to Kavanamur, Yala and Clements (2003), "one reason is that the national planning and budgetary process in Papua New Guinea is not done appropriately, resources are allocated along political, regional or ethnic inclinations and affiliations" and not according to needs of the population (p. 93). Daily sustenance for the rural population is through subsistence-based agriculture. And according to McBride and Greenhill (2010) "about one third of this population live on less than US\$1.25 per day" (p. 169). A comprehensive review of the PNG education sector in 1991 showed that, up to 90 per cent of school-age children did not have access to education (Kukari, 2012). This scenario also applies to the health sector, with successive governments

being fully aware but failing to deliver on many occasions (Kavanamur et al., 2003; WHO Papua New Guinea demographics report, 2011). In the last few years the PNG government has designed elaborate schemes to improve education and health services through the Medium Term Development Goals (MTDGs).

Although the MTDGs are specific and reflect the nation's current stage of development, these plans have either been partially fulfilled or not achieved (MTDP 2005-2010, 2004). PNG can only expect to see tangible changes if plans are implemented accordingly (Turner, 1990). The failure of governments to deliver in the health sector was highlighted by Saza Zibe the Health Minister in the last government. He noted in the 2004 NHP that health indicators had not improved over the past ten years. He also said, "... the current system is not effectively providing the level of service required to meet our targets" (National Health Plan Secretariat, 2010, p. iii) Research into areas of health service provision also show that achieving uniform outcomes in the country is very difficult (Toikilik et al., 2010). In the various MTDPs the lack of basic health care services is attributed to lack of roads and remoteness. Often medical supplies and emergency medevac's have to be done using expensive air transport. Weak controls and management mechanisms impede positive outcomes (National Health Plan Secretariat, 2010; Toikilik et al., 2010). This has resulted in the closure of essential rural health posts leaving the people prone to health risks. PNG is the only country rated second to Bangladesh (see Table 7.1) for its severity of nonexistence of basic health services as portrayed by the NHP(MTDP 2005-2010, 2004; MTDP 2011-2015, 2010; National Health Plan Secretariat, 2010).

Table 7.3: Mortality rates for the under-five year olds, 2003.



Source: Papua New Guinea National Health Plan, 2010

Media reports also show that lack of adequate trained staff in most facilities results in five mothers dying every day from child birth complications in PNG (Trained health staff needed, 2012). Information also shows that the number of registered midwives in the country has dropped from five hundred in 2009 to three hundred and twenty in 2011 and two hundred and seventy more recently. Although this is being addressed through Australian government support to train midwives to boost the much needed human resource, it may take time before the required staff ceiling is met (Tiwari, 2012; Trained health staff needed, 2012). In the absence of adequate skilled personnel in the health and education sectors, information sharing through mobile telecommunication could be an alternate to fill this vacuum.

7.3: Training and service providers

The 2008-2012 United Nations Country Programme (UNCP) for PNG highlights the shocking reality that health outcomes have stalled and have since been in decline over the last decade with maternal and infant mortality rates remaining unacceptably high (United Nations Country Programme, 2007). Although there has been significant levels of financing by both government and development partners, the emerging picture still shows that human development outcomes are less than satisfactory with health service provision collapsing in many parts of the country (National Health Department, 2010; United Nations Country Programme, 2007). The provision of health services in the country is shared more on an equal basis between government and church medical services. Church health services provide and manage almost half of the country's health services while the government takes care of the other half (Foster et al., 2009). Churches also provide the bulk of the health personnel training in the country, mostly Community Health Workers (CHW) and nurses. There are about twenty church run CHW training schools spread across the country at rural health centres. There are about eleven nursing schools as well. The CHW courses run for two years and the nursing courses run for three years respectively (Foster et al., 2009; National Health Plan Secretariat, 2010).

In 2002, the College of Allied Health Sciences, the only facility in the country that trained Health Extension Officers (HEO) and Environmental Health Officers (EHO) amalgamated with the Catholic Church run Divine Word University's Faculty of Health Sciences. The HEO and EHO courses from the Allied Health Sciences College have since been upgraded to four-year Bachelor degree courses. This allows students to graduate with a Bachelor degree in their respective fields. The Health Sciences in Rural

Health programme concentrates on preparing HEOs to serve in district health centres in rural areas. Upon completion of the course, the HEOs are responsible for patient care in rural areas, daily administration of rural health centres, and the coordination of community health services. EHOs on the other hand can manage environmental health activities in the country's provinces, districts and towns. They become specialists in the health environment field and help local communities improve environmental health conditions through advising, educating and planning environmental health measures (DWU faculty of health sciences, n.d).

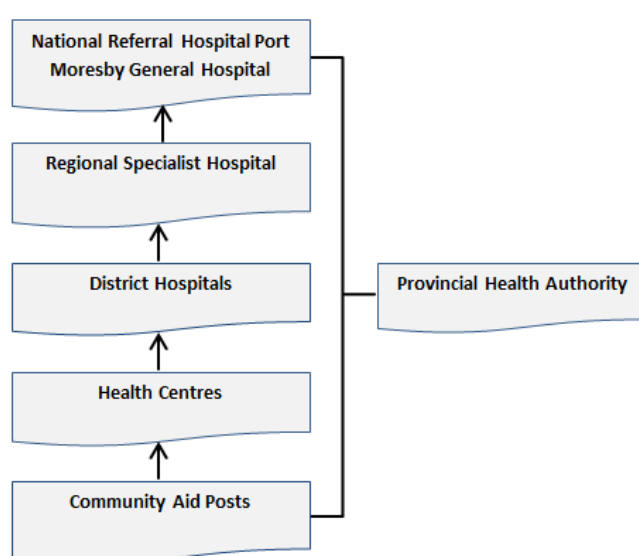
Medical officers are the highly trained component of the health service delivery hierarchy. They are educated at university level for a period of five years, they provide secondary and tertiary care at district and main hospitals-but the number of doctors in the country is very limited (National Health Plan Secretariat, 2010). Most doctors are confined to major centres and towns. According to Duke (1999), the National Capital District has more doctors than the whole Highlands region which has five provinces and an estimated 40 per cent of the country's population. This inequitable ratio has not changed since 1970. Three quarters of rural health facilities in the country including Western Highland province do not get visits from physicians often. Similar ratios can be expected with other health workers as well (National Department of Health, 2009). Although seen as an in-country issue, Kalil's (2008) study shows such trends are common in developing countries where people have limited or no access to doctors and nurses. He points out that in Mozambique there are only three doctors and 21 nurses for every 100 000 people.

7.4: Health hierarchy and role

In PNG health services are delivered through a hierarchical system. The lowest level of service is provided through aid posts, followed up the hierarchy by health sub-centres, health centres, district hospitals, provincial hospitals and a national hospital. More recently the NHD did away with aid post and hospital orderlies. Their shoes were filled by CHWs whose role is to provide basic preventative and curative services to rural populations. They either work alone as frontline health workers or under supervision in health centres and sub health centres. When this happens they are most likely to take on roles and responsibilities beyond their training (Jayasuria, Whittaker, Halim, & Matineau, 2012). The hierarchical health service system in the country allows for reporting to be done from the bottom up through the health data network system. Aid-posts are supervised by health centres and health centres report to the provincial

health office through the district hospitals if necessary (Outcalt et al., 1995). This structure enables information that can contribute to policy formulation and planning to flow from the bottom to the top. But in PNG, Barclay (2010) noted that the national health policy decrees that aid-post data should not be included in health centre statistics. The reason being that aid-post orderlies are not adequately skilled to diagnose illnesses thus the data they present would be inaccurate. The consequences can be that the absence of village data combined with recording inconsistencies and the margins of human error among health facilities has an impact on intervention planning at the upper level, resulting in a lack of most services required. However the phasing out of aid-post orderlies and replacing them with a well-trained cadre of CHWs it seems can solve this problem (Barclay, 2010).

Figure 7.7: A hierarchy health reporting structure.



Source: HIV/AIDS Survey WHP.

Chronic staff shortage issues have enabled Nursing Officers (NO) to be assigned management responsibilities of health sub-centres (HS-C) and health centres (HC) (WHO Papua New Guinea Demographics Report, 2011). Health centres sometimes have Health Extension Officers (HEO's) as Officer in Charge (OIC) supported by other staff. District hospitals have a range of staff including CHWs, nurses, HEOs and if lucky enough, they will have one medical officer to provide primary health care to the people, with backing from other staff.

The country Demographic Reports (2011) estimates nurse-to-population ratio stands at one nurse/2271 people (1:2271). This information shows that additional personnel are

required throughout the country to adequately staff all operating health facilities and deliver health services. The current production rates are insufficient to fill the gaps. The estimated doctor-to-population ratio is 1:19,399 people. Meanwhile the majority of the doctors serve only in the capital, Port Moresby, and not where the people need them the most. Doctors' confinement to main centres is also attributed to the trend of poor management in the higher end of the hierarchy. Notably there is an absence of supporting infrastructure such as good schools and roads that can meet the doctors' welfare needs in many places. This often results in health workers having to abandon their posts. Serving in remote isolated areas also means travelling for long periods of time to collect medical supplies, salaries or basic necessities. Due to this, few health centres now actually carry out scheduled clinics and immunisation patrols (National Health Plan Secretariat, 2010; O'Brien & Lawrence, 2009). Donor agencies including Australian Doctors International (ADI) which often engages in health service delivery in PNG acknowledge that training and increasing numbers of health workers who can work as an integrated team and incorporate capacity building as a major goal, is the way forward for PNG (Trained health staff needed, 2012).

7.5: Management funding and Government support

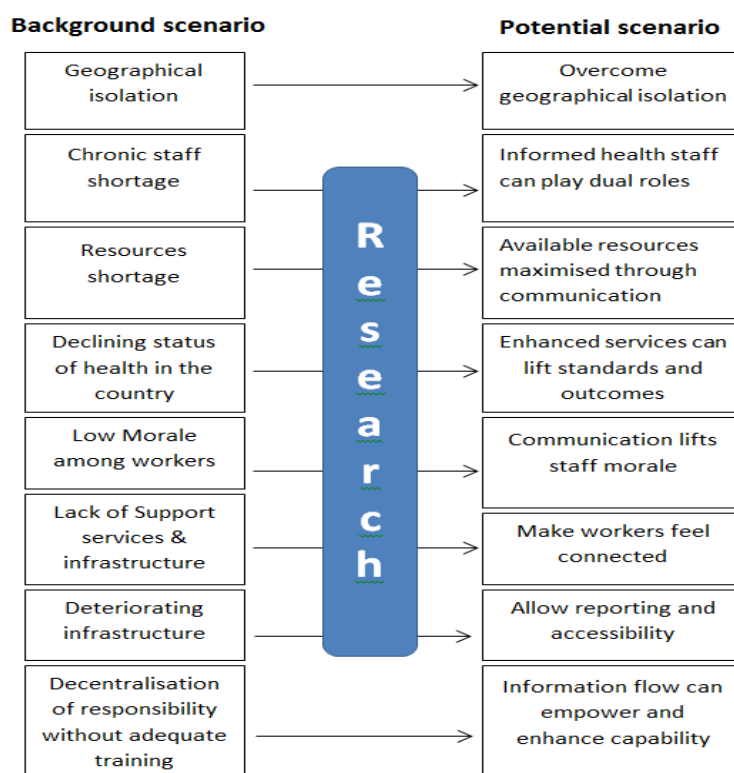
According to the NHP procurement and distribution of medical supplies and vaccines to health facilities in the health sector throughout the country remains a major challenge with health facilities frequently running out of drugs. Evidence shows there is low availability of key medicines. This has vastly affected outreach clinics to rural villages to provide essential antenatal care, amongst others. Poor storage facilities at rural health centres without refrigeration make it unsafe to store essential drugs and vaccines (Toikilik et al., 2010).

And problems associated with health worker shortage in the provinces are endemic. Staff retention in remote and semi urban areas is very difficult and has greatly eroded the quality of care that is delivered. This is a problem within the public sector that the government continues to ignore. Most health staff have moved off to the private sector because of low salaries and poor working conditions provided by the Government. This trend is common in most developing countries (Kalil, 2008). While most of these happen as a result of Government funding shortfalls, some of the problems also transpire from poor management in many facilities. This greatly limits the capacity of the health sector to provide adequate services of an acceptable quality (National Health Department, 2010; National Health Plan Secretariat, 2010).

Through the 2011-2020 NHP, the Government plans to realise the PNG Vision 2050 and the PNG Development Strategic Plan (DSP) 2010–2030. The Government says that the strategy for the health sector for the next twenty to forty years is to transform the current health service delivery system. This will include the progressive introduction or reintroduction of additional community health posts, district hospitals, regional specialist hospitals and new national referral hospitals (National Health Department, 2010). Health systems in rural areas were described as being in a state of slow breakdown and collapse. According to the function and expenditure review in 2000, their complete demise is being saved at present by donor agencies. This review also noted that about six hundred rural facilities are closed or not functioning effectively. Where services are being delivered, the extent and quality are fast diminishing. Reports state that this dire situation has worsened and more facilities have closed down (WHO Papua New Guinea Demographics Report, 2011). The Government through the NHP acknowledges that basic health service delivery improvement is crucial at all levels, and there is a far greater need for integration between hospital and rural health services, both public and church-managed.

The country's health sector also lacks information and communication infrastructure apart from its aged health radio network. This AusAID funded National Health Services Radio Network installed in the late 1990s was designed to provide remote and rural areas with a reliable and effective means of communication to support health services. The network is used for clinical consultations, health promotion and administrative enquiries (Papua New Guinea national health services radio network, n.d). Apart from this network, there is no other known ICT or communication connection between main hospitals, district health facilities and rural health posts. However, evidence shows that a limited number of simple, affordable interventions could reduce deaths of both mothers and children if service provision was strengthened and maximized (National Department of Health, 2009; National Health Department, 2010; National Health Plan Secretariat, 2010). This chapter describes the health service provisions, and lack of medical services and resources. The general scenario and background which has been the basis of this research is outlined in the following figure.

Figure 7.8: What can be possibly achieved.



Apart from the numerous approaches and attempts to improve service delivery, Parliament in 2007 passed the Provincial Health Authority Act, empowering provincial health services to be delivered under a unified system resulting from a provincial health partnership agreement with the Health Minister and Provincial Governor. Three provinces - Milne Bay, Eastern Highlands and Western Highlands signed up in 2009 to pilot the Provincial Health Authority (PHA) initiative, while several other provinces indicated their intention to follow suit with the reforms (WHO Papua New Guinea Demographics Report, 2011). This landmark amendment enables streamlining of provincial health services to occur by transferring the management of public hospital services and rural health services under one provincial health authority or entity (National Health Plan Secretariat, 2010). Although the Act provides the right for provinces to choose to create a single provincial health authority responsible for the management of health service delivery within the province, if policies and guidelines are poorly framed and badly implemented then the expected proportions may not be reached and the problems, if any, will only worsen (Turner, 1990).

Given the above status of the health sector and the provision of health services, the government formulated the NHP as a pathway to guide the rehabilitation and strengthening of the services that have either crumbled or are about to (after many years

of negligence). The Plan is laid out with the aim of strengthening and improving primary health care for all once again. However rehabilitation of the foundations of primary health care can only be achieved through adequate government funding and support from stakeholders and donor agencies. With the rollout and implementation of the Provincial Health Authority reforms it is anticipated that the Plan can be realised over the next ten years to meet the country's vision of a healthy and prosperous nation. But, there is lot more the government has to do. Early in 2012 the then Health Minister Sasa Zibe said the Government's 2011-2020 National Health Plan needs K14.17 billion over the next 10 years to transform health service delivery in Papua New Guinea. On the back of this, the government pledged K350 million for the redevelopment of hospitals. It is anticipated that resources sourced from the funding over the next 10 years will transform PNG's health service delivery and reverse the trend of declining health services and outcomes (Health minister issues reminder, 2012; Pangkatana, 2012). However the truth is that more effort is required from the Government in this area other than drawing colourful pictures of expected outcomes.

7.6: Summary

The status of health services in the country shows a grim picture of the Government not being able to adequately provide this basic service to the people. Churches and non-governmental organisations play a major role in providing half of all health services and the training of most health workers in the country. The rapid increase in population in PNG has not been met with the goods and services needed. Apart from lack of government funding, the lack of appropriate management and planning also places constraints within the health hierarchy, contributing to the lack of well-informed planning resulting in ineffective delivery. Although various approaches and initiatives have been taken on board, attempting to forge a way forward none of them seem to have worked well for the health sector. The Government, every now and then, formulates ambitious plans to haul the health service system out of its present state, but real changes and achievements are yet to be seen.

CHAPTER 8: Design and Methodology

8.1: Introduction

This chapter discusses the design and method used for this study and outlines the process used and tools deployed to gather data in this research. A qualitative approach was used to examine the adoption of mobile phones in the Western Highlands health sector and investigate their use and how the flow of information among HCWs through mobile communication has impacted on and enhanced their ability to deliver health services. Firstly, a look at the methodological approaches employed including the design of research instruments. Then the difference between qualitative and quantitative research methods to distinguish their approaches and qualities and examine how the qualitative research method fits this research. Finally, how data was collected, the means employed, including facilities visited, types of questionnaires involved and physical approaches taken and the difficulties encountered when collecting data will be outlined. Due to the short time frame of this study, data was collected within a week in two provinces, Western Highlands and Jiwaka. However this research will be considered only to have taken place in WHP for the following reasons:

- ❖ This project was planned for the Western Highlands province prior to its political and administrative separation into two separate provinces, which saw the birth of Jiwaka province on 17, May 2012.
- ❖ The health functions of both provinces are still administered by one body, the WHPHA.
- ❖ The mobile phones under study were located in health facilities in both provinces.
- ❖ Although Jiwaka had already been declared a fully-fledged province, when this study was being carried out, the constitutional process of electing leaders to enable the province to be administratively and politically separate was just in progress (June national elections). Therefore it is assumed that technically Jiwaka still fell under the political administration of WHP until its leaders were elected.

Health facilities in both provinces will be regarded throughout the research as being in WHP. The data is rich given that it was obtained from a natural location, the work place of health workers in the two provinces. This research incorporates a case study approach given that it is small and involves a group of health workers in one province, but also big in the sense that it has a wide range of information from varied experiences,

qualifications and geographical locations. It thus fits the features described by Punch (2005) that case studies can be either big or small. This study was carried out within a bounded context where certain health workers within the provincial hospital including hospital management and specialist medical officers and rural health staff in Western Highlands are equipped with mobile phones for communication purposes. Miles and Huberman 1994, (as cited in Punch 2005) define a case as a phenomenon of some sort occurring within a certain area. This explanation fits with the conceptual structure of this study which considers the experience accompanying use of the mobile phone by the people including health workers as a phenomenon (Silverman, 1993).

8.2: Approach

During research, according to Neuman (2006), researchers choose from alternative approaches as a methodology to ascertain what makes social science scientific or a way of study. In this section we briefly look at the three major and commonly used approaches to social research. They are; positivist, interpretive and critical social science (Neuman, 2006). Each approach has its own philosophical assumptions and principles and its own stance on how to do research. Positivist is the oldest and the most widely used approach which is insistent on looking at how external forces, pressures and structures operating on individuals, groups, organisations or societies produce outcomes (e.g., behaviours, attitudes and so forth). The focus is on observing, understanding and documenting what is found among those social groups. (Marvasti, 2004; Neuman, 2006). The researcher may approach the community as an investigator or as an information seeker, while the community becomes an object of study (Unage, 2011). It is predominantly used to analyse quantitative data and is “applied by researchers working as market analysts, policy analysts, programme evaluators and planners” (Neuman, 2006, p. 82). In comparison, the interpretive approach has for years existed in opposition to positivism. This is because the foundation of social research techniques are sensitive to context and get inside the ways others see the world (Neuman, 2006; Silverman, 1993). It explores “qualitative data to acquire an in-depth understanding of how people interact and get along with each other to create meaning in everyday life” (Neuman, 2006, p. 88). Qualitative research situated within the interpretive approach is seen as a basis of theory construction as opposed to quantitative methods “which include surveys and experiments which are often considered as leading to the creation of artificial research situations where studying ‘real’ views and behaviour are not possible” (Henn, Weinstein, & Foard, 2006, p. 150). Among the three, the critical or

structuralism approach mixes nomothetic and ideographic approaches, agreeing with many of the criticisms that the interpretive approach directs at positivist but it also adds some of its own and disagrees with the interpretive approach on some points (Marvasti, 2004; Neuman, 2006; Silverman, 1993). The purpose of critical social research is not simply to study the social world but to change it, allowing for it to critique the work of researchers in the interpretive and positivist approaches to effect change. This is aligned to its purpose, which is “to explain a social order in such a way that it becomes itself the catalyst which leads to the transformation of this order” (Neuman, 2006, p. 95). Considering the roles played by the various approaches in the social sciences and their related applied fields, it is appreciated that all research methods are executed for a common objective, which is change (Neuman, 2006). Research looks at challenges faced by people regarding their wants and needs in specific situations. It studies the causes, learns from those challenges and systematically documents the issues, using appropriate methodologies (Unage, 2011). Since the nature of this study warranted for the interpretive research approach to be employed, the qualitative method was used to collect and analyse data. This method is considered by the way the research problem was formulated, and the specified research agenda makes it a suitable approach (Allan & Skinner, 1991). It is fitting for this study where participants and sites were not selected but fit into the research based on their relevance to the theoretical focus of the research which is the social process experienced by health workers when using mobile phones for health communication and service delivery purposes (Henn et al., 2006).

8.3: Research instruments and techniques

Questionnaires were designed using both standardised and open ended questions, an approach often used in qualitative surveys. To achieve a deep understanding of complex social phenomena, Anderson and Kanuka (2003) state that the best methods would be through using semi and unstructured interviews. Data for this research was to be gathered through one-on-one interviews using semi-structured questionnaires as indicative interviewing guides. These would allow flexibility for new questions as they emerged during interviews (Watson, 2011). Questions were asked in English and Tok Pisin for clarity when necessary and the verbal responses written down. How questions were drafted and laid out and the reasons for certain questions being asked were given thorough consideration to ensure they fitted the research purpose (Gillham, 2000).

8.4: Methods

In research, certain techniques used to collect data are called methods (Taylor, 2010; Wisker, 2001). The two methods often used in research to collect data are the qualitative and quantitative methods. Each method has certain distinct characteristics or approaches and techniques which provide a context for the process involved and a basis for its logic and criteria applied to serve the research purpose (Neuman, 2006; Thomas, 2003). The two methods can also be combined in a study using them side by side or one after another in a mixed method approach (Neuman, 2006). The nature of qualitative research, according to Kaplan and Maxwell (2005), emerged from the need to study social and cultural phenomena to understand issues and behaviour of people within a certain context. Qualitative findings may be presented alone or in combination with quantitative data in some cases. Combining both methods are popular and adopted by some research (Watson, 2011). The art or method of combination as described by Neuman (2006) is known as triangulation. It allows researchers to draw and use multiple methods or forms of data (qualitative and quantitative) that can be used to reinforce a research argument and allow the study to be complete and comprehensive. In research, triangulation - to get the “exact or fixed location by measuring distances between objects or making observations from multiple positions-is a way of seeing something from several angles rather than from only one angle.

Although each approach uses several research techniques as pointed out by Neuman (2006), there is some overlap between the two methods both in practice and theory that complement each other in many ways during a research process. Hence it is fitting to highlight the complementary aspect of the two approaches as found to be embedded in this research. For that matter it is better to be informed that all semi structured questionnaires used in this research featured both fixed choice (closed) questions and open ended questions. Even though this research has embraced a qualitative approach, Punch (2005) states that an interview questionnaire that asks both fixed choice (closed) questions and open ended questions, is an example of how quantitative measurement and qualitative inquiry are often used together. But that should not permit this research to be seen as deploying mixed methods, because the structuring of questions as outlined is deemed part of the complementary process embraced by the quantitative and qualitative approaches regardless of their distinction. The following table shows how the two research approaches differ respectively, however the procedures within the approaches also portray why they can complement each other.

Table 8.4: Difference between two research methods.

Qualitative vs. Quantitative	
Qualitative	Quantitative
❖ The aim is to complete, detailed descriptions.	❖ The aim is to classify features, count them, and construct statistical models in an attempt to explain what is observed.
❖ Researcher may only know roughly in advance what he/she is looking for.	❖ Researcher knows clearly in advance what he/she is looking for.
❖ The design emerges as the study unfolds	❖ All aspects of the study are carefully designed before data is collected.
❖ Researcher is the data gathering instrument.	❖ Researcher uses tools such as questionnaires or equipment to collect numerical data.
❖ Subjective- individuals interpretation of events is important, e.g., uses participant observation, in-depth interviews, etc.	❖ Objective- seeks precise measurement and analysis of target concepts, e.g., uses surveys, questionnaires, etc.
❖ Qualitative data is more 'rich' time consuming and less able to be generalised.	❖ Quantitative data is more efficient, able to test hypotheses, but may miss contextual detail.
❖ Researcher tends to become subjectively immersed in the subject matter.	❖ Researcher tends to remain objectively separated from the subject matter.

Source: (Taylor, 2010, p. 55)

To some extent the stated research complementary process also portrays Miles and Huberman's (1994) argument that research is a craft rather than an adherence to methodological rule and researchers can bend the rules according to the uniqueness of the setting. This argument was borne out of this research where three interview processes were used. Verbal interviews using semi-structured questions took between 40-60 minutes to complete. In facilities where staff were available but inaccessible, questionnaires were left to be completed and collected. Phone interviews were the other means of gathering information from health staff in areas that could not be reached. Thomas's (2003) description of research interviews shows that all approaches used are acceptable given the advent of modern technology and the hardships that can be encountered during research. Although face to face interviews are preferred to ensure misunderstandings of the questions don't happen and questions are clarified and the information collected more accurate, the situations faced during data collection dictated which approaches were taken (Neuman, 2006). Since all research is often problem-driven and not method-driven as portrayed by Berg (2001), the qualitative method approach used in this study is considered as one that can best answer the research inquiries. It is not a matter of one method being superior over the other. Rather it is

considered as one that can yield convincing answers to the question that the investigation intends to settle (Thomas, 2003).

8.5: Ethical considerations

Ethics in the context of research is described by Winterdyk et al. (2006) as being developed and used in the context of a liberal democratic tradition that emphasises individual rights and freedom. Ethics encompasses concepts and principles of right conduct and concern for human well-being (Sieber, 2012; Singh, 2012). This means subjects of research have the right of consent to participate or not and to know they are being researched and the right to be informed about the nature of the research and the right to withdraw at any time. These measures were adequately administered through participants signing informed consent forms after reading through the information forms supplied for their understanding of their rights as research participants (Silverman, 1993). Although interviewees were not to be used as human subjects and interviewed only to garner information on the use of the mobile phones, it was necessary to adhere to standard ethical practices as observed universally (Silverman, 1997). Interviewees were involved through invitations and their participation acceptance. They were also informed that they could terminate their participation anytime during the research if they desired. The recruitment process was more voluntary from the staff, although with some reservations. This was a result of their limited understanding of the term research which to some sounded more technical or advanced (Winterdyk et al., 2006). Studies by Marvasti in 2004, (as cited in Silverman, 1993) show that before the 1970s highly unethical social and medical studies were common, leaving an air of uncertainty to the credibility of research content. This called for researchers to be more prudent in adhering to ethical practices and procedures in research. As stated by Kanungo (2006), this applies to every other research because there are high expectations (if not mandatory) of following ethical guidelines while carrying out any type of research.

These ethical principles became the basis of this study and the WHPHA was initially consulted to ensure the research was appropriate and the approval was granted for the research to be conducted in the province. Ethical approval (No. 12/106) was also granted by the AUT University Ethics Committee on 29 May, 2012. Because good research is based on good ethical standards as noted by Dahlquist (2006), staff were informed before every interview that their confidentiality and privacy would be protected. Interviewees were informed that any information they provided would not be divulged in any way to authorities up the hierarchy. This was in line with research ethics

as pointed out by Neuman (2006) which calls for all participants' identities, and other information that may make them vulnerable to any potential harm, to be protected if they wish so. This then set the researcher and participants on an equal footing which was maintained to ensure successful data collection. The issue of incentives did not play a big role in this research because most staff were happy to participate because they thought the mobile phone was assisting them and if the information they provide for the research would assist in any way to improve mobile communication services then they would be the eventual beneficiaries of improved communication services, thus they were highly motivated to participate.

“With these questions what you want to know is how useful have the CUG phones been, but I think the way you stated the questions are even more helpful. I have never been given a call to give assistance using the CUG but on my personal phone yes, so again it may not mean that mobiles are a bad technology for getting health care information.” (Health worker 2 South Wahgi, July, 2012)

Because this research did not delve into highly sensitive health associated topics concerning human subjects, no ethical risks were encountered. All interviews were conducted in health facilities in full view of other staff. Being a Papua New Guinean national with a good working knowledge of the culture and an appreciation of its diversity, this researcher observed all ethical aspects of the interview process through the introduction sessions. This process allowed for participants not being put under any pressure during the course of the research.

8.6: Data collection

This research is based on 25 semi-structured in-depth interviews, 12 self-administered and five phone interviews conducted among rural and urban health workers in seven districts of WHP (Jiwaka included). Although the questions were predetermined, they differed in nature and structure. Some were open-ended, some closed and others multiple choice. This resulted from one research question generating another. Coincidentally Punch (2005) acknowledges that this happens when research questions are carefully considered. Thus, having an array of questions, including open questions, provided the opportunity for clarification when necessary to ensure understanding, and the responses indeed indicated understanding had occurred (Griffie, 2005; Olsen, 2012). This option ensured the interview sessions were more formal and

dialogical and enabled more information to be derived from respondents with probing during each session. This study was done following the purchase of phones by the WHPHA and equipping its staff for communication purposes. The study's intention was to elicit information from staff about their experience using the mobile phones and to what extent the flow of information among health workers had impacted on their output in delivering health services to the rural sector. It was anticipated that the information sought by the study would bring to light how mobile phone use among health workers in the province has hindered or assisted with delivery of health services.

The study was conducted from June 30-July 9 among 38 health facilities in the seven districts of the province. The main provincial hospital is located in the Hagen district, and there are two rural hospitals, Kudjip Nazarene Hospital in Anglimp/South Wahgi and Tinsley Baptist Rural Hospital in Mul/Baiyer districts. All other districts have a string of health centres dotted across them. Table 5 (chapter 8) shows the number of health centres involved and where interviews were conducted.

Table 8.5: Facilities visited in each district, July 2012

Type of facility	District						
	North Wahgi	South Wahgi	Jimi	Dei	Tambul/Nebilyer	Mul/Baiyer	Hagen
Hospital							1
Rural hospital		1				1	
Health centre	6	8	4	5	6	3	3

When planning the research it was expected that data would be collected from respondents using all 80 phones acquired and distributed by the WHPHA. However during initial contact with the respective phones, it was discovered that communication with some phones was impossible. Calls could not get through. This allowed interviews to be conducted only with those staff that were contacted and those in facilities accessible by road. Phone interviews were conducted with staff in inaccessible facilities. This included four in Jimi district and one in Tambul/Nebilyer district. In some areas attempts to contact the listed numbers turned up mixed results. Some officers could be reached while others were completely out of reach or the phones automatically switched to recorded voice prompts. Inaccessibility to these areas was associated either with roads being impassable or isolation which increased risk factors that abound with travelling to distant locations.

Where successful contact was established, interviews lasted between 30-45 minutes in each location. However, what was more tiring was driving from one location to the next, negotiating rough roads which were both a constraint on the time and a drain on energy. Consequently in attempting to cover the province within the available time,

some interviews were conducted with duty staff during evening hours as long as prior phone contact had been made and the researcher's arrival was expected.

Figure 8.8: Negotiating a slippery log bridge returning from Norba, July 2012.



Photograph by Tartz Tazee Arumbii.

Figure 8.9: The sign board at Norba (Milep) Health sub-centre, July 2012.



Photograph by Author, July, 2012.

Another factor that impinged on the study was that, data collection was done at the time the country was in the middle of a national election (Electoral commission PNG, n.d). Election time in Papua New Guinea is a highly unpredictable period when election related violence is likely to erupt among supporters of political candidates and rivals (Flower & Leahy, 2012). *The Economist* portrays PNG elections as quite 'notorious' and tags the country as 'land of the unexpected', and other internal and external reports say likewise (Elections in Papua New Guinea, 2012; Nada, 2012; Poiya, 2012). Although this situation put the study potentially at risk, other options were constrained by time. Regardless of the odds that confronted the successful data collection compounded by the hardships encountered to locate some health workers who had left their facilities for their home districts to participate in the elections, one or two were tracked down and interviews were done. The consequence of the phones not being at the health facilities

resulted in the number of interviews being scaled down to only 42 from the planned 80. This information is shown in Table 8.6 outlining the number of rural facilities to which CUG mobile phones were issued. The number of working phones available when this study was conducted is also shown, including number of interviews done in each district and why some phones were not in action serving the intended purpose.

Table 8.6: Status of phones in WHP rural health facilities, July 2012.

Phones issued	Phones working	No contact	Taken/lost/stolen	Interview done	Phone not at H/C	Working kept by OIC	Access Air/road
Anglimp/South Wahgi district – eleven health centres, 1 rural hospital							
13	8	2	1	8	1	1	12-road 1-air
North Wahgi district - eight Health centres.							
8	6		1	6	1		Road
Dei district - seven health centres.							
7	6	1		5			
Jimi district - ten health centres.							
10	5	5		4			6-road 4-Air
Mul/Baiyer district - eleven health centres 1 rural hospital.							
6	5	1		3			Road
Hagen district - four health centres 1 provincial hospital.							
8	4	3		3	1		Road
Tambul/Nebilyer district - ten health centres.							
10	7	2		6		1	Road
62	41	14	2	35	3	2	

Source: Author's field work, WHP, 2012.

Where accessible, each facility was visited physically and interviews were conducted at health facilities using semi-structured in-depth questionnaires.

During interviews, open ended (also called free-response) questions were used to follow through the answers derived from closed questions. This permitted respondents to explain the reasons for their choice of answer to the preceding question. This process permitted respondents the flexibility to express themselves either through written or verbal form outlining their reasons if they thought it necessary to be pointed out (Singleton & Straits, 1988). A notable positive of this technique is that it can balance out the criticism that most of the information provided by respondents would be predetermined and guided by the standardised form of the questionnaire, and not reflecting their actual opinions, therefore biased and inaccurate (Marvasti, 2004). In this way it was good to get health workers personal comments through open ended questionnaires. Allowing personal comments during interviews is recognised by Patton (2002) as reflecting the anguish, fear or achievement revealed in their own reflections,

thus making the words have a face - validity and credibility. The other aspects considered for using open ended questions were that; firstly, it was highly unlikely to get more than one chance to collect information. The university was in New Zealand and the data was collected in Papua New Guinea. Costs and resource constraints would impede further data collection after the initial phase. Secondly, a semi-structured interview according to Patton (2002) can have open ended questions included which allows for emotions and experiences of the interviewee to be captured. It may also contain closed questions (i.e. yes-no answers). The inclusion of open-ended questions provides a window of opportunity for the interviewee to express how they are thinking and feeling and for the interviewer to identify new ways of seeing and understanding the topic at hand. Thirdly, the semi-structured interview allows informants the freedom to express their views in their own terms, thus can provide reliable, comparable qualitative data by means of a dialogue (Punch, 2005; Silverman, 1993).

The nature of the semi-structured questions allows for the answers to diverge from the interview. This opportunity was seized to record digitally and transcribe later for analysis. Time and resource constraints coupled with travelling distance between interview points (health centres) prevented analysis of each interview before the next. However notes and audio recordings were taken when possible during each interview. These memos were later transcribed to get the substance of the responses to the questions (Winterdyk et al., 2006).

In most of the facilities staffs were keen to participate, but interviews were attempted only when they were free and briefed about the nature of the research. This method was considered appropriate and fundamental as it allowed respondents to be settled into the interview without distraction. All questions asked during the interview were focused on the use of the mobile phone and its potential as a tool to assist with delivery of health information and services in the rural sectors.

Figure 8.10: Fording at Kotna, Dei-District, looking for health staff that had gone to cast votes at the polling place.



Photograph by Tartz Tazee Arumbii.

Support interviews were also done with Dr James Kintwa, Chief Executive Officer of Mt Hagen Hospital and Dr Kiagi, Acting Director Medical Services (DMS). These interviews involved structured self-administered questionnaires. This method was helpful because their schedules clashed with district data collection schedules.

According to Sapsford and Jupp (2006), self-administered questionnaires are still highly structured methods of data collection equivalent to interviews. The main advantage of structured questionnaires over interviewer-led methods is that they are less costly to the researcher. This statement was proven first-hand with this interviewer led-method research when vehicle fuel costs for the research exceeded K1, 000 (NZ\$589) and the cost of vehicle hire for 9 days was K5, 400 (NZ\$3,180) (Babbie, 1989). Nevertheless it is also noted that all forms of research have their own strengths and weaknesses, whatever the method. There is no single best way of collecting data and the method used is determined by research design and research question, including time and other factors because all methods aim to obtain valid and reliable data (Sapsford & Jupp, 2006).

In Port Moresby an interview using open-ended questions was done with Kenneth Lao, Relationship and Networking Officer with Igat Hope Inc. (IHI), a non-government organisation. IHI is an advocacy organisation that works to address policy issues to ensure clinical services, treatment and medical services are provided to people living with HIV/AIDS (PLHIV, also referred to in this thesis as HIV-positive people) in PNG. IHI uses the Frontline SMS (short message service) computer software to communicate through the mobile phone with a string of its affiliated support centres across the country caring for HIV-positive people. The Frontline SMS is a system that connects to the mobile network either through a GSM modem or a mobile phone connected to a

computer via USB or Bluetooth (see Figure 8.11). At the IHI office, a computer installed with Frontline SMS software is connected to a mobile phone to receive and transmit messages to and from mobile phones in the districts.

Figure 8.11: How computer based Front-line SMS works with mobiles.



Source: (Frontline SMS, n.d)

The CUG mobile phones used by the health staff also became useful in this study to establish contact with staff in inaccessible areas. Phone interviews were considered as option 'B' during planning and proved a reliable option. In this study five health staff from various health facilities in the province could not be reached by road, so had to be interviewed by phone. This was after making contact and seeking consent through explaining the nature of the research. In this case, the road to Gia health centre in Tambul/Nebilyer was inaccessible, even by a 4WD vehicle. So a phone interview was arranged and conducted with the health worker. Although network outage was encountered occasionally in mid conversation the interview was completed. Positive aspects of phone interviews were that time and cost were saved and risk factors associated with travelling to some areas were minimised (Babbie, 1989). However, getting a phone interview was not an easy task; various methods were employed to transcribe information effectively while talking over the phone (Burnard, 1994). In this study a hands-free option with the phone speaker turned on was helpful, ensuring free hands to write the answers. Interviews with staff in Jimi were done by phone because they lived several kilometres away and the road was often prone to landslides during wet weather. So it was not worth risking the drive. Security issues echoed by members of the local Banz community a town sharing borders with Jimi were also heeded. It was better to be safe and complete the research than to encounter an incident and jeopardise the entire research.

8.7: Difficulties with phone and other interviews

Phone interviews in Jimi were quite hard to get at times. Difficulties included network outage or staff not being at specific spots where network coverage signal is strong at appointed times (one health centre). This prevented scheduled interviews taking place, and had to be done as soon as contact was established. This approach worked out well and all interviews were eventually completed (Dillon, 2011). Other support interviews sought from mobile communication service providers; Digicel PNG Limited and Bemobile were unsuccessful. Lack of cooperation from people at the organisations' front desks who acted like gatekeepers (Neuman, 2006) coupled with organisational bureaucratic red tape particularly at Digicel PNG smothered any indication that service providers would be willing parties to the research. Seeking out appropriate people for interviews was suffocated by non-response to the numerous phone calls and emails to organisations requesting interviews. Questionnaires were sent direct to senior management at Digicel on two occasions, and got responses stating that most of the information sought through the questionnaire was 'classified information'. On another occasion during email conversation with Lorna McPherson the Operations Director, Digicel (PNG) Limited, the response was the same.

“Most of the questions I cannot disclose the answers, what I can tell you is that we have over 700 towers covering all provinces within PNG. We do not release subscriber numbers or any further information”. (Email conversation with the author 3/09/2012)

This lack of response was followed up by research-supervisor Professor David Robie, making a written request to Digicel, but to no avail, thus no interviews were done with mobile service providers. Nevertheless all other interviews went well and data was collected using three basic questionnaire methods: phone interview, self-administered, and face to face interviews. Although data was planned to be collected through one-on-one interviews, the other two methods had to be applied due to situations faced during data collection.

8.8: Summary

This chapter outlines the nature of the research method and process. The qualitative method was chosen given the nature of the research, which was to seek out the experience of health workers using mobiles. Studies (Berg, 2001) show that the qualitative method is most appropriate to seek and record human experience. All data

was collected by using different forms of interview procedures, applying methodical approaches within the bounds of qualitative research. Differences between research methods were also explored. Ethical research conduct was observed and guided the research.

CHAPTER 9: Support Interviews with Informants

9.1: Introduction

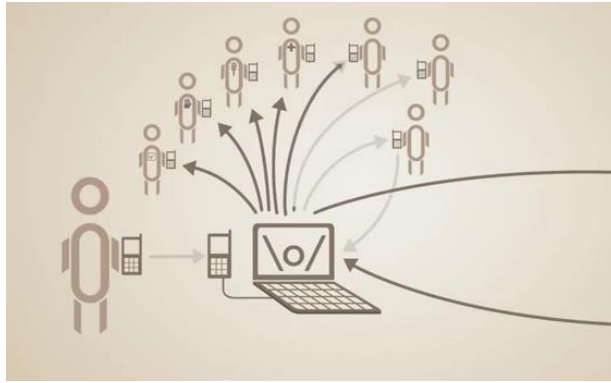
Three separate support interviews were conducted, one with Kenneth Lao the Relationship and Networking Officer at the IHI office in Port Moresby and two with the CEO of WHPHA, Dr James Kintwa, and Acting Director Medical Services (DMS), Dr Guapo Kiagi at the hospital. The interview with the officer at IHI was done to get information regarding the organisation's use of the CUG service to provide service to people living with HIV/AIDS in the country. The interview with Dr Kintwa was to get his views about the intention of the CUG and what was planned for the future of the initiative. Dr Kiagi was interviewed to get his views about the CUG through his experience as a CUG phone recipient and his interaction with the management and other staff including SMOs.

9.2: Kenneth Lao – Igat Hope Inc

IHI is a non-government organisation (NGO), the national peak organisation for PLHIV in the country (Igat Hope is PNG national body for PLWHIV, 2010). 'Igat Hope' in neo-Pidgin English means 'there is hope.' IHI acts on behalf of HIV positive people to address their issues at the policy level to ensure that clinical services, treatment and medical services are provided to PLHIV. According to Lao (2012), this organisation works with 34 provincial PLHIV networks around the country, serving a total of 1,416 HIV positive people. Given the spread of the networks, regular contact with them was impossible, so the organisation tapped into mobile phone communication with funding from the Australian government's aid agency AusAID. IHI saw that getting in touch with PLHIVs and providing basic treatment information was difficult. Vital information could not be sent directly to those infected due to isolation and geographical difficulties, thus Frontline SMS was used to make it easier.

The interview with Kenneth Lao was conducted on 16 July 2012 to get information about the short message service (SMS) project launched in early 2012. This project uses mobile communication services provided by Digicel PNG, using Frontline SMS, a relatively cheap way to employ SMS for mobile communication within a CUG (see Figure 9.12) (Waima, 2012a).

Figure 9.12: Diagrams showing how Frontline SMS works and a wireless USB Dongle.



Source: (Frontline SMS, n.d)



For this service the Frontline SMS software is installed in a computer and a mobile phone is then connected to the computer through the USB port as a transmitter. Sometimes a USB dongle is used. The phone transmits messages from the computer to the phones registered under the IHI CUG service. IHI only pays the standard text messaging charges to the service provider (Frontline SMS, n.d). In this case, IHI through AusAID funding, had bought 30 Subscriber Identifier Module (SIM) cards from Digicel PNG and distributed to 20 provincial agents. An additional 10 were distributed to the organisation's board directors. Lao is also charged to manage data and information sent and received through the Frontline SMS system. He said communication was important for information to flow between HIV-positive people in PNG and IHI.

“Maintaining communication in our organisation is very important. Most of our people now have mobile phones and so it was seen as an effective means to communicate with them in the rural settings of Papua New Guinea. That is why we have this network in the organisation.” (Lao, 2012)

According to Lao, IHI communicates with the person charged with the SIM in each province and this person then communicates with the PLHIV in the province.

“We have 30 SIM cards registered in the CUG. Of the 30 SIMs, 9 were issued to members of the board of the organisation. Other SIMs were issued to regional and provincial representatives around the country. We do not communicate directly with people living with HIV but with the associations in each province which the various people are attached to.” (Lao, 2012)

He also pointed out that SIM cards were issued without phones so people were calling on IHI to issue phones to them. Some SIM cards had been lost already.

“17 SIM cards have been stolen or lost so we are going to deactivate them from the network. We reported the information to the technical officers at Masalai communications and they will put a block to it.” (Lao, 2012)

According to Lao, this has affected the flow of communication to some extent. Communication cannot be established with those who have lost SIM cards or have not inserted it in a phone. This also cuts down the amount of information flowing back and forth either from the provinces to IHI or vice versa. He also outlined that training for use of the SIM cards was yet to be conducted as well.

“The communication process is very low at the moment because we only delivered the SIMs and the holders have yet to be trained on the use of the SIMs.” (Lao, 2012)

He also stressed that although there are setbacks; communication using *Frontline SMS* has been very helpful since its introduction and inception. It has enabled IHI to control, manage and deliver appropriate information through SMS to PLHIV in the provinces.

“Lately we ran out of antiretroviral drugs nationwide, so we put out a press release and people living on antiretroviral drugs started to react to the message thinking that they were in danger. At that critical time the mobile phone played a very crucial role for us to calm the situation through communication. We told them that this is what is happening so please be calm and you should get your supplies eventually.” (Lao, 2012)

Communication through the mobile service has cut down a lot of cost for the organisation as well. Lao stressed that prior to the introduction of the CUG service the organisation’s communication related expenses were quite hefty.

“Communication networking has cut down a lot of expenditure experienced previously when staff had to travel to the provinces to conduct trainings. With communication trainings are done at the provinces and we advise using the mobile.” (Lao, 2012)

While communication has picked up, other things that still need to be addressed by IHI are, user policy and guidelines are yet to be put in place by IHI to avoid abuse of the Frontline SMS system by users.

“I actually asked the communications specialist if there was a way we could detect what was being said among positive people. The response was that it was impossible. Our issue now is to ensure a user guideline is provided to avoid the system being abused.” (Lao, 2012)

Although Frontline SMS is new to PNG it is already in use in other developing countries. One health intervention project that used the Frontline SMS software was in Malawi, Africa (Lemay et al., 2012). Here Frontline SMS was deployed to provide a fast, reliable, and inexpensive communication mechanism between CHWs in rural posts and their district teams. A study by Nchise, Boateng, Shu and Mbarika (2012) in Uganda also found that a similar software, Google SMS Health Tips Application (GSHTA) was used to send educational messages and other information to HIV-positive people in Africa. According to Kaplan (2006) cited in Nchise et al. (2012), SMS reminder systems such as those cited are effective in improving attendance rate in primary health care as well. These examples demonstrate the transformative effects mobile phones and technology can have on health care activities including HIV treatment. Again, Adler (2007) cited in Uhrig et al. (2012) found that, SMS has fast become a common mode of communication given its instantaneous nature and relative low cost - well suited to supporting the treatment of chronic diseases and conditions, including HIV. African farmers also use SMS platforms to collect and exchange local agriculture content such as market and price information of commodities. The SMS platform allows access to market and information sharing on farming methods and other necessary information among farmers (Duncombe & Boateng, 2009).

9.3: Acting/Deputy Director Medical Services, Dr Kiagi

The interview with Dr Kiagi was conducted on 10 July 2012. It is one of the two support interviews conducted with top management staff of the WHPHA.

Administratively through the medical services directorate, all SMOs and technicians at the hospital and province report to Dr Kiagi and he reports to the CEO. Because SMOs come under his charge, it was thought that Dr Kiagi would have some knowledge of how the CUG phones issued to SMOs were assisting them or how SMOs were assisting rural health staff using the CUG phones. During the research period, some phones issued to doctors were not contactable. It was also established that several officers had either gone on leave or had transferred to other provinces or completed their contracts. So Dr Kiagi was asked what became of the phones.

“One doctor took the phone with him when he left and so the WHPHA was trying to ask him to return the phone and also working to get Digicel to deactivate the phone from the CUG.” (Kiagi, 2012)

According to Kiagi (2012), another doctor that had finished his contract had also taken the CUG phone issued to him. After observing different types of phones being used by staff at different levels in the provincial health hierarchy, information was sought about the types of phones issued to staff in the province. This revealed that SMOs and some management staff were issued BlackBerry phones while others got basic Alcatel phones. During data collection it was also found that health facilities were issued two types of mobile phones, some had fixed wireless handsets and others had basic Alcatel mobile phones.

“Another doctor, who went finish, took a BlackBerry phone with him. The CEO will have a fair idea about the brand of phones that were distributed among specialists and doctors within the hospital and those distributed to rural health centres in the province.” (Kiagi, 2012)

He further highlighted that the CUG mobile phone communication service was introduced as a means to improve health services to the people. Phones issued to health workers in the province are managed by the WHPHA. When phones are lost or stolen management has to contact Digicel to deactivate the SIM and ask for a replacement. Whenever a problem or missing phone is reported the WHPHA attempts to replace or address the issue promptly. The phones used by the health staff in the province are those

with basic features and can be used only for calling or sending text messages. Dr Kiagi was issued a BlackBerry CUG phone. And so at times he is called for assistance when staff in rural facilities need specialist information to deal with certain issues. He said the phone has been useful in which he was able to provide patient referral and treatment information to rural health workers. He said the flow of information has enabled them to save patients and that has made a lot of difference since the CUG service was introduced (see Appendix 10). He said there is no road to some places in the province including Tsendiap. So whenever there is a medical emergency in any of these inaccessible places the CUG phones becomes very handy for evacuation exercises (Kiagi, 2012).

“There is no road access to Tsendiap so we communicate with them through the CUG phones.” (Kiagi, 2012)

He added that mobile phone communication among staff was contributing well towards productive delivery of health services and information sharing among health workers in the province. When called for assistance through the CUG phone by the health worker at Tsendiap, Dr Kiagi was able to provide the information that would assist the health worker keep the patient alive until she could be airlifted.

“Putim lo IV fluid, don’t disturb, givim sampela spectrum anti-biotics, and stabilisim infection just controlim infection until evacuation can be done.”¹
(Kiagi, 2012)

According to Kiagi (2012), the feedback received from rural health workers show more positive aspects than negatives which is a good sign, such as, staff being able to communicate with hospital specialists or order medical drugs from Area Medical Store (AMS) by phone rather than having to travel to do that. Like all other things there may be negative aspects with the use of the CUG service but to date Dr Kiagi is not aware of the negative impact brought about by this service. It appeared that none of the SMOs had made their CUG experiences known to Dr Kiagi, hence he was only able to outline his own experience and how the mobile phone had enabled him to assist rural staff to save lives.

9.4: CEO WHPHA-Dr James Kintwa

Given the CEO's busy schedule and time clashes caused by other interviews, an interview with him (Dr James Kintwa) was not possible. However he agreed to complete the questionnaire with the required information. According to the CEO, the CUG service was introduced to the province's health sector to improve and upscale the level of communication between provincial health administration and the districts (Kintwa, 2012). The initiative enabled rural health staff to communicate with peers in other facilities, creating a networked communication hub among health workers in the province. It was envisioned that communication among staff in the various facilities and in various capacities would enable critical and crucial information to be shared and improve rural staff accessibility to specialists whenever required. According to Dr Kintwa, the CUG phones are managed by the Deputy Director District Health (DDDH), Dr Michael Dokup. This officer is tasked to maintain a phones registry and ensure the effective upkeep and maintenance of all phones so that communication continues to flow among staff in the province. He could not be interviewed during research, as he was out of the province when data collection was underway. One way the management of the phones was facilitated was through an internal CUG phone survey carried out by the WHPHA in June 2012. This was 18 months after the CUG service was first introduced to the province in December 2010.

“The CUG is a fixed rental cost per month paid by the WHPHA at K35.00/month. Additional calls outside the CUG are paid by individuals through pre-paid system.” (Kintwa, 2012)

He said mechanisms put in place by the WHPHA to ensure the effective use and upkeep of the phones included quarterly meetings with staff where the status of the phones are reported. At the moment all phones used by staff have only basic functions. However, the WHPHA has plans to improve this so all calls are received and dispatched through a central computer- based call centre. This system will also allow data to be transmitted, so arrangements will be facilitated with Digicel to get this system operational. No training was done during introduction of the CUG phones because they were basic phones that could be operated without difficulty. According to the CEO, there has been significant improvement in referrals and care at the local sites since the CUG service was introduced. It also allows constant communication with key staff and

facilitates on a regular basis. This has also made staff and facility supervision easier for most managers at the district levels (Kintwa, 2012).

CHAPTER 10: Findings

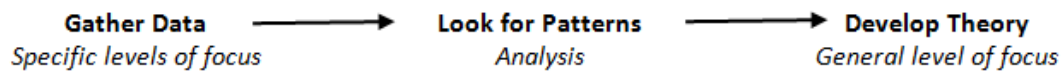
10.1: Introduction

This chapter outlines the approaches and procedures used to analyse data from the interviews. According to Punch (2005) the term data analysis can have different meanings among qualitative researchers. The method of analysis used by researchers to address research questions depends on their interpretation of qualitative research. This means that different techniques can be applied to the same body of qualitative data. Thus it is viewed that there is no right way to do qualitative data analysis, much of what is done depends on the purpose of the research. Patton (2002) acknowledges that qualitative data analysis is a process with no prescribed formulas that can be applied to determine significance. Absolutely there is no rule to guide the researcher except for the researcher to do his/her very best “with full ability to fully represent the data collected and communicate what the data reveals with regards to the purpose of the survey” (Patton, 2002, p. 433). In qualitative analysis Patton (2002) points out that researchers’ look for patterns, themes and categories using both creativity and critical thinking in order to make careful judgement about what is significant and meaningful in the data. Through this process, the researcher seeks information from respondents that explain their experiences which are reflected in the findings resulting from this research. The information is presented using tables and related quotes to reflect participants’ voices, experiences and recommendations. They are also used to portray the trends in the delivery of health services brought about by use of CUG mobile phones among health staff in the province.

10.2: Data analysis approach

According to Patton (2002), qualitative analysis transforms data into findings which then translates into information. Therefore in order to make a grounded analysis that would produce the necessary findings as translated information, a general inductive approach was chosen as the method appropriate to analyse the data gathered in this research. The general inductive approach allows the findings to emerge from the frequent, dominant or significant themes inherent in raw data without restraints by structures or methodologies (Thomas, 2003). In other words, the researcher moves from the data collected to the theory developed or from the specific to the general.

Figure 10.13: Inductive research process.



Source: (Blackstone, n.d)

To achieve that, data was read through several times and recordings were repeatedly listened to in order to get the key items and recurring themes (Powell & Renner, 2003). Recordings were then transcribed and all data was put into an identified thematic framework, examined and referenced in textual form by annotating the transcripts with appropriate codes, supported by short text descriptors elaborating the index heading.

According to Pope, Ziebland and Mays (2000), coding is a key process of simply sorting, categorizing and synthesizing data. Coding also provides the link between data and conceptualization and is applied in more than one way to the task of fitting data and concepts together in a way that conceptualization is not rigid and under constant revision if necessary (Powell & Renner, 2003). Data was then rearranged according to the appropriate part of the thematic framework to which they related, to find associations between themes with a view to provide explanations for the finding (Pope, Ziebland & Mays, 2000). In this analysis, the clusters of meanings derived from expressions based on psychological concepts from respondents on the use of the CUG mobiles were then linked together to give general descriptions of the experiences encountered by health workers (Thomas, 2000). These experiences will be specified in a textual description of what was experienced and a structural description of how it was experienced. In this case the qualitative data included the response from interviewees relating to the use of the CUG mobile phone technology in relation to their work in the province.

10.3: Interviews

A total of 44 interviews were conducted among health staff in Western Highlands Province. From the total, 42 were conducted with varied practising staff, ranging from specialist medical officers, WHPHA management staff and rural district health staff. Two were conducted as support interviews with the CEO, Dr James Kintwa and the Acting Director Medical Services (DMS), Dr Guapo Kiagi. The research was initially planned to cover all 80 CUG mobile phones bought and distributed by the WHPHA among HCWs in the province. However, during consultation with potential interviewees it was discovered that 45 per cent of the phones were out of action and 55 per cent were in action. Out of action meaning no contact could be established. The phones may still be in working order, but for possible reasons such as flat battery, network outage or

malfunction, contact could not be made during this study, thus it was concluded that they were out of action. For this research the quickest way to invite HCWs to participate was by calling them through their CUG phones, but attempts made on several occasions were fruitless. Due to this factor, some interviews were not possible (see Table 10.7). But where contact was made, interviews were done after staff accepted the invitations to participate. Phone outage was quite common and realising that more facilities were not contactable, facilities accessible by road were physically visited and staff were approached and if they consented then interviews were done. The ‘not working’ section in table 10.7 represents phones which could not be contacted. Calls to them went either to voice mail or gave a feedback indicating the phones were off.

Table 10.7: Status of CUG phones in health facilities in WHP, July, 2012.

No of phones distributed	Working	Not working	Stolen/lost
82	60	17	5
Per cent (%)	73%	21%	6%

This information shows that 73 per cent of the phones are working and 21 per cent are not working, while six per cent have been either stolen or lost. Thus it is deemed that 27 per cent of the phones were not working during data collection. Although it was confirmed by the CEO of Mt Hagen General Hospital, Dr James Kintwa, that 80 CUG phones had been distributed, the list provided during data collection by the WHPHA illustrated (see Appendix 1) that 82 phones had been issued to HCWs in total. That number is reflected in the table above and will be so in other tables throughout the research.

“We have 80 mobile phones on the CUG and we invited all the facility managers to Mt Hagen and gave each facility manager the phones.”

(Kintwa, J., email communication with the author, 7 April, 2012)

Based on the figures provided, it was concluded that 2 more mobile phones were added to the initial 80 considering the need for more staff to be included in the CUG network.

10.4: Types of Interviews

All questionnaires included three types of questions; open ended questions, closed questions and multiple choice questions. The aim was to carry out one-on-one interviews with respondents. However, difficulties encountered with accessibility to facilities, HCWs being out of reach or interview appointments clashing with travel schedule necessitated for options that would allow for adequate data collection to be

incorporated. Time limitation was a very crucial factor among others that determined these changes to be effected. Even after failed attempts to make contact with staff in some rural facilities, trips still had to be made hoping that duty staff would be at the facilities and could be interviewed. This approach made it possible for 71 per cent of the interviews to be conducted one-on one (see Appendix 3). Where contact was made but accessibility was impossible, phone interviews were conducted. This amounted to 14.5 per cent of the interviews. The remaining 14.5 per cent of the interviews resulted from self-administered questionnaires. This method was used when faced with time clashes. This was more practical with hospital staff where completed questionnaires could be collected easily after returning from field trips.

Table 10.8: Types of interview done in WHP, July, 2012.

Staff Interviewed	Male	Female	Method		
			Personal Interviews	Phone Interviews	Self Administered questionnaires
42	29	13	30	6	6
		Percent (%)	71	14.5	14.5

Travelling to a facility where contact had been established was more assuring than at facilities without prior contact. On arrival at a facility, the Officer in Charge (OIC) was often sought out either to seek consent or for an interview. Where OICs were absent, available staff were briefed, and if willing, they were interviewed. Most times staff in all facilities visited were willing to take part after explanations about the research were done. This made the travel worthwhile even if prior contact had not been established. However at facilities where the CUG phone had been kept and used only by the OIC, staff were reluctant given their limited experience using the phone.

10.5: Staff involved in the research

All staff involved in the research were those who had access to the CUG phones according to the list provided by the WHPHA. Almost all had medical qualifications ranging from CHWs to specialist medical officers (SMOs). WHPHA Management staff also had medical experience and qualifications but had ventured into the administration sector and had since taken up permanent positions. However, they had been issued CUG phones and assisted clinical staff when required. Having them included allowed the research to get an insight about the level of communication between the management and rural clinical staff. It also provided the opportunity to get the management's perspective of whether the CUG phones were useful or not during discharge of their

duties. The variety of views and information taken from workers regarding the effects of the CUG service in relation to their work at different service delivery levels (see Table 10.9), makes the information rich and diverse.

Table 10.9: Public health management staff in WHP, July, 2012.

Gender	Experience in years	Qualification
M	20-24	Diploma in Public Health
M	20-24	Diploma in Community Health
M	9-12	Grade ten (worked through the system)

Other staff interviewed were those practising either at the main hospital or at rural facilities with varied work experiences. From the total number (42) of staff interviewed 24 per cent had 20-24 years of experience and 17 per cent had either 17-19 or 9-12 years of experience respectively (see Table 10.10). Among them 12 per cent were the most experienced having clocked 30 or more years of experience. The interviews were dominated by male staff, mostly because they were at the facilities when the interviews were conducted or they were in charge at facilities. Some female officers interviewed were also in charge of certain facilities.

Table 10.10: Public health staff work experience by years in WHP, July, 2012.

Years worked	30+	28	20-24	17-19	13-16	9-12	5-8	1-4
Number of staff	5	1	10	7	4	7	6	2
Per cent	12%	2%	24%	17%	10%	17%	14%	5%
Male	4		7	4	3	6	4	1
% male staff	14%		24%	14%	10%	21%	14%	3%
Female	1	1	3	3	1	1	2	1
% Female staff	8%	8%	22.5%	22.5%	8%	8%	15%	8%

The levels of qualification among staff interviewed varied widely, ranging from CHWs to medical officers and management. Apart from OICs, staff were chosen at random as long as they were available and had used the CUG phone. Most times OICs felt confident and duty bound to take the interview on behalf of their staff and facility. They also had frequent use of the phones. Qualification levels of OICs varied from nursing officers, HEOs down to CHWs. Most of the interviews (see Table 10.11) were dominated by nursing officers followed by HEOs and CHWs. This was followed by others including SMOs in rural hospitals and those with other qualifications, apart from the WHPHA management and main hospital staff. The people with varied qualifications

among the staff were sparsely distributed throughout the province (see Appendix 2). However, regardless of there being more experienced staff in one district, their experience could be limited in terms of knowledge diversity given that, qualifications are defined by the specific field of expertise. Out of the total number of interviewees 31 per cent were females and 69 per cent were males (see Table 10.11).

Table 10.11: Public health staff in WHP qualifications, July, 2012.

No	Qualification	Male	Female	Total
1	Nursing Certificate	5	4	9
2	Health Extension officers (HEO)	6	1	7
3	Community Health Worker (CHW)	4	2	6
4	Bachelors in Nursing	2	3	5
5	Specialist Medical Officers (SMO)	3	1	4
6	Diploma in Public Health	2	1	3
7	Nursing Diploma	2	1	3
8	Diploma in Community Health	2		2
9	Anaesthetic Scientific Officer	1		1
10	Grade Ten	1		1
11	Clerk	1		1
Total		29	13	42
Per cent (%)		69	31	100

10.6: Distribution and status of phones

The distribution of CUG mobile phones in the province have been put into four areas:

1. WHPHA Management team
2. Specialist Medical officers
3. District Health Officers
4. Health facilities

The WHPHA management team was issued eight phones. During the time of this research all phones were working and were being used by the respective officers (see Table 10.12).

Table 10.12: Status of phones issued to public health management staff in WHP, July, 2012.

No of phones issued to WHPHA management	Phones working and being used	Phones not working	Lost/taken/stolen	Per cent (%) working
8	8	0	0	100

SMOs were issued 12 phones. During research it was established that some SMOs' phones were not working. Some had been taken away by SMOs leaving the province (see Table 10.13). The scenario here was that only 33.33 per cent of the phones were at the hospital with working staff, another 33.33 per cent of the phones were taken on leave and the remaining 33.33 per cent had either been taken by staff at the end of the time on the job, or calls did not get through. This shows that two thirds of the phones (66.66 per cent) were not effectively in use serving the intended purpose.

Table 10.13: Status of phones issued to SMOs in WHP, July, 2012.

No of SMOs	On leave	Gone finish	Transferred	Phone ringing out	Call not going through	Onsite	Per cent (%) working
12	4	1	1	1	1	4	33.33

Obvious conclusions drawn from the above are that; there are no guidelines pertaining to use of the phones as resources to be used only in the course of duty and be returned if staff have to go on leave or transfer, because the phones are hospital property. The obvious downside is that 66.66 per cent of the phones not working at any given period are a massive setback in the service delivery process. The effects can be that rural staff calling for services may not get the information sought or available SMOs may be put under pressure by frequent calls from rural HCWs, hindering their performance in the process. This can also mean potential loss of lives if rural health care workers are not able to give the required care without necessary information.

The seven District Health Officers (DHOs) in the province were issued CUG phones that could be used to administer district facilities and staff. The phones could also be used to report to the provincial health office and assist with clinical matters when necessary (see Table 10.14).

Table 10.14: Status of phones issued to public health DHOs in WHP, July, 2012.

No of phones issued to DHOs	Phones working and being used	Phones not working	Lost/taken/stolen	Per cent (%) working
7	5	2	0	71

The data shows that 71 per cent of the phones issued to these line managers were working, while 29 per cent were not working. This group of workers are considered important. They are positioned appropriately in the middle to supervise those at the bottom and report to those at the top. Thus having working phones among them is important to ensure health care services get delivered. Having 29 per cent of the phones not working does have some remarkable negative effect in the service delivery chain and efficient management of staff.

In the seven districts, a total of 55 CUG mobile phones were issued to each health centre, rural hospital and hospital. The number of phones received by each district depended on the number of facilities in each district as illustrated in Table 10.15. It shows that 58 per cent of the phones as working and 27 per cent categorised as not working. Meanwhile, 11 per cent of the phones although working were either not at the facility or were taken away by OICs during data collection. Differences can also be noticed in the table between the number of working phones (32) and number of interviews done (35). Although fewer phones were working, more interviews were conducted. This was achieved by physically visiting the facilities even if initial contact was not possible.

Table 10.15: Status of CUG phones at rural health facilities in WHP, July, 2012.

Phones issued	Phones working	No contact	Taken/lost/stolen	Interview done	Working Phone not at H/C	Working kept by OIC	Access Air/road
Anglimp/South Wahgi district – eleven health centres, 1 rural hospital							
12	7	2	1	8	1	1	12-road 1-air
North Wahgi district - eight Health centres.							
7	5		1	6	1		Road
Dei district - seven health centres.							
6	5	1		5			
Jimi district - ten health centres.							
10	5	5		4			6-road 4-Air
Hagen district - four health centres 1 provincial hospital.							
5	4	1		3			Road
Mul/Baiyer district - eleven health centres 1 rural hospital.							
7	3	3		3	1		Road
Tambul/Nebilyer district - ten health centres.							
9	4	3		6	1	1	Road
55	32	15	2	35	4	2	
Per cent (%)	58	27	4		7	4	

The heading ‘No contact’ in the table means, no contact established with the phones at time of data collection. At the time it was hard to clinch the reasons for the phones’ outage. No contact meant the phones were not working and there was no way to find out why. They may still be working, but were not at the time. For example the phone at a health facility was working but had been switched off due to disturbances caused to staff.

“The phone was ringing at night so I came and answered but it was a drunken man calling and saying things I did not understand. So I hung up. But the phone rang again. When I answered it was the same person, this time he started using bad language so I hung up. I was about to leave when it rang again and it was the same person, so I switched off the phone and went to sleep.”

(Health worker 3 Tambul/Nebilyer, July, 2012)

The phone was still off when the interview was conducted until the officer was asked if the phone at the facility was working. This was when the health worker remembered the phone had been switched off at night and not turned on again. Although contacting this facility was impossible for the given reason, it was accessible by road so data was collected.

10.7: Hindrances to effective use of phones and communication

While staff may be partially responsible for outage of some phones, other issues that emerged as potential causes hindering effective communication among health workers are shown in the following tables. All causes identified were put into three categories; management induced, externally induced and staff induced. This separation allowed for causes and agents responsible to be identified. Information in Table 10.16 shows the status of the phones in some facilities and their associated problems/issues as reported by staff in respective facilities.

Table 10.16: Emerging management issues hindering communication in WHP, July, 2012.

No	Management related disadvantages	Respondents	Per cent (%)
1	Phone not working properly/poor quality	8	19
2	Phone with OIC	7	17
3	WHPHA phone not working so CUG SIM in personal phone	3	7
4	Status of phone reported but no action taken by WHPHA	8	19
5	Add more numbers to CUG	4	9
6	Phones are of poor quality	5	12
7	Purchase own talk time credits	7	17

Notably most responses portray what is seen to be lacking with management of the CUG phones by the WHPHA. The areas pointed out reflect lack of appropriate action by the WHPHA to ensure communication among health workers is maintained at all times. Again this highlights that there is a need for quicker action by the WHPHA to address the issues outlined so that the intended purpose of the CUG service is fully served.

Health staff using the CUG phones also contributed to hindrance of communication owing to negative staff behaviour such as losing phones. Staff in nine out of the 34 facilities involved in this research claimed that staff negligence, misuse and abuse were some of the causes hindering effective communication between affected facilities and others in the province (see Table 10.17). Although inevitable, such behaviour by staff, defeats the purpose and categorically denies people the right to basic health services from lack of appropriate communication. Information in the table shows that staff negligence resulted in some phones being lost and others taken away. This displays the need to have guidelines governing the use of the phones to be adopted and enforced.

Table 10.17: Staff induced causes that hinder effective communication in WHP, July, 2012.

No	Disadvantages caused by staff	Reporting facilities
1	Loss of phone through negligence	4
2	Status of phone not reported	1
3	Officers with phones not at work	1
4	Misuse by staff	3

The area identified and categorised as ‘externally induced causes’ comprises three areas which are: lack of regular power source, network outage and disturbance during work. Although not much control can be exercised on external causes, the information can be valuable for management to institute approaches particularly in area one (see Table 10.18). If the cause is common across a number of health facilities, then steps to address that aspect need to be taken. Measures can include purchasing and providing portable winding chargers, or obtaining phones with in-built solar chargers. Having better phones with the potential to pick up the slightest mobile signal can lessen some network related issues faced by rural health workers.

Table 10.18: Externally induced causes that hinder effective communication in the WHP health sector, July, 2012.

No	Disadvantages caused externally	No of Reporting facilities
1	Lack of charging source	9
2	Network outage	25
3	Disturbance during work	2

This may cut down the number of issues related to phone quality faced by health workers. Acquiring hardy phones is better than those that can get damaged quickly. Undermining the quality of phones and their abuse by staff can result in unfavourable effects to both workers and patients. The other disadvantage common among rural staff, is keeping phones charged. This is a predicament that needs to be addressed to ensure the potential of the CUG initiative is maximised.

10.8: Keeping phones charged – cost to staff

Keeping phones charged is not easy because some health staff do not have access to steady sources of electricity. Ad-hoc measures are often taken to have phones charged and operational. This entails taking phones to electricity sources to be charged at a cost or to use personal solar systems to have them charged. Whether they use this or regular electricity, charging phones incurs a cost to the staff (see Table 10.19). For those using electricity from the main power grid, costs to charge phones are absorbed into personal electricity bills. Some staff pay service providers out of their pockets, and some use personal generator as phone charging sources.

Table 10.19: Power sources where phones are charged by HCWs in WHP, July, 2012.

Type of power source	No of respondents using	Per cent (%)
Electricity- Main power grid	27	64
Electricity (paid service)	2	5
Generator set	7	17
Solar (free)	2	5
Solar (paid service)	3	7
Both (solar/electricity)	1	2

However, the convenience of having and not having reliable power sources to keep phones charged makes a lot of difference between the staff being constantly connected. While a good number of facilities (64 per cent) and staff have access to electricity from the main power grid, the chances of rural health staff having sources to charge phones hinges on service providers and how long such services can last. Likewise the chances of staff keeping phones charged using solar power depends very much on the weather.

“We use solar but we do not have inverters to charge the phones so we go to other people to charge the health centre phone. We are charged K1.00 (NZ\$0.58) to charge a single phone at private solar generated electricity.”
(Health worker 1, Jimi, 2012)

This then creates a level of uncertainty among 36 per cent of the staff as to whether the phones can be kept charged and in constant service. Figures in Table 10.19 show that one third (1/3) of the facilities require a reliable power source to keep phones charged at all times. This shows that one third of the services provided depend very much on how phones can be kept charged. Just as important as electricity is the requirement to have talk time credits in the phones in order to communicate. Lack of talk time credit can also be a hindrance to the flow of communication.

10.9: Talk time credit purchased to maintain communication

According to the CUG service arrangements between mobile service provider Digicel PNG and the WHPHA, all monthly bills accrued by each subscriber would be paid for by the WHPHA (see Appendix 5). This was also demonstrated by 81 per cent of the responses indicating that calls were made among CUG phones at no cost. Interestingly the remaining 19 per cent said, although calls did not cost them, there were limitations. This limitation was observed in their answers to a question as illustrated in Table 10.20 in which 55 per cent of the respondents showed that they often waited for talk time credit to be activated after they ran out. This was experienced on two fronts; either within the month or at the end of the month. Then 17 per cent of the respondents said they used their own money to buy credit when they ran out. Obviously this hinders effective communication.

Table 10.20: How talk time credits are afforded by HCWs in WHP, July, 2012.

Wait for top up to be activated	Use own money to top up	PHO pays for credit
23	7	12
55%	17%	28%

Because costs are met by the WHPHA, there are potential limitations which health workers may not know. According to Digicel (*FAQs: CUG*, n.d), a monthly subscription fee applies for each member that joins a defined CUG. The scheme is outlined by Digicel as a cost control measure that allows organisations to make significant savings on calls. This means each subscriber has a quota limit per month. Thus if more calls are

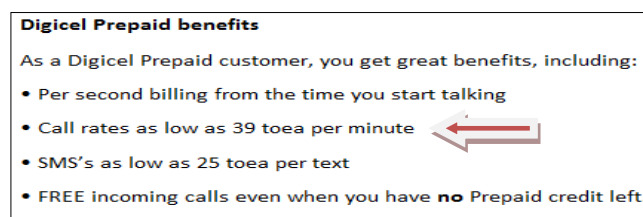
made by the subscriber, the quota can be exhausted before the month ends. If this happens the subscriber has to buy (personal expense) talk time credits (see Table 10.20) to stay in touch till the end of the month or until the following month's quota is activated.

Another cause of loss of communication is when monthly quotas are not activated on time due to late payments to the service provider. Subscribers' running out of credit is for two possible reasons; there is more communication among staff during the month or the monthly subscriber allocations is inadequate to meet health workers' communication needs. Information pertaining to cost as offered by the CEO during the interview is below.

"The CUG is a fixed rental cost per month paid by the WHPHA at K35.00/month, per phone. Additional calls outside the CUG are paid by individuals through pre-paid system." (Kintwa, 2012 July)

Because the CUG service used by the WHPHA is a prepaid service, Digicel's call rates per minute illustrated by Figure 10.13 will be used to determine talk time minutes each subscriber has in a month. This information should shed some light on the subscribers' credit purchase claims. Although Digicel provides other call rates (appendix 6), its peak and off peak hour rates differ, therefore rates in Figure: 10.13 are used to get an understanding of the minutes available to each subscriber. The amount allocated for per subscriber is K35/month (NZ\$20) and the cost per minute is 39 toea (NZ\$0.22). So amount allocated divide by call rate gives 89 minutes. Therefore it is seen that each subscriber supposedly has 89 minutes of talk time per month. Given this scenario it is concluded that the responses illustrated in Table 10.20 are experienced by health staff after exhausting their quotas before the month ends and buy credits or wait till the following month's quota is activated.

Figure 10.13: Digicel minutes call rates in PNG, 2012.



Source: (Digicel prepaid & rates, n.d)

10.10: Facilities without CUG phones

Another notable factor that will ensure a balanced health service delivery approach is to ensure that all phones are operational and at the facilities. The information in Table 10.21 shows the status of phones in some health facilities known to have the issues, apart from those that were out and could not be reached. The information shows what has become of the 12 CUG phones 14.63 per cent from the total number (82) of phones issued. In some cases when the phones didn't work, respondents said they removed and inserted the SIM into personal phones to ensure communication was maintained. But the phones were then kept full time by OICs because they owned the phones. Almost all facilities claimed to have reported the issues relating to their phones to the WHPHA during the provincial review meeting in June, 2012.

Table 10.21: Status of CUG phones in some rural health facilities in WHP, July, 2012.

Lost	Stolen	Phones spoilt SIM in personal phone or not working	Taken by outgoing staff	Not issued at all
1	2	6	2	1
1.21%	2.43%	7.31%	2.43%	1.21%

The above shows that a good number of phones are not being used for the desired purpose because of them being lost, stolen or damaged. This has telling effects on health services that rely to an extent on mobile use. Having looked at the aspects that may potentially hinder communication, it is also appropriate to look at areas in which, use and management of the CUG phone can be improved given the various experience based recommendations that emerged during interviews with the health workers.

10.11: Recommendations by HCWs

Although recommendations were not expected, some were brought up as suggestions in the interviews and audio recordings as part of the respondents' responses. Outlined in Table 10.22 are the recommendations of the HCWs'.

Table 10.22: Recommendations done by health staff during interviews.

No.	Recommendations for CUG expansion	Occurrences in the recorded responses from staff in 23 health facilities
01	<ul style="list-style-type: none"> ➤ Include all key people working at the hospital such as rural health officers, program managers and officers in the medical and surgical sections ➤ Include church health services secretaries ➤ Include trained village birth attendants (VBA) ➤ Add Area Medical Store to the CUG ➤ Include provincial health office management as they deal directly with rural staff ➤ Include provincial health service and health promotion coordinators 	8
02	Purchase and issue better phones to health staff	6
03	Find ways to set up systems that are going to make sense for the future. Connections that are limited and respected enough and those that can be used correctly.	1
04	Rural hospitals should have own internal CUG	2

Many of the recommendations came from the audio recording transcriptions in response to a request for feedback. Various recommendations made by staff in 17 health facilities taken from the 23 random audio recordings, portrayed the need for the CUG service to be revisited and suggestions made by staff taken into account by the WHPHA. Their recommendations can contribute to strengthen or improve the existing service. These recommendations were made on the back of earlier staff recommendations (see Figure 10.14) made during the Western Highlands provincial health sector review meeting held from May 27-June 1, 2012. This was a few weeks before this study began.

Figure 10.14: Some recommendations from the May 27-June 1 review.

<p>5. Do you have any other comments regarding the CUG phones not related to the above question?</p> <ul style="list-style-type: none"> a) We need a reliable CUG phone that does not malfunction to often b) I do not have a CUG phone for my health facility and I need one c) Install a permanent communication link with reliable power supply d) Be good to have ward rounds by doctors once or twice per week e) All district managers (DHOs, OICs, Health Secretaries, DHPO, DEHO, drivers) should have a CUG phone f) CUG phones to be given to all Program Managers and the PHI Officer and the AMS Management g) Prompt reporting of stolen or lost CUG phone to discourage misuse of unit (funds)
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Source: WHPHA provincial review meeting, May 27-June 1, 2012.

The following conclusions have been based on past and present staff recommendations. The range of recommendations made on two separate occasions speaks volumes and reflects the fact that appropriate consultation and adequate planning prior to

introduction of the concept did not seem to have happened or was done inadequately. The recommendations also call for certain key officers within the health sector to be included in the CUG network. Calls for the inclusion of identified officers are based on the roles these officers play and how their roles relate to daily interaction with rural health workers. Usually a review is an evaluation of a product or service to determine how weaknesses can be improved and strengths enhanced (Review, n.d). Therefore it is expected that the June recommendations by HCWs will be embraced by the WHPHA for the benefit of the scheme and to improve service delivery. What is also portrayed in light of the recommendations is that, if essential procedures including consultation and planning were the forerunners of the CUG initiative, most of what has been encountered could be minimal. The general outlook portrayed by the various recommendations shows that the initiative is appreciated by the greater work force. But for it to be widely beneficial, it has to be expanded and managed appropriately. The time taken so far to address earlier recommendations also reflects that the initiative may either be financially constrained or poorly managed.

“The only problem is that the CUG system that has been set up just does not include enough people and not enough working numbers. It is a useful technology but the CUG as it is set up now is not that functional.”(Health worker 2 South Wahgi, July, 2012)

Health workers think it's a good idea and have made recommendations that would increase and maintain the flow of information among them, and could improve and enhance service delivery.

10.12: Skills transfer through communication

Given that the nature of this research was to find out how the flow of communication among health workers can assist in enhancing service delivery, the following emerged from interviewee responses (see Table 10.23). When asked if communication on the mobile with specialists would allow knowledge to be generated and used in service delivery, an overwhelming 98 per cent of the staff responded positively, stating that a flow of information allowed knowledge to be generated. Only two per cent responded negatively, but this can be attributed to lack of fully understanding the question.

Table 10.23: Responses from health staff in WHP indicating whether CUG communications allow skills transfer or not, July, 2012.

Respondents	Yes	No
Mul	3	
Hagen	9	1
Jimi	4	
North Wahgi	6	
South Wahgi	8	
Dei	5	
Tambul/Nebilyer	6	
Total:	41	1
Per cent (%)	98	2

Similar results were encountered with a follow-through question asking if the CUG mobile phone assisted in capacity building. From the responses, 63 per cent of the total occurrences in this category showed that giving and receiving information through the CUG phones had also resulted in increasing staff capacity. Twenty four per cent (24 per cent) of the occurrences indicated that the CUG phones were a reliable means of communication, while 13 per cent showed that it enhanced and improved staff relationships.

Table 10.24: Overall use of CUG phones in the public health sector in WHP and how it enhances staff skills capacity, July, 2012.

No	Capacity enhancement/communication	Occurrences in the answers	Per cent (%)
1	Help build and increase knowledge	34	63
2	Reliable means of communication	13	24
3	Enhanced staff relationship	7	13
Total		54	100

This shows that information sharing is a positive aspect that is helpful to staff. Being informed means they can do better or make better decisions when discharging their duties.

10.13: Areas in which the phone is used

Most of the staff interviewed indicated they had experienced differences in many areas relating to their work with use of the CUG mobile phones. Their responses are shown in Table 10.25.

Table 10.25: Differences experienced by staff with use of the CUG phones in their work in WHP, July, 2012.

No.	Areas	Occurrences in the answers	Per cent (%)
1	Saves cost/time and limits unnecessary referrals	11	26
2	More time for patient care	3	7
3	Timely access to patient care information and resource sharing	5	12
4	Saving lives with communication	7	17
5	Receiving meeting alerts/administration matters	8	19
6	Enhanced staff relationship	8	19
Total		42	100

These positive changes experienced by staff are very encouraging. Most of the answers show how the phones are used in different settings and what they are used for and how often. For example 26 per cent said, use of the phone had saved time and resources, especially for distant facilities that had cut back drastically on their usual long-distance trips. Less travel meant more time was spent at the facility as noted by seven per cent of the respondents. More time at the facility allowed for additional services to be provided. Better communication also enhanced staff relationships as noted by 19 per cent of the staff. Thus the mobile phone has become a gadget bringing many positive aspects that enhance and lift the level of service delivery.

10.14: Use of the CUG phone - assistance

As noted in Table 10.25, CUG phones have allowed instant assistance to be given by health workers to other health workers when requested. The assistance is rendered in various areas; providing transport for referrals, providing patient care advice or supplying drugs sought by facilities with short supply. These arrangements are seen to have been triggered by the CUG mobile phone network as illustrated in Table 10.26.

Table 10.26: Assistance sought and provided among health workers in WHP, July, 2012.

	Provide advice by phone	Assist referrals with transport	Provide drugs	Administrative matters	No answer	Other
Staff	13	7	8	4	4	6
Per cent (%)	31	17	19	9.5	9.5	14

The information above shows that 31 per cent of the staff use the phone to seek patient care advice either from specialists or other colleagues. This is followed by 19 per cent of the staff seeking assistance for drugs, and 17 per cent seeking referral assistance. Some staff (four per cent) had no answers to this question so it is assumed they did not

receive calls for assistance. This may be because they did not have the resources required by staff in other facilities. While drugs can be shared among facilities, advice and transport are resources that only certain facilities have. Therefore it is concluded that assistance is sought only from facilities that have what others facilities require. Most answers to open-ended questions show that a range of answers were generated from a single question depending on how each health worker valued, observed or experienced using the CUG phone. This made it difficult to get straight answers from some questions. Rather, two or three answers emerged from some questions.

Answers were grouped under varying themes or integrated into responses with similar meanings as directed by Miles and Huberman (1994). Through this process, remarks with similar meanings from all responses were brought together. They were then slotted into tables to ascertain the frequency of certain ideas, words, or proposed uses of the phones. This information was then compiled into groups to illustrate the phones' positive and negative aspects and their potential to be either useful or not to the health service delivery process. It also helped determine for what purpose the phones were used most frequently. The total number of occurrences within the clinical category showed that the phones were used predominantly to seek patient care assistance (49.77 per cent) then to seek or order drugs and supplies (27.35 per cent) and for referrals and emergencies (18.39 per cent). Other minor but important areas (see Table 10.27) in which the phone is used are where lives were saved (2.24 per cent) and where phone assisted patient care was administered (1.35 per cent).

Table 10.27: Overall use of CUG phones by health staff in WHP for clinical purposes, July, 2012.

No	Clinical	Occurrences in the answers	Per cent (%)
1	Seeking patient care information and advice	111	49.77
2	Drug & supply orders	61	27.35
3	Referrals/emergencies	41	18.39
4	Save lives that would be lost	5	2.24
5	Phone assisted patient handling	3	1.35
6	Outreach clinics	2	0.90
Total		223	100

The other category in which the CUG phones were used regularly was for facility and staff administration. According to occurrences in the answers, 77 per cent showed that the phones were used for general administration and 23 per cent showed they were also used for receiving meeting alerts and other information.

Table 10.28: Overall use of CUG phones in the health sector in WHP for administration purposes, July, 2012.

No	Administration	Occurrences in the answers	Per cent (%)
1	Receiving meeting alerts	8	23
2	General administration	27	77
Total		35	100

10.15: Responses to multiple choice questions

Answers to three multiple choice questions were integrated and distributed into four areas. This was done by grouping responses with similar meaning or ideas under one heading and the headings chosen depended on the frequency of certain answers indicating the most popular use of the CUG phones. Table 10.29 shows how the phone usage fits into the four areas as used by health staff. From the total, 41.29 per cent used them to attain patient care information and advice from colleagues. Mobiles were also used for administrative purposes as illustrated by 37.62 per cent of the responses. Responses on ‘receiving work directives’ shows 13.62 per cent of the staff which can be grouped under administration. This was followed by 7.33 per cent of the staff stating that the phones were used to seek resource assistance from other facilities or WHPHA. It should also be noted that the total number of responses exceeds the number of interviewees. This is because respondents chose one or more answers from the choices provided to highlight their use of the phone in certain areas.

Table 10.29: Type of assistance sought by staff using the phone in the WHP health sector, July, 2012.

	Ask advice and information for patient care	Receiving work directives	Administrative	Assistance with/for Resource
	45	15	41	8
Per cent (%)	41.29	13.76	37.62	7.33

In order to get the desired patient care assistance, health staff approached other health personnel. Information in Table 10.29 shows that doctors were the most sought after, although the “all the above” category records 38 per cent, it is assumed that this includes doctors and others, and should be viewed as being representative. The next most sought after staff are OICs (16 per cent) followed by HEOs (13 per cent) with experienced staff at the bottom of the rung (four per cent). Which officers are called is due to many things. Most obviously, the nature of the medical case determines who, eg a midwife for a birth. Secondly, personal relationships can be used and relied on when

in need of assistance. Thirdly, the level of experience of a certain health worker or proximity can be a reason for calling them. Above all, doctors are the most preferred, and this may be because specialists are available and can be reached for necessary information when required.

Table 10.30: Officers that are sought out by WHP health staff for assistance, July, 2012.

	Doctors	HEOs	Experienced staff	OICs	All the above
	13	6	2	7	17
Per cent (%)	29	13	4	16	38

Another area in which the CUG phone has been used is during emergencies (Table 10.30). Staff responses indicate that the phones have supported childbirth procedures more than any other emergency. Again the number of responses supersedes the number of interviewees because one respondent may have chosen more than one answer from the choices provided. This could have resulted from cases in which a staff may have attended to more than one emergency. Emergencies during childbirth (57 per cent) have been greatly assisted by the phones, followed by accidents (20 per cent) and domestic violence (17 per cent).

Table 10.31: Emergencies dealt with successfully by health staff using the CUG phone in WHP, July, 2012.

	Child birth	Tribal fights	Accidents	Domestic violence
	26	3	9	8
Per cent (%)	57	6	20	17

This gives an impression that not many officers in the province have midwifery skills or expertise to deal with problems in childbirth, so have to seek assistance from others with the capability or experience. It can also mean that the province lacks appropriate number of midwives. One officer interviewed outlined how a twin baby in a breech position was delivered following instructions given over the phone. This phone assisted delivery was successful without a C section².

“Then I told the health worker to push his hand into the vagina and turn the head around and make sure the head is in the cervix, and the health worker replied that it was in the cervix, then I told him to allow normal process to take place and the baby will come out. Then he finally managed to deliver the second twin and when he said he had done it, I told him you great man. This phone is very handy, very useful, very handy.” (Health worker 5, South Wahgi, July, 2012)

From the total number of staff, 86 per cent indicated that communication between staff in different sectors was open. There wasn't much restricting them and staff could easily reach officers at the management level (Table 10.32). Although 10 per cent stated that getting in touch with people higher in the hierarchy was not easy, this could have been because phones were switched off during meetings or were left charging elsewhere. Just because you can use the mobile phone and have a mobile phone, doesn't mean an answer is guaranteed.

Table 10.32: Communication between rural staff, specialists and health hierarchy in WHP, July, 2012.

	Communication is open	Hard to reach people at the top	Quite Restricted	Not sure
	36	4	1	1
Per cent (%)	86	10	2	2

Even though the reasons described above may be shallow and against the intent of the CUG service, they are highly likely in a PNG scenario.

When using the phones it has been established that staff used only two features - to send and to receive messages. Most staff indicated that they dialled calls to communicate, while a good number also stated that they used both features, dialling a call and text messaging (see Table 10.33). The rest chose other answers. This is because the phones were basic and these features were the most common and easy to use and may be all they need for their purposes.

Table 10.33: Features of the CUG phone used for communication by health staff in WHP, July, 2012.

Text message	Voice mail	Dialling calls	Text & Dialled calls
1	1	19	18

When asked how useful the phones were to their work, an overwhelming 73 per cent of the staff indicated that they were very helpful (see Table 10.34). A further 10 per cent indicated that they were helpful and another 10 per cent said they were helpful at times. The other seven per cent gave varying answers, and no negative answers were given. The extent of impressive responses given by staff indicates how they value the use of the mobile phone and their ability to support or enhance health care work.

Table 10.34: How helpful the phone is to the work of health staff in WHP, July, 2012.

	Very helpful	Helpful	Sometimes helpful	Not helpful	Other
	31	4	4	0	3
Per cent (%)	73	10	10	0	7

Staff were then asked to rate the CUG mobile phone as a potential tool that can assist with the delivery of health care services (see Table 10.35). In their responses 38 per cent rated the phone as extremely handy and 38 per cent rated it as very handy, while 12 per cent rated it as handy and seven per cent rated it as quite handy. Again, no staff gave negative feedback. This goes to show that the need for communication has been met by mobile technology, enabling two way communication. This should be used as a basis to look for further improvements or enhance this service and broaden its scope.

Table 10.35: How HCWs in WHP rate the CUG phone as a tool, July, 2012.

	Not handy	handy	Quite handy	Very handy	Extremely handy	Other
	0	5	3	16	16	2
Per cent (%)	0	12	7	38	38	5

Based on their experiences with the phones, staff when asked to give their view about the mobiles, showed that they valued the CUG phones. From the responses, 48 per cent of the staff thought the introduction of the CUG phone service in the health sector was very useful and 33 per cent said it was extremely useful. A further 10 per cent said it was useful and seven per cent said it was quite useful (see Table 10.36). None of the staff said it wasn't useful. It is clear that staff value the introduction of the CUG phone service, provided that the answers are based on their use of the phones, and experiencing the difference brought about in their performances and how they are able to provide health care to the people.

Table 10.36: The CUG service as viewed by HCWs in WHP, July, 2012.

Not useful	Useful	Quite useful	Very useful	Extremely useful	Other
0	4	3	20	14	1
Per cent (%)	10	7	48	33	2

Chapter 11: Discussion

11.1: Introduction

The findings related to this research will be discussed in this chapter. The purpose of this study was to examine if mobile phone communication among HCWs had the potential to assist workers in WHP deliver health care services to rural parts of the province. The methods applied in this study, including the general inductive approach to analyse the data, highlights the experiences that are central to the initial research question. These are the realities as experienced by respondents using the CUG phones when delivering health care to the masses. To ensure relevancy, findings from similar studies in other developing countries will be discussed to either substantiate or argue against the findings. Attempts will also be made to interpret the descriptive data in order to attach significance to what has been found and offer explanations or draw conclusions on some findings. This will take into account the positive aspects of HCWs use of the CUG phones, basically how the phones have assisted them in their work. It will then look at how the mobiles are used overall, including the resulting benefits and disadvantages. Furthermore, issues that can potentially hinder constant use or the opportunity to tap into mobile technology for health service delivery in the WHP will be discussed.

11.2: Positive aspects of the CUG phones

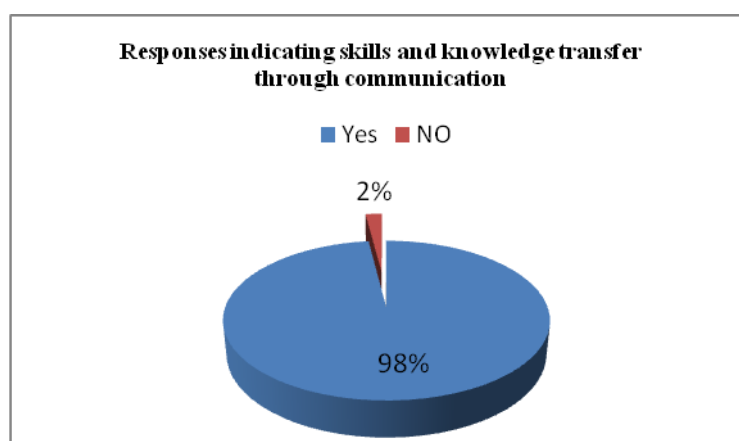
Most of the views presented by health workers using the CUG phones were generally positive (see Table 11.34). The general impression relating to use of the phones was very encouraging. While the phones have been used primarily to seek patient care information and advice from specialists and other experienced staff, communication plays a significant role when it comes to effective delivery of health care services. This is noted by Kenyon et al. (2011) who suggest that use of mobile phones in health service delivery can impact on various health care challenges in a wider variety of ways including routine clinical practices. In light of the mobile becoming a potential tool for the health worker, Ramesh et al., (2008) point out that mobile phones have become part of a physician's equipment and is extensively used for communication in clinical settings, and so can assist in the delivery of health care in PNG. The introduction and use of the mobiles among health workers in WHP is considered to be transformative, simply because this service was never available before. What is being experienced by health workers is a completely new service within the country (Duncombe & Boateng,

2009). Although this initiative may be an experiment or a pilot and may not continue, it is important to note that, the previously impossible within the health sector is now practical (Donner, 2004). Like any other new approach, it has costs, benefits and risks, however its survival will depend on how its potential is embraced and utilised with appropriate attention to its continuity (Kalil, 2008).

11.3: Differences noted by respondents with use of the CUG phones

The findings show that communication among health workers allows information and skills transfer. This was indicated by 98 per cent of the research participants stating that they had experienced information and skills transfer through mobile communication (see Graph 11.1).

Graph 11.1: Responses indicating skills and knowledge transfer through communication among health workers in WHP, July, 2012.



This is almost the entire staff interviewed and shows a very strong case for use of the mobile phone and its possibilities. This shows increasing individual staff capacity to perform tasks they previously had not been able to. This is consistent with other studies (Dixon, 2009; Kenneth et al., 2010; Kenyon et al., 2011) undertaken in developing countries which highlight that communication has the potential to break down physical barriers and enable information and knowledge to be shared not only in health but in, education, agriculture or social interaction. Through sharing information, many health workers can then deliver services related to certain skills and knowledge that are usually confined only to certain staff. The information can enhance their capacity to handle difficult cases and broaden their horizons to deal with situations often left to the knowledgeable (Nicholas, 2012; Waima, 2012b). Mobile communication provides the

opportunity for staff to learn from each other, reinforce the known and facilitates direct implementation. According to Outcalt, Kewa and Thomason (1995) information challenges faced by HCWs in developing countries are similar, because the countries lack systems to seek and share information and lack locally relevant material and tools. With the mobile phone, knowledge can flow from skilled to less skilled workers or from specialists to non-specialists.

“What I am happy about is that if I did not have a phone when that health worker needed advice to deliver the second child, that child in the transverse position would have died, but we were able to save the child because I had the phone to give advice, how the child in such a position should be delivered. All the time his phone was on speaker and I was shouting instructions into the phone directing him on what to do.” (Health worker 5, South Wahgi, July, 2012)

The above information is a strong indication that mobile communication among health staff in the province is an important ingredient in assisting the imparting of knowledge and lessening the pressure felt by the few specialist staff. It is also a relief on the pressure of limited resources. Similar studies by D’Adamo, Fabic and Ohkubo (2012) show that interventions to arm health workers with mobile phones has shown dramatic improvements in two way communication and knowledge sharing. Thus it is envisioned that mobile communication among HCWs is contributing to meet this information need, although not on a large scale. If the CUG mobile communication can be strengthened and sustained, it has the capacity to assist geographically disadvantaged staff and patients. According to Toikilik et al., (2010) local conditions in PNG make uniform distribution of health programmes difficult. While some conditions are related to geographical factors, others are associated with insufficient funds. Moreover there are unpredictable episodes including violence between communities that can disrupt basic health care services.

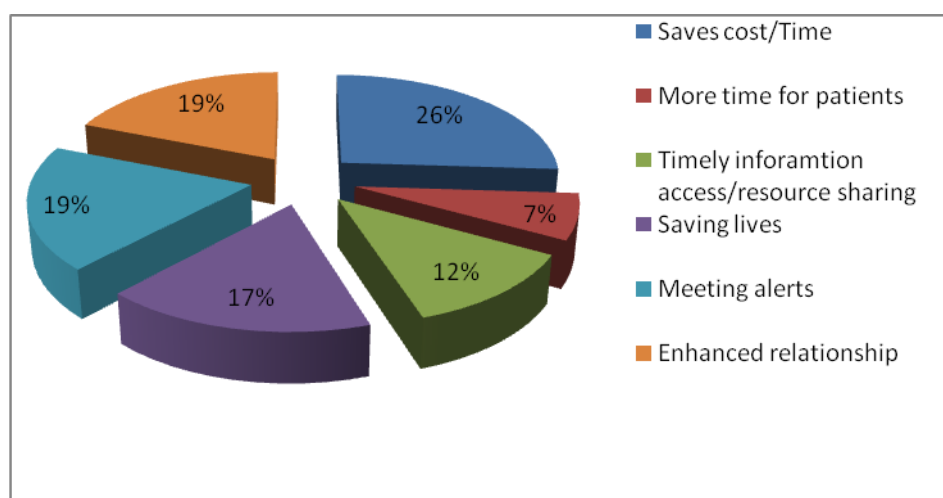
Prior to introduction of the CUG service, information and skills could be transferred via meetings, workshops and staff gatherings. Information was still restricted to a selected few because objective selection was often never a criterion (Outcalt et al., 1995).

However, with the advent of CUG mobile communication, any information is only a phone call away. Information is empowerment, therefore an information deficit can lead to poor health outcomes, but knowledge sharing can be an element in strengthening health systems.

11.3.1: Enhancing performance and increasing service time

Apart from exchanging skills and knowledge, respondents also claimed to have experienced benefits in other areas relating to their work. They said the phones assist them to respond more quickly to emergencies and to stay in touch with other workers in geographically dispersed locations. Staffs in such locations are also able to seek advice and get direct support and assistance from specialists and others.

Graph 11.2: Differences experienced by staff using the CUG phone.



Much of what has been experienced by the staff of Western Highlands is strongly supported by studies (Donner, 2008; Duncombe & Boateng, 2009) which portray similar revelations in developing African countries. In PNG, there is significant mobile penetration into segments of the population that was previously excluded from any form of communication (see Appendix 7). Thus health workers are able to get and send information from their locations. This has translated to staff in the province giving more time to patient care and being at facilities (see Graph 12.2). People who seek health care in rural areas have to walk for hours or even days to get to the nearest health post. Duke (1999) shows that in 1982, 93 per cent of the population in the province studied (Eastern Highlands) lived within 2 hours walking distance from a primary health care facility (aid post). But that changed by 1997 when the public health system broke down and by 1998, 82 (56 per cent) of the 147 aid posts in the province closed officially. This scenario is widespread across the country and the resulting effects can only be imagined (Evara, 2012; National Health Plan Secretariat, 2010; O'Neill: Blame past leaders for

rot, 2012). However, with communication it is possible, the chances of people getting help can be increased.

11.3.2: Cost saving

Communication has also allowed WHPHA and rural facilities to drastically minimise operational costs as indicated by 26 per cent of the respondents. The cut in cost has also been experienced by IHI when providing services to HIV positive people in PNG (Lao, 2012). Most of IHI's travel requirements and expenses have been slashed dramatically and tasks are often delegated to provincial reps through mobile communication while IHI plays an advisory role. This and the experiences of respondents is consistent with studies by Duncombe and Boateng (2009) who note that better communication via mobiles reduces the frequency of journeys and cuts down on time and expenses. In PNG travelling from the furthest part of a province both on land and sea can be time consuming, risky and treacherous. Trips can take hours or even a day depending on distance, road condition, weather and type of transport used. But with mobile communication, some factors including cost, time and travel associated risks can be cut down. Mobile communication also ensures referrals and other information is sent in advance before actual travel.

“We are in a very remote area so instead of making the long trip to the provincial headquarters and health office, we use the mobile phone to call and get information we want and also report on issues to the appropriate officials there.” (Health worker 2, Jimi, July, 2012)

The benefits of calling can also be reaped by patients if they can call health workers to ascertain their availability before setting out to seek treatment. This can also be helpful in village to health post referrals. Advance information can save them hours of walking or assist them to make life saving decisions by referring patients to facilities with staff available.

“We had a certain kind of chemotherapy program where the medicine only comes from a donation out of the country so sometimes if it wasn't here patients didn't want to waste time travelling here so they would just call me on my personal mobile and say, is the medicine here if not do you know when it is

going to come in. I think the mobile phones can be quite helpful.” (Health worker 2, South Wahgi, July, 2012)

Cutting down on travel time means more time for patient care and savings in costs can be directed to purchasing solar kits that will provide a steady power source to keep phones charged and also allow staff to discharge night duties at rural facilities.

11.3.3: Networked and enhanced working relationship

Prior to the introduction of CUG phones and before mobile penetration the ability to have a networked cadre of staff in the province was very minimal. Fixed line phones were only available to the main hospital and management. All rural health facilities did not have access to fixed lines other than a AusAID funded National VHF Health Services Radio Network that was rolled out in the late 1990s by the Health Department, attempting to have all facilities networked (PNG national health services radio network, n.d). Although this research was not able to determine if this service is still operational, an indication from a health care worker was that, it was not working effectively due to lack of maintenance and upkeep.

“Our- our radio needs solar cleaning and the solar panels are damaged. Phone is much needed if there is an emergency in Mt Au or somewhere else, it’s very useful” (Health worker 4, South Wahgi, July, 2012)

The introduction of mobile technology in PNG paves the way for organisations to be networked through communication. On the basis of experiences, 19 per cent of the respondents reflected (see Graph 11.2) that communicating by phone made them feel they knew people on the other end even without meeting them. This gave them confidence to talk openly with a sense of connectedness. Studies by Duncombe and Boateng (2009) also show that networks are essential for responding quickly to emergencies. Networks are vital for health workers in the province because not all facilities have resources such as transport to attend to emergencies. Thus through an established network, assistance can be swiftly sought from each other. Research also shows that health staff can contact each other in the same building in a much quicker time by using the mobile than if they moved physically - and regardless of where they are or what they may be doing (Ramesh et al., 2008).

“We are using our own mobile phones to call among staff within the facility and so if the facility wanted to call a doctor they would not want to spend their own minutes but a CUG phone if introduced within the facility and if the on call doctor was also carrying a CUG phone it would be easy to get hold of the doctor to provide the required service.” (Health worker 2, South Wahgi, July, 2012)

Respondents also said they were able to get assistance from each other when being networked.

“The other thing is that we do not have an ambulance so with the phone we are now able to contact health centres with vehicles to assist with referrals or during drug shortage.” (Health worker 2, Mul/Baiyer, July, 2012)

11.3.4: Saving lives

Although saving lives is the predominant basis of providing basic health care, 17 per cent of the respondents highlighted some extraordinary cases in which staff have experienced saving lives using the CUG mobile phones. Ofosu-Asare (2011) and Watson (2010) also note that the mobile phone is priceless when people are confronted with emergencies including snake bites that can be very fatal resulting in death within minutes if not attended to swiftly. Respondents stated that some emergencies they were unable to attend to were referred using the CUG phone, which otherwise would have resulted in death due to remoteness and inability to get appropriate timely assistance.

“There was an occasion during a delivery process when a personal phone was used at Mt Au when three patients were diagnosed as mal-presentation and they called me through my private phone and I relayed the message to the PHO adviser Philip Talpa and he then advised me that it was weekend. So a plane was sent to Mt Au by the WHPHA on Monday to evacuate the three patients. Some have either walked through Chimbu province with complications and there was one case when two women, one with twins and the other with a retained placenta had to walk. The phones can assist to decrease the problem faced by the people and it can be used to get information from specialists to help the people at the village level saving the poor mothers all the pain they have to go through or the hardships faced when walking long distances to get to the nearest specialist or health facility.” (Health worker 4, South Wahgi, July, 2012)

Kiagi (2012) in a support interview also stressed a similar scenario where the CUG phone was used to divert a plane by calling the airline company's base to do an emergency medevac (see Appendix 9). Most of the descriptions were never possible before the CUG mobile phones were introduced. Miller (2007) found that mobile phones are at the heart of the survival of many developing countries, especially among low-income locals. According to Kalil (2008), phones have assisted community health workers to save the life of a mother or young child, or give a farmer the access to build a path out of poverty. Mobile communication has become a major source of assistance.

11.3.5: Timely information

The ability to save lives results from health workers receiving timely information. This is supported by a further 12 per cent of the respondents who said that the mobile phone allowed them to get information on time when faced with critical situations. Although the respondents' representation may seem insignificant, it importantly highlights and represents the experiences of certain staff in the province that encountered situations in which the CUG phone assisted them to get timely information to deal with them. Results also indicate that not all staff interviewed had similar experiences. However it does signify that without transfer of skills and information serious fatalities are more probable.

"I am a community health worker working alone, one day I encountered a situation where a domestic violence victim (lady) with a skull fracture was brought in and I did not know what to do so I called the OIC on the CUG phone using my personal phone, and he instructed me the procedures to be applied to stabilize the patient before referring to Kudjip rural hospital. If I did not have the phone or if the OIC did not have the CUG phone, I think the patient would have been referred without stabilization and could have died on the way." (Health worker 7, South Wahgi, July, 2012)

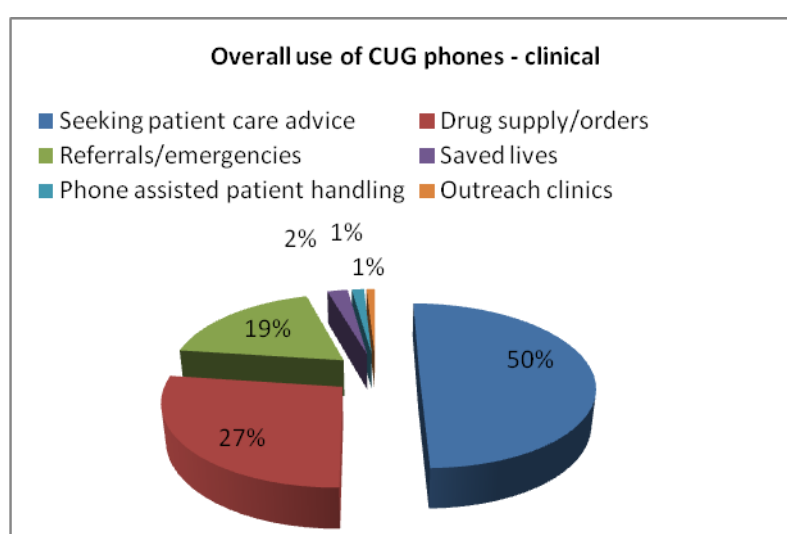
The variances in the responses are based on staff experience and can be very different from each other depending on factors such as distance, resources, experience, qualification and location. For example, seven per cent of the respondents said they had more time for patient care. Their experiences also differ with other users in relation to availability of enabling infrastructure including electricity and network coverage. Thus what is reflected in the responses (see Graph 11.2) is sporadic but important. It is

therefore noted that the introduction of the CUG mobile phone among HCWs in WHP can cut costs, increase service quality and efficiency (Lemay et al., 2012).

11.4: Overall use of CUG phones-positive aspects

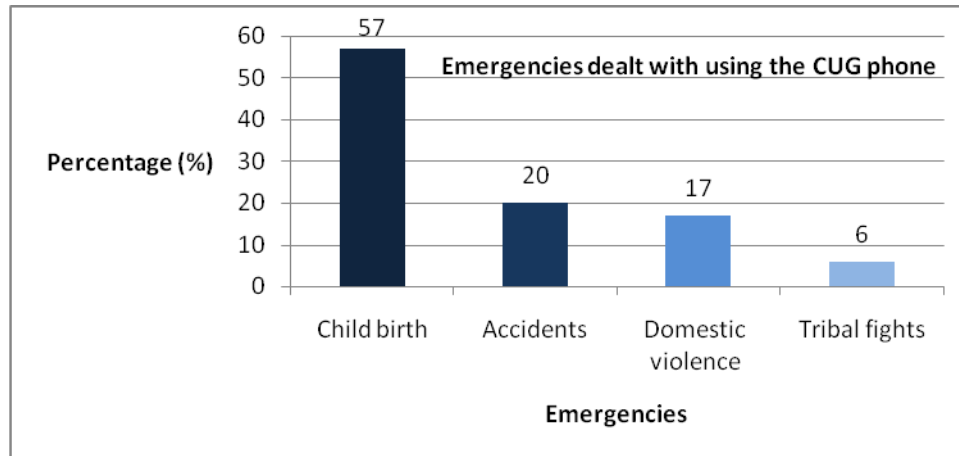
Findings from the overall use of the CUG phones indicate that apart from differences noted by staff, other areas associated to use of the phones to provide health care is captured in (Graph 11.3) which shows the areas and in which the phone is used more often.

Graph 11.3: Overall use of the CUG phone by WHP health staff for clinical purposes.



Again the findings display that 50 per cent of the CUG phones use by staff is to seek patient care and treatment information. This portrays a greater need for staff to be informed and the possible lack of appropriate patient care information or experience among staff. It also portrays the potential lack of staff with specific knowledge in facilities. For example, staff shortage may allow midwives to be located only at the main hospital, thus staff lacking adequate midwife skills may call to get assistance. This is highly likely because midwives need to be stationed more centrally in order to deal with referrals from around the province (see Graph 11.4). Half the time, the phone is used to deal with childbirth emergencies. Child birth emergencies are a common occurrence (as opposed to other emergencies) and appropriate measures should be taken to minimise this. The low use of phones in other emergencies can mean they are non-frequent, one-off, or patients with such needs are transported straight to the main hospital knowing little can be done at smaller facilities.

Graph 11.4: Emergencies dealt with successfully using the CUG phones



Another aspect of the overall use of the CUG phone displayed in Graph 11.3 is that 27 per cent of phones-use is related to seeking drugs and supply. The phones have been very instrumental in this area as indicated by respondents given the laborious drug procurement process. Sometimes the area medical store can be out of stock or the paperwork delivered may not have been attended to. This means waiting, and waiting can be detrimental. Besides, rural facilities without stock of certain drugs cannot make time consuming, expensive trips just for one drug. Importantly patients can't be sent away. So the phone is used to contact other facilities within the vicinity to seek supply and replace after replenishing their stock. This ensures continuous treatment is delivered, costs are minimised, referrals are limited and unsuccessful trips stopped.

According to the responses (see Graph 11.3), two per cent of the phones use is related to saving lives. This can be achieved through sharing drugs or information with other workers. Although illustrating a minimal use, it importantly produces its own output and testimony to the phones varied potentials to support and change the landscape of health care delivery. Findings from other studies (Lemay et al., 2012) also show that communication can affect the quality of care clients receive, thus is no different with the PNG scenario where the service delivered can be immediate. Notably one per cent of the time, the phone was used for outreach clinics. The low response could be a reflection of the non-availability of this crucial service in the province. Responses show that not many facilities carry out this important role anymore, or if they do it was not mentioned. A study by Duke (1999) in Eastern Highlands province

revealed that vaccine coverage was low and 35 per cent of children in PNG had severe or moderate malnutrition. This scenario was attributed to poor maternal health, poor nutrition and the frequency of low birth weight. This outcome results from a lack of outreach programmes. Thus it is assumed that outreach programmes are no longer carried out or are minimal in the provinces.

11.5: General Administration

Apart from clinical purposes the CUG phone is also used for administration purposes. When comparing the types of assistance sought using the phone, 41.29 per cent of the respondents indicated its use for patient care information, 37.63 per cent mentioned that it was also used for administrative purposes and 7.33 per cent said it was used to get assistance with resources and a further 13.76 per cent pointed out its use for receiving work directives. This shows that apart from clinical purposes, the phone's use for administrative purposes is equally important. This is no surprise given that prior to the introduction of the CUG service, travel was necessary for administrative duties to be undertaken. This was in order to meet and discuss or get information from appropriate sources. Without travelling, nothing could be accomplished. While health workers need timely information to support service delivery, management and administrative staff including OICs and DHOs need up to date information for effective management, supervision, program planning and implementation. Communication has also filled the vacuum in districts where health administration is constrained by resources.

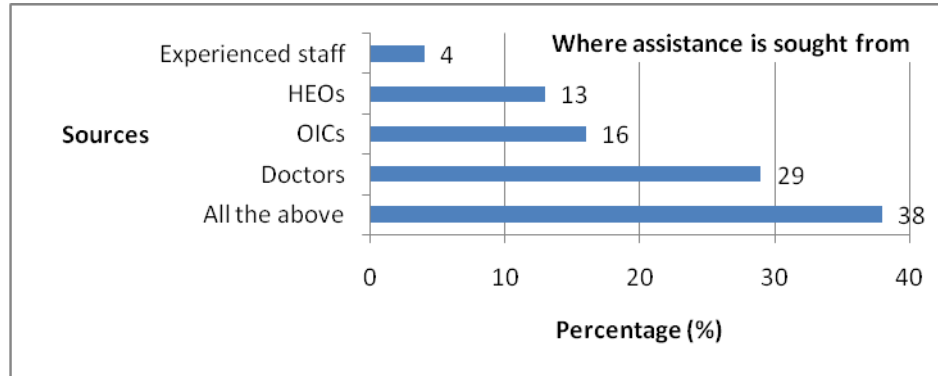
“No vehicle so it assists with monitoring and managing staff through phone calls” (District Health Officer, July, 2012)

The importance of information for administration purposes is also highlighted by D'Adamo et al. (2012) that current and up-to-date information is required for programme planning and implementation and mobiles can provide this.

12.6: Sources where assistance is sought

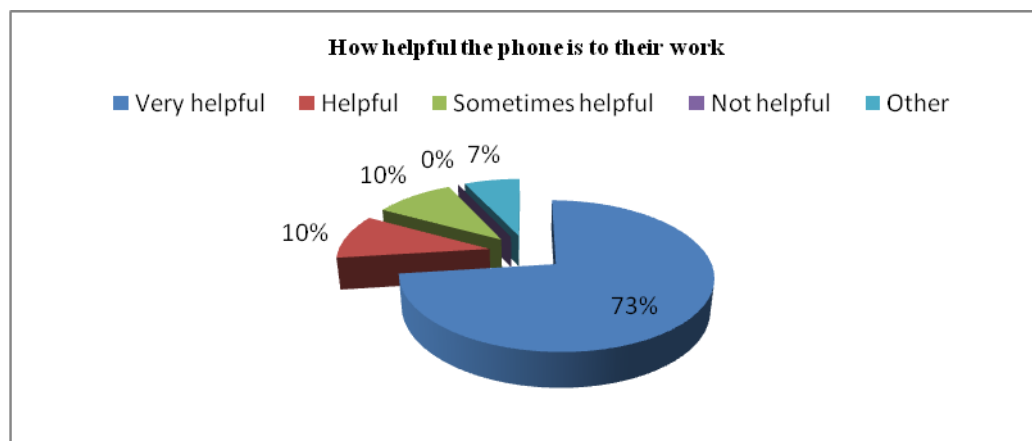
From the responses provided it was established that staff used the phone to seek information or assistance from several sources. This is portrayed in Graph 11.5 showing that 29 per cent of the respondents often called doctors to get patient care assistance.

Graph 11.5: Officers from whom patient care assistance is sought by health workers in WHP, July, 2012.



Information in the graph also shows that information is sought from people with higher positions in the service delivery hierarchy. This means that protocol is observed by maintaining the hierarchical channel of communication. This way if anything goes wrong, staff will be seen to have followed appropriate procedures. Other aspects that can also determine calls include personal relationship or proximity of an officer. Although 38 per cent indicated 'all the above' it is deemed that this is inclusive of doctors and portrays a general picture given their needs, so is not taken into consideration. Given the differences noted and the experiences encountered with the CUG phones, staff interviewed were asked to give their view of the phone's usefulness and how helpful it was to their work. This process reflected the following.

Graph11.6: How helpful the CUG phone is to health workers in WHP, July, 2012.



It showed that the phone has assisted HCWs in much of their work. To most health workers, using mobile technology to assist them seek work related information may be their first experience. Therefore, they may find that this is the best they ever used. A study by Chib (2009) looking at midwives with mobile phones in the Aech Besar region of Indonesia also shows that CHWs did benefit from the use of mobile phones, and the benefits eventually trickled down to the communities. It also implies that given the

phones' success to assist service delivery, the means need to be found to strengthen its functions. The uniformity of answers from a range of workers including the management down to the community health worker shows that the phone is valued at all levels of the hierarchy.

Similarly, the same cross section of respondents' views about the introduction of the CUG service was also very positive. An overwhelming 48 per cent agreed it was a very useful concept and another 33 per cent indicated that it was an extremely useful concept, while 10 per cent stated that it was useful and seven per cent saying it was useful. This again point to the fact how HCWS value the concept based on their experience using the phones.

Another significant view conveyed by the respondents was the rating of the phone as a potential tool to assist their work. Again a majority (76 per cent) pointed out that it was extremely or very handy, while 19 per cent indicated that it was quite or handy. Generally the impressions drawn from the answers show the usefulness of the phones. Thus the onus now remains on the WHPHA to ensure its continued use so that experiences associated with staff and resource shortages can be adequately addressed. It is concluded that the views outlined by respondents are associated to experience in which the phone has been the means of support, information and cost cutting measures in their work. Studies into use of mobile phones in the health sector have also found similar results where the phone enabled outbreaks to be curbed by frontline HCWs and resources have been shared for the benefit of the wider community (Chib, 2009; Kalil, 2008; Lemay et al., 2012). However respondents have also noted that there are some aspects that hinder the full potential of mobile communication to be utilised. These grey areas need to be addressed if the potential of mobile communication is to be fully reaped by service recipients and workers alike.

11.7: Hindrances/constraints

Like every initiative, the introduction of the provincial CUG service has its own constraints. While some are related to technology infrastructure and connectivity, others include phone management both by the WHPHA and OICs of rural facilities. Although people can learn from this, the consequences can be major setbacks which may cause the initiative to stall like earlier ICT in health care projects in the country which are no longer operational (Au, 2009).

11.7.1: Network outage

At the outset it is better to understand that mobile network coverage is demand and profit driven, so coverage distribution is likely to be uneven depending on population density, affecting the effective delivery of services in some segments of the country where network signals are low or unavailable. Other studies undertaken also show that mobile-health (m-health) undertakings in developing countries are often faced with such constraints (Duncombe & Boateng, 2009). Some respondents mentioned the need for up to speed communication between Mt Au in South Wahgi and the WHPHA but there was no Digicel telecommunication tower on Mt Kubor. This could mean that by business terms, the population in Mt Au may not be adequate to support profit generation, given the excessive costs encountered by Digicel to set up, maintain and keep mountain top transmitters operational (Watson, 2011). Difficulties encountered by Digicel are also voiced by Banerjee (2011) showing that rural network infrastructure is hard to maintain as access to power, transport and road conditions are very poor in many developing countries including PNG. Network outage difficulties were also stressed by 74 per cent of the respondents from the 34 facilities visited. Outage is often related to technical issues and mobile phone users are at the mercy of how best service providers can keep the service going. Network outage is also suggested to be a contributing factor which resulted in 21 per cent of the phones issued to health workers being reported as not working. However given the widespread number of respondents, appropriate measures to minimise this across facilities is by purchasing phones with high capability to pick up network signals in low coverage areas.

11.7.2: Phone charging source

With the lack of rural electrification infrastructure, 36 per cent of the respondents use available means in their localities. Given the need to remain connected, HCWs seek service providers or opt for solar powered energy and private generators to keep their phones charged. However, such means can be inconvenient to sustain long term communication. The number of facilities without power is quite significant and can impinge on balanced and fair distribution of health services. This problem is not isolated to health workers only but also to locals with mobile phones. A survey into the mobile phone usage patterns in Tanzania found that village residents often took turns weekly to take all phones in the village to the nearby town with electricity to have them charged (Donner, 2008). Such means can be adopted by health care workers. However the time

taken can impinge on service delivery. Possible solutions to minimise this trend can be, purchasing phones with inbuilt solar chargers or supplying solar kits to health facilities.

11.7.3: WHPHA management of CUG service

While electricity and network are external causes that can interrupt effective mobile communication among HCWs, other factors uncovered by this research show prominently that lack of appropriate management of the phones may also be detrimental to the initiative. The phones were distributed in four categories; management team, SMOs, DHOs, and health facilities. Of these, the management team was the only category that had all eight phones (100 per cent) working. During the time of research 66.66 per cent of the 12 phones issued to SMOs were not working for varied reasons. Phones had either been taken away by leaving staff or calls not getting through. Only 33.33 per cent of the phones were working at the hospital. Similar scenarios were encountered with phones issued to DHOs, where 29 per cent of the seven were not working. Among the 55 phones issued to health facilities there was no contact with 27 per cent of them, 4 per cent had either been stolen or lost, seven per cent of the working phones were not at health facilities and four per cent of the working phones were kept by OICs. These results suggest that 41 per cent of the total number of phones were not working at any specific time. Among the working phones seven per cent were not serving the intended purpose. They were being kept by staff while not being on active duty. The other four per cent of the phones were taken over by individuals, although the phones continued to serve the purpose. This amounts to almost 50 per cent of the phones issued within the CUG service.

Thus it portrays a lack of appropriate management of the phones, both at the WHPHA and district levels. Control measures if existing need to be reviewed and strengthened to ensure there is greater control. Allowing SMOs to take phones away during their leave is inappropriate, unless the phones are part of the employment package. Lost or taken phones amount to six per cent, this calls for established measures to be executed, either by promptly replacing the phones or holding staff accountable for the loss through guidelines.

The non-function of almost half of the phones indicates a huge imbalance in the appropriation of health care services in the province. Of these, 19 per cent of the non-function of phones has been attributed by respondents to low quality of the phones. Health workers missing out on information means patients also miss out on needy services. The introduction of the CUG service may be in line with the National Health

Plan (2011-2020) to strengthen primary health care for all (National Health Plan Secretariat, 2010) and improve service delivery to the rural majority, however the scenario painted with management of the phones shows this may hardly contribute effectively towards this outcome. Another notable factor was that 19 per cent of the respondents' stated that the status of the phones was reported to WHPHA but no immediate action was taken. This indicates that WHPHA needs to tighten up phone governing policy guidelines and establish appropriate reporting procedures that will see the continued and sustained operation of the phones. Reports of internal CUG reviews indicate that issues surrounding the malfunction of phones were reported prior to the commencement of this research, however similar reports were presented by eight per cent of the respondents during this research indicating that no action had been taken since concerns were aired. According to the respondents all call costs incurred are borne by the WHPHA, however 17 per cent of the respondents indicated that they often used their own money to purchase talk time credit. This means, if they run out of money and talking credit, they may not be able to make calls but only receive incoming calls. Thus it is necessary for management to ascertain why health staff run out of talk time credits.

11.7.4: Lack of consultation portrayed by recommendations

Documents illustrating a survey of the CUG service carried out internally highlight some improvements and differences noticed by staff in service delivery (Appendix 7). Most of the recommendations based on difficulties were highlighted by end users relating their experience, therefore measures to address the presented situations should also be recommended by end users through the review process. If such was discussed during the review it had not yet been implemented. The vast numbers of recommendations suggest that HCWs were probably not involved during initial planning. Hence numerous corrective measures were requested by HCWs as a means of voicing their views.

11.8: Leveraging on the opportunity

The opportunities presented by mobile communication are massive and need to be tapped into earlier than later. So the option taken by the WHPHA is timely to harness the potentials provided by this technology. Many studies into the mobile phone revolution in developing countries have been conducted to ascertain its potential to be a technology that can be leveraged to ensure information and knowledge reaches the once marginalised and information poor sectors of the countries (Arminen, 2007; Kakulu et

al., 2009b). However the difference between such studies and this research is that the WHPHA CUG service is an intervention initiative by the hospital management without external funding or mobile application support. Studies elsewhere were mostly done with external donor funding and humanitarian organisation support. Some were done in conjunction with software and mobile application developers, internet service providers and major educational institutions (Chib, 2009; Kalil, 2008; Lemay et al., 2012; Nchise et al., 2012). Most studies also looked at how certain mobile applications for SMS or voice and image transfer could be used, and suggested that mobile technologies need to be integrated into broader healthcare and social systems so that they complement existing technologies such as the computer and the internet (Chib, 2009). While all the above is possible, the development of mobile applications varies from country to country, hence others may be more advanced than others in developing and deploying mobile technologies. Thus the suggestions cannot be a reality for PNG because it lacks internet and computer technologies to complement mobile technologies. In 2011, only two per cent of the population in PNG had access to the internet, but mobile penetration has outpaced it from two per cent in 2006 to 34 per cent in 2011 (Cave, 2012). This development shows that use of mobile applications in service delivery is promising if made available. But achieving this requires greater commitment from all sectors, including government and universities to consider curriculum that teaches mobile technologies. This approach can allow mobile applications relevant to the country's needs to be produced and used (Froumentin & Boyera, 2011; Kalil, 2008). It is anticipated the introduction of the CUG service into the provincial health sector will lead to better things.

11.9: Discussion summary

Since the introduction of the CUG service to the health sector, staff have shown that significant differences have been noticed in the way services are delivered. They also show that most things not possible earlier are possible now, most significantly, the transfer of information and skills among staff. Numerous lives have been saved through communication and services have continued to be delivered through resources and information sharing. Importantly staff have realised that, their needs are a phone call away and not kilometres, hours or days. Needs based information has started to flow among staff leading to capacity enhancement, confidence boosting, resource saving and increased service delivery where possible. This shows that it is vital to leverage on the growing private sector investment for public consumption and tap into mobile

technology (Kalil, 2008). This research shows that there clearly remains significant potential to do more to enhance the quantity of service by utilising the growing mobile coverage in the country. This growing trend has been utilised by social media taking the country by storm with over 136, 000 Facebook users using mobile phones with Facebook applications (Cave, 2012). This potential is also available as an alternative to the present communication methods if HCWs can be issued phones with Facebook applications. Broadening the horizons of service delivery through such means can assist wider community support including funding and support agencies. The hindrances and constraints, however, need to be given serious consideration. They are real and can potentially derail the current project if adequate attention is not given to them, particularly the management of the phones. Appropriate measures need to be set and enforced for the benefit of the CUG service. Experience from earlier ICT initiatives in the health sector shows that they discontinued for reasons not limited to inadequate financing and inappropriate management (Au, 2009; National Health Plan Secretariat, 2010). The question is, to what heights can this WHPHA initiative be taken to, in order to allow HCWs and the people to benefit from mobile technology? The answer lies in how the WHPHA manages and nurtures the CUG mobile communication as a partner in service delivery.

Chapter 12: Conclusion

12.1: Main findings

The findings from this research confirm that HCWs need up-to-date information that is useful for efficient service delivery. The findings suggest the need to enhance or invest more in areas that take advantage of expanding information and knowledge through mobile technologies. This will enable HCWs to share the experimental knowledge and can support and strengthen existing working networks and relationships. Harnessing emerging technologies can help improve information sharing and provide the opportunity for SMOs and other staff to become potential sources to fill the information gap through communication. With information, HCWs will be better positioned to deliver services, likewise, decision makers will be better positioned to develop policies that improve health management and outcomes.

Findings also show that the mobile phone is very handy and has assisted very much with both administrative and clinical aspects of their jobs. This has resulted in a cut back of administrative costs for facilities and the WHPHA. Communication enabled HCWs to save lives through phone assisted deliveries of babies and emergency medical evacuations. Their ratings of the CUG phone as a tool is very high and staff equally applaud the introduction of the CUG services into the province, stating that the amount of support they have received through this means of communication has been overwhelming.

However around 32 CUG phones were not contactable, the reasons could not be established but a guess could be arrived at. This shows almost half of the HCWs, including the people they serve, may have missed out on information and assistance. The findings also show some circumstances in which lives were saved by being able to communicate on the mobile. This research could not benefit from the information held by HCWs without communication for the stated reasons. This study also found that most hindrances to communication were often induced by inadequate management of the phones by the WHPHA and staff. Replacement of lost/stolen or malfunctioning phones or those out of contact were not promptly attended to. SIMs from damaged phones were found in OIC's private phones because the chances of malfunctioning phones being replaced quickly were minimal. This often led to information being possibly concentrated only with OICs and not being spread among staff. Some facilities (three) claimed to be without phones although they were listed as having been issued with them. Claims of this and other issues relating to the upkeep of phones reported by

respondents were yet to be acted on by the WHPHA. These findings show that with appropriate management of the CUG phones the flow of information among health workers and the delivery of services would have been fully realised as intended.

12. 2: Limitations

Like any other study, this research had its limitations. Key among them was the limited time for data collection which also clashed with the Papua New Guinea national election schedule. Hence interviews with some HCWs were not possible because they had left the health facilities to vote. The elections also impacted on earlier transport arrangements with a hire car company. All vehicles had been taken out and there was no way of getting cheap vehicles for the research. The vehicle eventually hired was at double the budgeted cost thus reducing the available time to collect data. A major setback was the unresponsive or non-existent phone, or the plain old silent phone. This resulted in the total number of interviews being reduced to only half the initial number planned on. This factor was seen to be a major setback. Being new to the province, it was risky for the researcher to travel into localities without health workers' knowing about the visits or the researcher getting advance information about road conditions into certain areas. Failed communication between researcher and potential interviewees for unforeseen reasons meant a smaller number of interviews. One can only assume that experiences of health workers that were not interviewed are not much different to health workers that were interviewed.

Lack of financial resources also hindered the extent of the research because some facilities could only be reached by air and the lack of communication between workers in these facilities and the researcher did not help at all. While it may be argued that not many facilities in the province were involved, the lack of communication between them and the researcher speaks for itself and the findings clearly illustrate how the CUG phone is used among health staff. The lack of contact greatly affected the research because even phone interviews could not be done with some HCWs. Another limitation was the lack of cooperation from hospital staff who failed to return questionnaires on time, resulting in the vehicle hire being extended and incurring additional costs. Finally, it should be noted that this study was not done to inform policy although it may have that potential.

12.3: Suggested recommendations

This research is the first since the WHPHA initiated the CUG concept in WHP in late 2011. Based on the findings various recommendations will be made to provide alternate views that can hopefully bolster and enhance the use of mobile technology within the WHP health sector. Suggestions from respondents during data collection are also incorporated considering their relevance as portrayed by people using the system. This is to contribute positively to the greater impact of mobile technology use in health service delivery.

- ❖ There is a need for consultation based on bottom up planning and taking on an approach that should not be seen as one size fits all. Staff in very remote areas should be issued phones and accessories according to their needs.
- ❖ Prudent management and discharging of policies safeguarding the use and upkeep of a robust mobile communication network among HCWs that should only be interrupted by external factors rather than internal.
- ❖ Recommendations from the June WHPHA provincial review meeting concerning use of CUG phones should be implemented as soon as possible. These recommendations portray the strengths and weaknesses of the CUG service and highlight areas to be improved to enhance and ensure health facilities are not victimised by poor management. Otherwise this initiative is in danger of terminating.
- ❖ Delegate management of the CUG phones to a full time officer. The hospital IT specialist may be a potential candidate because technology falls in his/her line of duty. This officer can then report to the present SMO tasked to manage CUG phones.
- ❖ Mobile communication applications such as Frontline SMS which is free can also be trialled district by district, but importantly the current phones must be managed properly to ensure full benefits are derived before embarking on using mobile applications.
- ❖ Given that mobile technology and communication is the best possible medium for the flow of information among HCWs, the CUG services should be assessed and improved so that the communication process is enhanced.

12.4: Recommended further research

- This research looked only at how the flow of information through mobile communication can be beneficial to the different levels of health care service provision in the province. Therefore there is a need for further research that can include beneficiaries of the service, including the patients whose lives were saved through use of mobiles.
- Further research can also involve HCWs to get a glimpse of the extent of skills improvement and implementation resulting from communication.
- Research could also be done to look at the type of information that is most often sought by rural health workers.
- Since this is the first research looking at a public sector organisation in Papua New Guinea using the CUG service it would be good to consider other public sector organisations using mobiles and to study their results.
- Look at other private or public organisations using the CUG service and see how they have fared with use of mobiles.

12.5: Summary

This research finds that the initiative by the WHPHA is timely when health resources including human resources are shrinking in PNG. The CUG service being a new initiative provides the need for the experiences, strengths and weaknesses to be recorded in empirical research as a basis for future research or to strengthen the services, building on the strengths and weaknesses identified. It shows that mobile devices can be used to deliver services where required and is not limited to health but other sectors as well. Such research is necessary to put emphasis on community needs which is important in a developing country. Since ICTs, particularly mobile technology can be mobilised and shaped in ways that can help in the development and progress of a country, the approaches taken by WHPHA and IHI to harness the potential of mobile technology can be a step towards its widespread and general application in PNG. This research should be seen as a means of providing organisations and the interested public with information and ideas on how better services can be delivered or attained by tapping into available technology. The findings suggest possible lines of successful intervention and lessons for the design of successful initiatives that are well thought out and are sustainable for the long haul. Hence it requires a holistic approach from all sectors putting in the necessary support for mobile use to be the next stage for effective delivery of essential services.

Collaborative effort, commitment and support are required from the people, the organisations, and the Government. At the governmental level and in the private sector, technological skills need to be taught and the educational opportunities need to be provided. The Education Department must be willing to accept and adopt a new curriculum and give approval for mobile technology to be taught as new strands in higher learning institutions. Private telecommunication companies and ISPs must be willing to provide the required support to ensure the full potential of mobile technology is appropriately tapped into. The use of mobile technology in healthcare settings can potentially deliver important benefits because it has the ability to provide and improve access to information resources and provides the platform for essential communication.

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Appendices

Appendix 1: Mobile numbers for facilities, District Health Officers, Specialist Medical Officers and Executive Management Team

1		Kudjip Hospital	73035274	1	Hagen	Mt Hagen Hospital	7100045
2		Kindeng	71444231	2		Kagamuga	73989559
3		Minj	73939296	3		Rebiamul	73982478
4	Anglimp	Sigmil	71691927	4		Bagl	71668451
5	South	Kolmel	73942497	5		Tengtenga	73873344
6	Wahgi	Tombil	72563856	6		DHO	73859464
7		Kurki	72018933	1		Tinsley Hospital	71726310
8		Pogla	72264474	2		Bukapena	72070303
9		Mt Au	72485300	3		Paglum	72517125
10		Madan	72053043	4		Trogla	72138882
11		Aviamp	72596530	5		Lumusa	
12		Ketepam	71726419	6	Mul	Kyanmanda	
13		DHO	73957155	7		Pinapaisa	
1		Kimil	73888384	8		Mamusi	
2		Nondugl	73989301	9		Kuruk	71286452
3	North	Norba	73543380	10		Kumdi	73305310
4	Wahgi	Dona	73505917	11		Simbumale	71156210
5		Banz	73077419	12		DHO	71595220
6		CLTC	73498285	1		Tambul	73045059
7		Fatima	71619005	2		Togoba	73157615
8		DHO	73880623	3		Pabrabuk	72014411
1		Kotna	72457559	4	Tambul	Gia	73003653
2		Nunga	71920233	5	Nebilyer	Piakona	73282763
3		Tiki	73274916	6		Kiripia	73850786
4	Dei	Mitiku	71023834	7		Tomba	73874183
5		Mun	73777459	8		Alkena	73863207
6		Rulna	73092975	9		Koibuga	73811187
7		DHO	73998573	10		DHO	71741952
1		Tabibuga	71494178				
2		Olna	72694474				
3		Koinambe	73761067				
4		Kumbants	73465494				
5		Amblua	73931101				
6	Jimi	Tsendiap	73021237				
7		Kol	73016510				
8		Togban	73011312				
9		Waramanz	72958852				
10		DHO	73887866				

WHPHA Management Team		Specialist Medical Officers	
Dr James Kintwa	71000455	Dr MagdalynKaupa	71000461
Dr Michael Dokup	71000456	Deputy Chief Paediatrician	
A/Director-Curative Health		Dr Wesong Boko	71000462
Philip Talpa	72620210/	Deputy Chief Physician	
A/Director for Public Health	71765523	Dr Ben Yapo	71000460
		Deputy Chief Surgeon & Paediatric Surgeon	
Samuel Yamu	71000457	Dr JacinthaGoswami	72621812
A/Director Corporate services		Deputy Chief Anaesthetist	
Dr GuapoKiagi	72621940	Dr Jacob Painui	71000459
A/Deputy Director-Medical Services		General and Orthopaedic Surgeon	
Sr Roselyn Kali	71000458	Dr Timmy Tingnee	71000464
A/Deputy Director Nursing Services		General and Urological Surgeon	
Benson Safi	72146879	Dr Sam Endikan	72583122
Deputy Director		ENT Surgeon	
Freda Pyanyo	72997679	Dr KipaBinga	71088735
Deputy Director		Physican	
		Dr Kaima	72104943
		Regional medical Officer	
		Dr GuboreUrae	73518538
		Physician	
		Dr Benny Kombuk	72620226
		Obstetrician & Gynaecologist	
		Dr George Jacob	72620199
		Ophthalmologist	

Appendix 2: Staff information by district

District	Gender	Experience in years	Qualification	Province of origin	Comments
Dei	M	20-24	Diploma Community Health	WHP	
	M	9-12	Certificate in Nursing	Chimbu	
	M	5-8	CHW	WHP	
	M	17-19	Bachelor in Nursing	EHP	
	M	9-12	CHW	WHP	
Mul/Baiyer	F	17-19	Bachelor in Nursing	Jiwaka	
	M	13-16	Master of Psychology	ARB	
	M	13-16	Certificate in Nursing	Jiwaka	
South Wahgi	M	37	Bachelor in Nursing	Jiwaka	
	M	17-19	Diploma in Health Extension	EHP	
	M	9-12	CHW	Jiwaka	
	F	37	Certificate in Nursing	WHP	
	M	5-8	Diploma in Health Extension	EHP	
	F	28	CHW	Jiwaka	
	M	9-12	Doctor	USA	
	M	37	Diploma in Health Extension	Jiwaka	
Jimi	M	5-8	Certificate in Nursing	Jiwaka	
	M	3	Diploma in Nursing	WHP	
	M	5-8	Diploma in Health Extension	Jiwaka	
	M	13-16	Diploma in Health Extension	Jiwaka	
	F	9-12	Diploma in Health Extension	WHP	
	M	20-24	CHW	WHP	
	F	20-24	Certificate in	Milne Bay	

Tambil/Nebilyer	M	20-24	Nursing Diploma in Public Health	Chimbu
	M	5-8	Diploma in Nursing	WHP
	F	17-19	Bachelor in Nursing	WHP
Hagen Central	M	9-12	Certificate in Nursing	Jiwaka
	F	5-8	Diploma in Public Health	Milne Bay
	M	9-12	Grade ten	Morobe
	M	20-24	Diploma in Public Health	EHP
	M	20-24	Diploma in Community Health	WHP
	F	20-24	Certificate in Nursing	Madang
	M	17-19	Diploma in Urology	WHP
	M	17-19	Nursing certificate	SHP
	M	30+	Anaesthetic Officer	Enga
	F	13-16	M.Med	Chimbu
North Wahgi	F	20-24	CHW	ENB
	F	17-19	Certificate in Nursing	Chimbu
	M	20-24	Bachelor in Nursing-Midwifery	EHP
	M	30+	Diploma in Health Extension	Jiwaka
	M	20-24	Clerk	Jiwaka
	F	1-4	Diploma in Nursing	Jiwaka

Appendix 3: Interview types

Qualification	Male	Female	Method		
			Personal Interview	Phone Interview	Self administered
Nursing Officers	8	8	15	1	
Health Extension Officers	6	1	3	4	
Community Health workers (CHW)	4	2	6		
Public Health Specialist	2	1	3		
Community Health Specialist	2		2		
Medical Officers (MO)	2	1	1		2
Urologist (SMO)	1				1
Anaesthetic Scientific Officer	1				1
Nursing Diploma	1			1	
Support staff/Clerk	2				2
Total	29	13	30	6	6
Per cent			71	14.5	14.5

Table 3: Staff experience by years

	Years worked							
	1-4	5-8	9-12	13-16	17-19	20-24	25	30+
Staff by Districts								
Hagen Central		1	2	1	2	3		1
Tambul/Nebilyer		1	2			3		
Dei		1	2		1	1		
North Wahgi	1				1	3		1
Jimi	1	2		1				
Mul				2	1			
South Wahgi		1	2		1		1	3
Total Staff = 42	2	6	8	4	6	10	1	5

Appendix 4: WHP health body gets mobile phones to aid rural areas

Source: The National, Friday 30th December 2011

WESTERN Highlands health authorities received K10, 000 worth of closed-user-group Digicel mobile phones for a monthly K6,000 service fee.

Rural health officers in the province received the phones to stay in contact with the Mt Hagen Provincial Hospital and other health centres in the province.

The timely help allows health officers from the seven districts in the province to communicate on treatment of patients.

Provincial health services chief executive officer James Kintwa said the CUG Digicel phones brought relief to

health officers and made life safer for many patients.

He said communications had been neglected in the delivery of basic health services and many patients lost their lives as a result.

He said the communication network had been cut off to many parts of the province, making it difficult to diagnose and treat sick people.

He said that rural and urban health had joined in order to eradicate the sickness in the province and the mobile phone communication was a relief for the people.

“The Mt. Hagen Provincial Hospital is very crowded because of the lack of medical advice health centres get from the doctors because we have only a few doctors serving at the general hospitals,” he said.

“The use of these phones will make it easier for health officers to call the doctors and get advice rather than transporting patients to general hospitals.

“The people have their right to receive health services.”

Dei district health officer Saiglon Wimp said this was “a blessing” for them.

Wimp said: “We have been serving patients in the darkness because we don’t have any tool to communicate each other.”

Appendix 5: Digicel call rates 2012

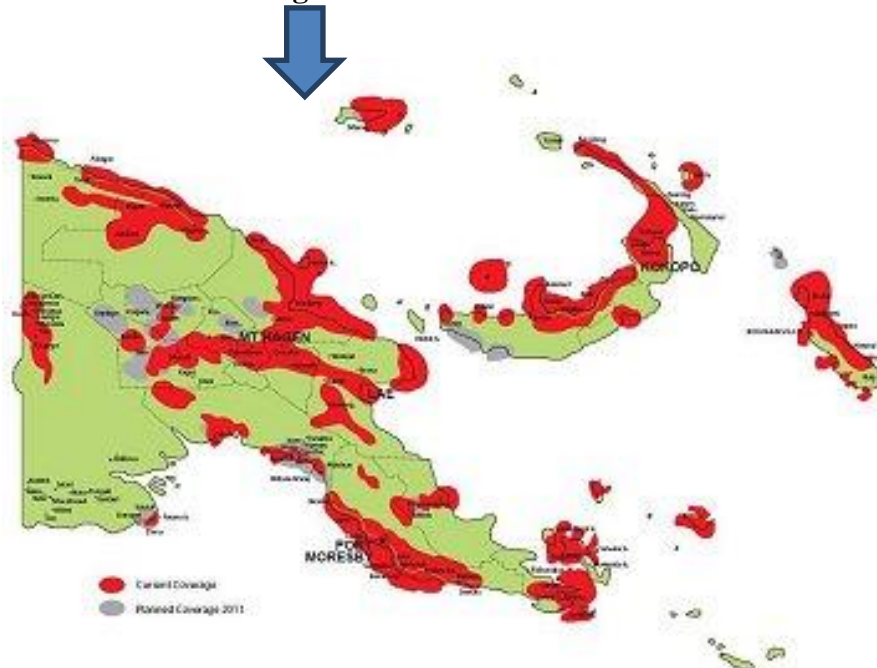
Prepaid Domestic Voice Call Rates

	1st Minute	2nd Minute on the same call	3rd to 15th Minutes on the same call
Peak rates*			
➔ Digicel to Digicel	0.99	0.39	zero
Digicel to Bemobile	1.38	0.54	zero
Digicel to Citifon	1.38	0.54	zero
Digicel to Telikom Fixed Lines	1.38	1.38	1.38
Digicel to Telikom Fixed Wireless (Xcess)	1.38	1.38	1.38
Off Peak rates*			
➔ Digicel to Digicel	0.49	0.39	zero
Digicel to Bemobile	0.68	0.54	zero
Digicel to Citifon	0.68	0.54	zero
Digicel to Telikom Fixed Lines	0.68	0.68	0.68
Digicel to Telikom Fixed Wireless (Xcess)	0.68	0.68	0.68

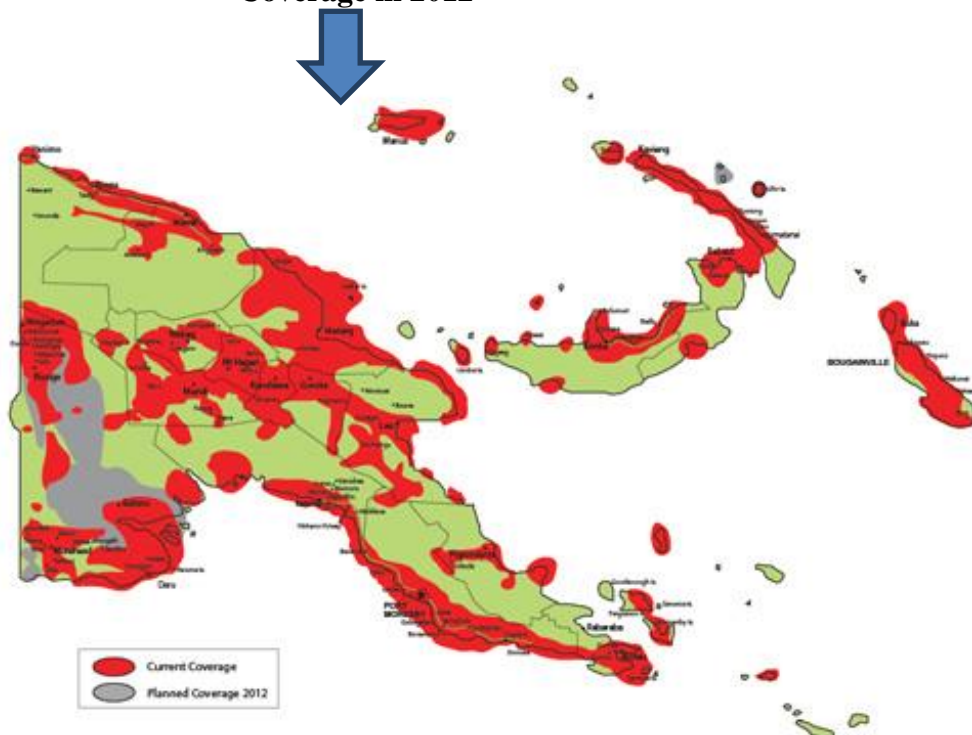
The new rates are effective as of 15th December, 2012.

Appendix 6: Digicel coverage map of Papua New Guinea

Coverage in 2009



Coverage in 2012



Source: http://www.digicelpng.com/en/coverage_roaming/coverage-map

Appendix 7: CUG internal survey WHPHA document

	Strategy	Action Officer	Deadline
	designed to cater for all future SIA. ➤ SIA Review should be conducted at the end of all SIA	"	
Most officers in-charge were not informed of the Review Meeting till a day earlier	➤ Notice of the meeting should be circulated two weeks in advance to all DHOs, OIC, and Church Health Secretaries ➤ District review is to be held prior to the Provincial Review meeting		
Jiwaka has become a province of its own	Any visit to Jiwaka province will be regarded as going into another province, so affecting the travel allowances. This will be so after the Health Function is transferred to Jiwaka provincial administration.		

UG (Closed User Group) PHONE SURVEY 2012

This survey was conducted during the Review Meeting held with all participants receiving questionnaires. Below is a compilation of the findings noted, as per question asked.

Are you using a CUG phone?

Officer's Title	Those who have CUG phone	Those who don't have CUG phone
a) Program Manager	1	5
b) DHO	7	0
c) Church Health Secretaries	2	5
d) OIC	25	3
e) District Health Promoter	0	5
f) District EHO	0	1

What are the things that have improved because of the presence of the CUG phone?

- Able to call PHO for administration issues
- Able to communicate with other health facilities and the DHOs
- Able to talk to doctors and specialists from the hospital

- d) Able to notify hospital of our referrals
- e) Two-way communication is established
- f) It saves time and money to address certain issues with the PHO admin or the hospital
- g) Emergencies are easily communicated from remote areas to relevant authorities
- h) It reduces unnecessary referrals

3. What problems have you encountered in communicating through the CUG phones?

- a) The phone is misused
- b) Easily damaged
- c) Charger is not working
- d) At times, people at the other end do not answer the phone
- e) Poor network coverage
- f) Difficulty charging the batteries as no power supply is readily available for free
- g) The type of phone used does not work at times
- h) Found it hard to replace CUG card when the phone is lost or stolen
- i) Keys on the phone are not working properly
- j) Unit runs out and I top-up using my own money
- k) Some are not using the CUG phones as they have their own phone
- l) Some PHO officer are not using their CUG phones

4. What improvements you need to see regarding this CUG phone?

- a) There should be power back up to charge the freely at the centre such as solar power, etc.
- b) Be better to issue dual-SIM CUG phones to cater for our own personal phones.
- c) Appoint an officers to manage CUG phone management
- d) Hospital receptionists need to be train to handle CUG phone calls
- e) All phones is the property of the health facility and the OIC is in charge of the management of the CUG phone
- f) All CUG phones to be kept in a place where it is accessible to all staff on duty
- g) All CUG phone numbers to be made known to all CUG phone users

5. Do you have any other comments regarding the CUG phones not related to the above question?

- a) We need a reliable CUG phone that does not malfunction to often
- b) I do not have a CUG phone for my health facility and I need one
- c) Install a permanent communication link with reliable power supply
- d) Be good to have ward rounds by doctors once or twice per week
- e) All district managers (DHOs, OICs, Health Secretaries, DHPO, DEHO, drivers) should have a CUG phone
- f) CUG phones to be given to all Program Managers and the PHI Officer and the AMS Management
- g) Prompt reporting of stolen or lost CUG phone to discourage misuse of unit (funds)

Appendix 8: Pictures of some health facilities in WHP



Ambulance at Mitiku health centre



Nunga Health centre



Dona health centre, North Wahgi



Kindeng health centre, South Wahgi



Health centre notice board displaying the CUG phone number to enable patients to call officer on call



Milep health centre, North Wahgi

Appendix 9: Research related pictures



Remote mobile communication towers in Papua New Guinea erected by Digicel mobile communication company in Tambul, Western Highlands province (*right*) and Daulo Pass Eastern Highlands province (*left*).



Crossing Kagul River bridge in the Upper Kagul area of Tambul/Nebilyer district, WHP.



A rural health facility visited during research in North Wahgi district, WHP.



Research dates coincided with the National elections in Papua New Guinea, particularly in Western Highlands province. Ballot boxes being sorted out at Minj police station (*left*) and defence personnel (*right*) waiting to move out to polling stations.



WEEKLY NEWS HIGHLIGHTS FROM THE HIGHLANDS REGION The National - Wednesday, May 30, 2012

Bleeding mum walked for two days before airlifted

By JAMES APA GUMUNO

A WOMAN in a remote Jiwaka district who had complications while giving birth is recovering at the Mt Hagen Provincial Hospital after various authorities pitched in to help her.

Susan Moses, 28, from Togban village in Lower Jimi, can thank quick-thinking health workers, the Missionary Aviation Fellowship, Digicel PNG and the Western Highlands provincial health authority for saving her life.

Moses developed complications after giving birth to her fifth child around 3.30am on May 20 at the Togban health centre.

Nurse-in-charge Allan Karu tried to help her but realised Moses needed to be taken to a hospital.

Nine schools in Jiwaka to receive K190,000

NINE schools in Jiwaka province have received K190,000 as school fee subsidies.

He then called the Mt Hagen Provincial Hospital for immediate help, using the closed-user-group Digicel mobile phone powered by solar energy.

Missionary Aviation Fellowship responded immediately and diverted a flight from Goroka. Moses was airlifted to Mt Hagen last Wednesday afternoon and admitted at the Mt Hagen hospital where she is now recovering.

Karu said Moses was losing a lot of blood and was fast becoming weak and had to be quickly evacuated to save her life.

Mt Hagen hospital acting director medical services Dr Guapo Kiagi was in constant contact with Karu, advising him on what to do, using the mobile communication.

He and acting director public

health Philip Talpa organised a possible medicare because vehicles could not reach the area.

The authority's chief executive officer, Dr James Kintwa, gave Talpa and Kiagi the green light to evacuate Moses.

They tried helicopter companies but they were all busy. They told Karu to organise for Moses to be carried on a stretcher as far as they could go. But the vehicle sent to meet them had to return because of the bad road conditions in Jimi district.

He said after a six-hour walk, they arrived at the Kwima aid post to overnight.

With the help of IV fluid to keep Moses going, they walked for another six hours to catch a vehicle to the Koinambe airstrip.

They again spent the night

there before being airlifted to Mt Hagen the next day.

Karu's wife, Jacklyn, who is also a nurse at Togban Health Centre, assisted her husband to administer the fluids and other help on their long journey to Mt Hagen.

Kintwa thanked the brave couple and the health team in ensuring that the patient was cared for at all times during the long journey.

He also thanked Digicel PNG for its wide mobile coverage of the remote areas of the country enabling easy communication between doctors and nurses.

He also thanked the MAF for agreeing to divert its flight from Goroka to Mt Hagen to pick up Moses at Koinambe.

He said health was everybody's business.

Women living with HIV/AIDS selling handicrafts abroad

WOMEN living with HIV/AIDS are earning their living

Govt urged to declare state of emergency in SHP

A LLG president has urged the government to declare a state of emergency in Southern Highlands province.

Ailo Arapa, council president for the Awi-Pori LLG and chairman of community development in the provincial assembly, said the province was in chaos and needed immediate intervention from the government.

He claimed that differences between politicians in the province had let the province and the people down.

Arapa, claiming to speak on behalf of the other 32 council presidents in Hela and Southern Highlands, said the

people wanted a permanent provincial administrator appointed.

He said public servants in the province were slack with some never turning up to work.

Often when he went to the provincial headquarters building in Agiru Centre, he saw many offices locked. He did not know where the public servants were.

He said many other people who went to see public servants were turned back.

Arapa said to make matters worse, casuals employed at the Agiru centre had not received their fortnightly wages this year.

LATE REV. STEPHEN KUSO SIDDY
14/07/1946 - 28/05/2012

This is to inform relatives, wantoks and friends of Late Rev. Stephen Kuso Siddy who passed away on the 28th of May 2012 at the Port Moresby General Hospital.



Woman in childbirth saved by united effort

P/C 31/05/12

By MANGA BENGI and PETER KORUGL

THIRTY-eight long years and mothers continue to die from childbirth complications in rural areas of Papua New Guinea.

Their ordeal was highlighted recently by a young mother who could have died if help had not gone to her in the nick of time.

The young mother from the remote Jimi District of Jiwaka Province has miraculously survived a life-threatening situation following the delivery of her newborn baby.

Here is rescue operations as a result of different partners working together to improve and sustain health service delivery into rural areas of the country.

Susan Moses, aged 28, from Togban village in the Lower Jimi area had retained placenta after giving birth to her fifth child at 3.30am on Sunday, May 20, 2012.

The nurse-in-charge of Togban Health Centre Allan Karu attended to her immediately and tried to remove the placenta by following all protocols of O&G (obstetrics and gynaecology) management procedure but without success.

He then called Mt Hagen General Hospital for immediate help, using the closed user group (CUG) digicel mobile phone, powered by solar energy.

With quick response from third level airline, MAF (Missionary Aviation Fellowship) which diverted a flight from Goroka to Mt Hagen, the young mother was airlifted to Mt Hagen on Wednesday afternoon and admitted to Mt Hagen Hospital where she is now recovering.

"She was losing a lot of blood and was fast becoming weak. I was worried that if she remained in the same condition for an extended period of time, she

may lose her life," Mr Karu said.

Mt Hagen Hospital's acting director Medical Services Dr Guapo Klagi was in constant contact with Mr Karu, advising him on what to do in such a situation, through the health services CUG mobile communication while he and acting director Public Health Philip Talpa organised for possible medivac as the road to the area was impassable by vehicles.

On Monday morning, with the approval of the WHPHA Chief Executive Officer Dr James Kintwa, Mr Talpa and Dr Klagi sought assistance from helicopter companies to medivac the woman to Mt Hagen but without success as all helicopters had been hired out.

With not much hope of getting her out quickly, Mr Karu was advised to organise for the woman to be carried on a stretcher to as far as they could go where a vehicle might meet them on the way. A WHPHA vehicle sent to Togban had to return half way due to the bad conditions in the Jimi District.

The vehicle arrived at Kwima Aidpost, a six-hour walk from Togban and stayed overnight. The patient was weak and still losing blood but an IV fluid that she was put on helped her and the next day they had to walk for another six-seven hours before catching a vehicle to the nearest airstrip at Koinambe where they slept again before catching the flight to Mt Hagen.

Mr Karu said an additional IV fluid he found at Kwima Aidpost added more hope for the patient's survival and he was pleased that at Koinambe, with the help of this fluid, she managed to eat some noodles and opened her eyes and talked and smiled.

Mr Karu's wife Jacklyn who is also a nurse at Togban Health Centre helped administer the fluids.

Appendix 12: AUTECH research ethics approval letter



MEMORANDUM

Auckland University of Technology Ethics Committee (AUTECH)

To: David Robie
From: **Dr Rosemary Godbold** Executive Secretary, AUTECH
Date: 29 May 2012
Subject: Ethics Application Number 12/106 **Mobile phones in rural Papua New Guinea: A transformation in health communication and delivery services.**

Dear David

Thank you for providing written evidence as requested. I am pleased to advise that it satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTECH) at their meeting on 14 May 2012 and I have approved your ethics application. This delegated approval is made in accordance with section 5.3.2.3 of AUTECH's *Applying for Ethics Approval: Guidelines and Procedures* and is subject to endorsement at AUTECH's meeting on 11 June 2012.

Your ethics application is approved for a period of three years until 28 May 2015.

I advise that as part of the ethics approval process, you are required to submit the following to AUTECH:

- A brief annual progress report using form EA2, which is available online through <http://www.aut.ac.nz/research/research-ethics/ethics>. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 28 May 2015;
- A brief report on the status of the project using form EA3, which is available online through <http://www.aut.ac.nz/research/research-ethics/ethics>. This report is to be submitted either when the approval expires on 28 May 2015 or on completion of the project, whichever comes sooner;

It is a condition of approval that AUTECH is notified of any adverse events or if the research does not commence. AUTECH approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are reminded that, as applicant, you are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

Please note that AUTECH grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to make the arrangements necessary to obtain this. Also, if your research is undertaken within a jurisdiction outside New Zealand, you will need to make the arrangements necessary to meet the legal and ethical requirements that apply within that jurisdiction.

To enable us to provide you with efficient service, we ask that you use the application number and study title in all written and verbal correspondence with us. Should you have any further enquiries regarding this matter, you are welcome to contact me by email at ethics@aut.ac.nz or by telephone on 921 9999 at extension 6902. Alternatively you may contact your AUTECH Faculty Representative (a list with contact details may be found in the Ethics Knowledge Base at <http://www.aut.ac.nz/research/research-ethics/ethics>).

On behalf of AUTECH and myself, I wish you success with your research and look forward to reading about it in your reports.

Yours sincerely

Dr Rosemary Godbold
Executive Secretary
Auckland University of Technology Ethics Committee
Cc: Henry Yamo hyaleah@gmail.com

Appendix 13: Types of CUG phones found in WHP health facilities



SMOs and some management staff were issued BlackBerry mobile phones.



Almost all health centres were issued basic ALCATEL mobile phones.



Health Centres with access to 24 hour electricity were issued fixed wireless handsets which are portable and convenient than the fixed landline phones.

¹“Administer IV fluid on the patient, do not disturb, give some spectrum anti-biotic to stabilise the infection and control infection until evacuation can be done.”(Kiagi, 2012)

²A “breech position” is when a baby is not in a normal head down position for birth in a woman’s uterus, thus posing delivery difficulties during birth (*Breech position and breech birth* n.d). Babies in breech position usually must be delivered by C-section. This is a surgical delivery of an infant through an incision in the mother's abdomen and uterus (Healthstaff Wise, 2010).