

**The prospect of implementing  
a community based home telehealth service for  
chronic care intervention**

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**A Thesis submitted in partial fulfillment  
of the requirements for the degree  
of Master of Health Sciences**

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## **Dedication**

This thesis is dedicated to all the nurses in the Canterbury region. Thank you for being our everyday local heroes through rain, earthquakes, power cuts, snow or sun.

This thesis is also dedicated to Grandpa Kim Bong Sup. You made me wonder so many times during this project if you could have still stayed with us, if I had known what I have come to learn from this research so much earlier on. May you rest in peace.

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## **Abstract**

Worldwide, the numbers of people living with chronic conditions are rapidly on the rise. Chronic illnesses are enduring and often cannot be cured, requiring a strategy for long term management and intervention to prevent further exacerbation. Globally, there has been an increase in interventions using telecommunications technologies to aid patients in their home setting to manage chronic illnesses. Such interventions have often been delivered by nurses. The purpose of this research was to assess whether a particular intervention that had been successfully implemented in the United Kingdom could also be implemented in Canterbury. In particular, this research assessed the perspectives of Canterbury based practice nurses and district nurses. The findings suggest that a majority of both district and practice nurses did not view the service as compatible with their current work situation. Existing workload and concerns over funding of the proposed service were identified as potential barriers. However, the service was perceived as potentially beneficial for some, with the elderly based in rural areas, or patients with chronic mental health needs identified as more likely to benefit than others. Practice nurses expressed strong views on who should deliver such services. Given that it was identified that practice nurses already have in-depth knowledge of their patients' health, while valuing the strong relationships established with their communities, it was suggested that patients would most benefit from locally based nurses to deliver any community based health services in the future. It was also found that teletriaging is currently widely used by practice nurses across Canterbury to meet a range of health needs, including chronic mental health needs. This suggests that the scope of teletriaging in community health and its potential and full implications are currently not well understood in New Zealand. Significant events, such as the Christchurch earthquakes indicate the potential role of teletriaging in addressing mental health issues, thereby reducing the chronic health burden in the community.

## **CHAPTER ONE: Introduction**

### **1.1 Background**

Around the world, the numbers of people living with chronic conditions are rapidly on the rise (World Health Organization, 2002). Predicted to account for 60 percent of the global health burden by 2020, chronic diseases such as diabetes mellitus, chronic obstructive pulmonary disease (COPD), cardiovascular diseases and related conditions have now become a significant health burden for many countries (World Health Organization, 2002, pp. 13-14).

Historically, infectious diseases and acute health problems have been the chief concern for health care sectors worldwide (World Health Organization, 2002, p. 29). For this reason, the present health system has come to focus on meeting acute health needs. Testing, diagnosing, and expecting cure for example, have now become hallmarks of the contemporary health care system. Over the last century however, a rapid development of medical sciences and public health has limited the impact of infectious and acute health needs across developed countries. Instead, all regions of the world are expected to experience a predominant shift from acute health needs to chronic health needs (World Health Organization, 2002). Although the timing of such change is predicted to differ across countries, developed countries (World Health Organization, 2002, p. 14) are seen as already experiencing this shift.

While there will always be a need for acute health treatments, health systems across most developed countries now face a need to respond differently to the growing chronic health problems. Chronic illnesses are enduring and often cannot be cured (Wagner et al., 2001), necessitating a strategy that extends beyond the acute care model. A strategy that has

particularly been proposed by the World Health Organization (WHO), is the Innovative Care for Chronic Conditions (ICCC) framework (World Health Organization, 2002, p. 42).

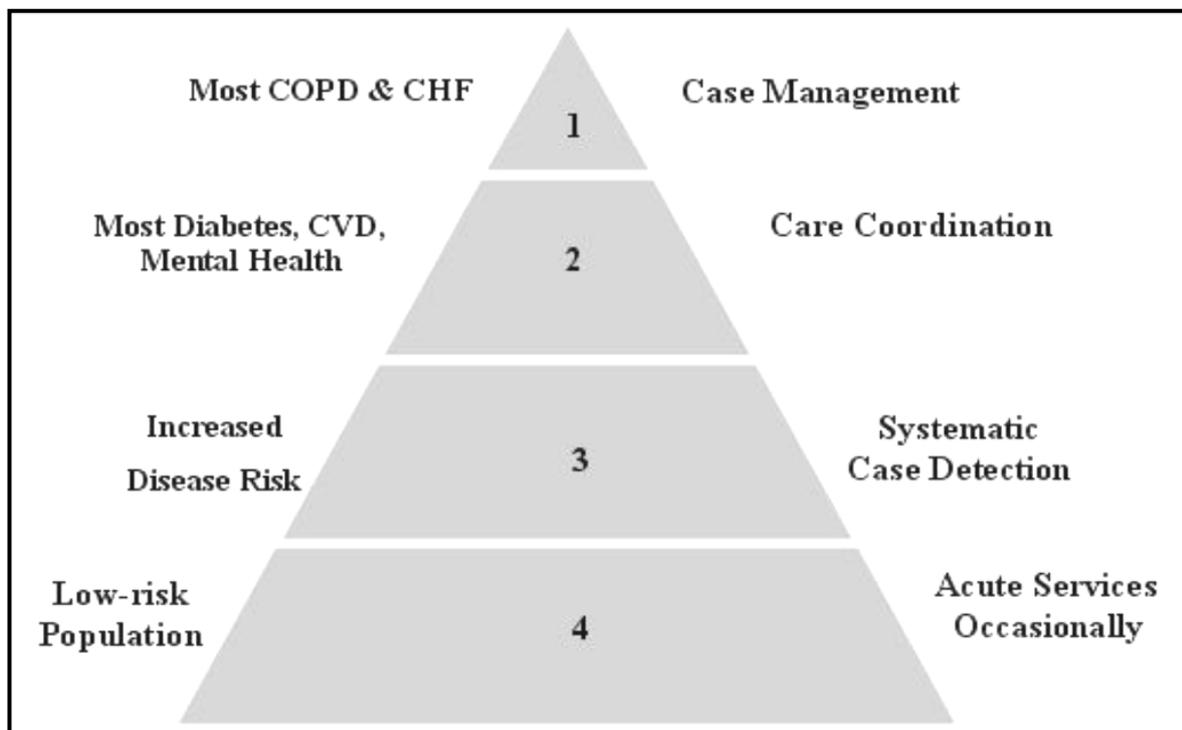
## **1.2 Changing health care environments**

### **1.2.1 Managing chronic conditions**

The ICCC framework (World Health Organization, 2002) is an expansion of the chronic care model (Wagner, 2000) that was adapted to focus more on the community aspects of chronic care intervention and management. In the ICCC framework, the health system is grouped into three levels: micro (patients), meso (community and healthcare organisations), macro (policy) (World Health Organization, 2002, p. 45). At the core of this framework is the micro level, consisting of patients, community partners, and the local healthcare teams (Appendix 1). The framework suggests that positive outcomes for chronically ill patients can be achieved, only when patients are supported and motivated by the health care teams and the broader community partners to make informed behavioural changes in their daily lifestyle (Singh & Ham, 2006, p. 9). In the framework, the micro level of the health system is also seen as impacted by the broader policy environment. Essential elements of the policy environment include supporting legislative frameworks; advocacy; strengthening partnership with stakeholders at meso and micro levels. The framework sees communication and collaboration across all three levels of the health system as vital for meeting the growing prevalence of chronic conditions (World Health Organization, 2002, p. 30).

The ICC framework has been further adjusted and adopted by local and national health policy makers worldwide (Singh & Ham, 2006). One of such adaptations has been presented by Rea et al (2007) in New Zealand (Figure 1.1). In this specific adaptation, chronic care management is seen as an integrated form of care, encompassing preventive care, and support

in the home for patients with chronic conditions (Rea et al., 2007, p. 2). In particular, it has been suggested that chronic care management services can be most effective when targeted to patients at earlier stages of their conditions (Rea, et al., 2007, p. 4). It has also been suggested that when such services are delivered to people at earlier stages of their chronic conditions and are at an increased risk of developing further complications; these services may aid prevention of further exacerbation by aiding the patients to better understand and manage their conditions (Rea, et al., 2007). As for how such services may be delivered, telemonitoring services that are nurse-led (Rea, et al., 2007, p. 3) have been identified as a possible strategy.



**Figure 1.1** *Appropriate service delivery strategy depending on the risk and complexity* (Rea, et al., 2007, p. 4)

### 1.2.2 Telehealth technology

Telecommunications technology has been rapidly changing the field of health care delivery around the world (Campbell, Harris, & Hodge, 2001; Hu, Chau, Sheng, & Tam, 1999;

Patterson & Botchway, 1998). With the range of technological tools that are readily accessible becoming increasingly diversified, the application of technological tools in the field of health care has also become diversified. From clinical services, epidemiology, health education, to chronic care management, the applications of telecommunications technological tools have come to permeate throughout the wider health sector. Globally, there has been an increase in the use of technologies for the purpose of chronic care worldwide (Johnston, Wheeler, & Deuser, 1997). In particular, such technology based services have been particularly useful for increasing the frequencies of patient-health professional interactions for the rural based communities and individuals with mobility issues (Dillon, Loermans, Davis, & Xu, 2005; Enguidanos et al., 2003) while also being cost and time effective (Johnston, Weeler, Deuser, & Sousa, 2000). International studies show that community based nurses have been the key providers of such technology based interventions (Jönsson & Willman, 2009).

### **1.3 The New Zealand context**

New Zealand is a country with a growing population of approximately four million people. The main ethnic groups in New Zealand are European (67.6%), Maori (14.6%), Pacific Islanders (6.9%) and Asian (9.2%) (Statistics New Zealand, 2006b, 2006c). These figures do not sum to totals, as people may choose to identify with more than one ethnic group (Statistics New Zealand, 2006a). New Zealanders are now largely urban dwellers, with about 22 percent of the total population residing in a rural setting (National Health Committee, 2010, p. 53). The New Zealand population is ageing rapidly. Currently, 12 percent of the New Zealand population is 65 years or older and this figure is expected to double by 2030 (Booth, Miller, & Mor, 2008, p. 39). The national life expectancy is also increasing steadily, with the average of 81.9 years for females and 77.9 years for males (Ministry of Health,

2007). It is currently expected that there will be an increased demand placed on the health services sector to meet the on-going health needs of the ageing population.

At the same time, chronic conditions remain the leading cause of hospitalisation for New Zealanders (National Health Committee, 2005). It has now been estimated that two thirds (Ministry of Health, 2009, p. 2) of New Zealand adults have a long-term condition of some type. Estimated to be costing more than \$100 million per condition annually (Ministry of Health, 2009, p. vii) and accounting for 70% of the national health expenditure (Rea, et al., 2007, p. 1), managing chronic conditions such as the Diabetes Mellitus, Chronic Obstructive Pulmonary Disease (COPD), Cardiovascular Diseases and related conditions is proving to be a both tangibly and intangibly costly burden for New Zealanders.

An important approach to addressing the needs of people with chronic conditions has been the Primary Health Strategy (King, 2001). This has been one of the most important health policy decisions made within the last decade in New Zealand, highlighting the importance of community health. Stemming from the principles of the Alma Ata Declaration in 1978, the Primary Health Care Strategy (King, 2001) was particularly implemented to expand the concept of community based primary health care on a nationwide scale (Barnett, 2009, p. 3). As a result, between 2006 and 2010, the Ministry of Health reported 106 primary health regional projects registered (Ministry of Health, 2008), with the key purpose of these projects focused on improving access to primary health professionals and encouraging communities to engage in healthier life styles by physical and dietary means.

Despite an international rise in the use of telecommunications technologies for chronic care management (Johnston, et al., 2000), New Zealand has not seen such a trend. Among the 106 projects implemented nationwide for the purpose of preventing or managing chronic

conditions, (Ministry of Health, 2008) none saw telecommunication technologies being used as the main mode of communication to deliver the health care services.

#### **1.4 The Canterbury Context**

Canterbury is a geographically dispersed area, with the region including areas from Kekerengu in the North, Rangitata in the South, to Arthurs Pass in the West. The Canterbury region also includes Christchurch City, Selwyn, Ashburton, Kaikoura, Hurunui and Waimakariri (Canterbury District Health Board, 2010, p. 9). Therefore, Canterbury has varying geographical characteristics, ranging from rural areas, semi-rural areas, to a large populated urban city such as Christchurch (Canterbury Clinical Network, 2009; National Health Committee, 2010).

Canterbury has been estimated as having a population of over 500,000, representing approximately 13 percent of the total New Zealand population, with further growth of 17 percent anticipated for over the next decade (Canterbury Clinical Network, 2009). Due to significant earthquakes that took place in Christchurch between 2010 and 2011 there is now some uncertainty about such future patterns of population growth. However, these trends of population growth could still broadly persist. It is likely that the growing population will have a number of implications for the provision of health services in the region. In Canterbury, demand for the local health services has been exceeding the total population growth rate for some time (Canterbury District Health Board, 2009, 2010). Long term conditions, such as those associated with cardiovascular illnesses, respiratory diseases and diabetes remain three of the top five causes of death in the Canterbury region (Canterbury Clinical Network, 2009).

Health behaviours such as a sedentary lifestyle, poor nutrition and obesity are generally accepted as being a significant contributor to poor health outcomes. The annual report for the period of 1 July 2010 to 30 June 2011 by the Canterbury District Health Board suggests that while Canterbarians are less likely to smoke and eat more fruit and vegetables than the national average, Canterbarians are also less likely to exercise than their national counterparts. It has also been found that over 96,000 persons in Canterbury may be obese. This is nearly a quarter of the region's population (Canterbury Clinical Network, 2009, p. 9). The bulk of the hospital admission cases in Canterbury are related to preventable and avoidable lifestyle induced conditions, suggesting that these conditions could have been prevented earlier before exacerbation (Canterbury District Health Board, 2010, p. 16).

Canterbury has a diverse population. Although the proportion of the Maori population is currently lower than the national average, it has been predicted that there will be an increase in this population by 27 percent over the next decade. In the Canterbury region, Pacific peoples comprise 2.2 percent of the population, with 50 percent of the population aged less than 20 years. It has also been found that while less than the national average, 12.5 percent of the total Canterbury population resides in deprived areas associated with inequalities (Canterbury Clinical Network, 2009). It has been found that a significantly higher proportion of Maori and Pacific peoples are living in such areas. People who identify as Asian comprise 6 percent of the regional population. This includes refugees, migrants, and the New Zealand born (Canterbury Clinical Network, 2009, p. 7).

### **1.5 Proposed intervention**

During November 2009, the operations manager from one of the largest community nursing providers in Canterbury visited Birmingham, United Kingdom (UK). The purpose of this visit was to gain more insight into a successful home telehealth programme for patients with

chronic illnesses that was implemented in Birmingham. The Birmingham OwnHealth programme is a telephone based service designed to offer people with chronic conditions such as diabetes and COPD means of support to effectively self-care for their chronic conditions by lifestyle choices. The Birmingham OwnHealth programme involves the patients being first screened by their general practitioners (GP) as most likely to benefit from the service. The patients are then followed up by a trained health professional, such as a nurse to receive telephone based coaching to better manage their chronic conditions. The chronic care management service is personalised for individuals. Since its first implementation in 2006, this region wide, innovative community based home health service has resulted in many positive outcomes. Patients who have been part of the OwnHealth programme has reported statistically significant mean reduction of blood pressure and total cholesterol levels (Birmingham East and North Primary Care Trust, NHS Direct, & Pfizer Health Solutions, 2007, p. 10).

Since the beginning of 2010, numerous meetings have taken place in Christchurch between various community health leaders, allied health professionals from a major community nursing organisation in Christchurch, and the principal researcher. From the meetings, it was suggested that a telephone based chronic care intervention project similar to the OwnHealth project could also be implemented in Canterbury. From the meetings, it was also suggested that the service should be provided to patients recently diagnosed with chronic conditions to prevent further exacerbation of their conditions. From the meetings, practice nurses from general practices throughout the Canterbury region and district nurses employed by a community nursing organisation were identified as potential contenders to provide the proposed service. However, considering that such innovation has not previously been implemented in New Zealand before, it was suggested at these meetings that a study should be carried out to understand the perspectives of potential providers, prior to considering

further development of such a service. International studies also suggest that health services can be most effective when adapted according to the local context (Singh & Ham, 2006).

### **1.6 Significance of the study**

To date, there has not been a study in New Zealand gauging the prospects of implementing a home based telehealth service. Internationally, hundreds of home telehealth projects have already been trialled (Koch, 2006). There also have been reports of telehealth projects with a clinical focus, reported nationwide (Kerr & Norris, 2004). However, a study examining the possibility of implementing a home telehealth service in New Zealand cannot be found.

Furthermore, studies evaluating how the growing prevalence of chronic conditions nationwide may be best addressed at the community level are scarce in New Zealand. As nurses are the primary agents of community health care services in New Zealand, it would be important to understand their perspectives.

### **1.7 Objectives of the study**

The key aim of this thesis will be to assess the prospects of implementing a community based home telehealth service for chronic care intervention in Canterbury. In particular, this prospect will be assessed from the perspectives of two key health professional groups who would be strong contenders to deliver such a service. The two groups are: practice nurses from local GP practices based throughout the Canterbury region; and district nurses from a major community nursing organisation.

The specific objectives will be:

1. To identify the current practices in the prevention and management of chronic conditions by Canterbury based general practices, and any problems faced by these general practices in meeting the needs of their population.
2. To assess the receptiveness of practice nurses from general practices on the possibility of implementing a home telehealth service for chronic diseases management.
3. To understand the receptiveness of district nurses within a large community nursing organisation to the possibility of implementing a home telehealth service for chronic diseases management, and also to assess the future possibilities of using various everyday technologies as part of their everyday work practice.

## **1.8 Overview of the thesis**

This introductory chapter provides the background information relevant to the research project and establishes an understanding of why this line of inquiry was undertaken. Specific study objectives of the research project are also provided.

Chapter Two provides a literature review of past, current and future international trends of home telehealth. The chapter also reviews the past and current state of telehealth in New Zealand and evaluates where New Zealand maybe heading. The chapter also discusses how the role of nurses is evolving in New Zealand and what implications these changes may have for the future of chronic care management.

Chapter Three introduces the research methodology used in this research project. The rationale of using a mixed methods approach for a health services research is discussed. The chapter discusses the research design, data collection methods, data analysis techniques, and the ethical considerations.

Chapter Four presents the findings from the qualitative semi-structured interviews conducted with the practice nurses. The current practices utilised by Canterbury based general practices to prevent and manage chronic conditions are also presented, as are practice nurses' views on both a proposed home telehealth service are presented.

Chapter Five reports results from the survey completed by district nurses from a major community nursing organisation in Canterbury. The district nurses were asked about their perspectives on a specific home telehealth service designed to provide support for people recently diagnosed with chronic conditions. The nurses were also asked about their interest in the future use of various everyday technologies, as part of their everyday nursing practice.

Chapter Six discusses the results from the mixed methods study. The implications of the findings with relevance to the aims of the research project are also discussed. Limitations of the research project are also considered.

Chapter Seven concludes this health services research study and provides a summary of the key findings. Recommendations for future research are also discussed.

## **CHAPTER TWO: Positioning Home Telehealth within chronic care management**

### **2.1 Introduction**

This chapter has three purposes. First, it will critique the past, current and future international trends in home telehealth. While hundreds of home health projects have been trialled internationally, some projects have been more useful than others. This literature review will critique why this is so, and what lessons may be applied to the prospects of implementing a community based home telehealth service in Canterbury, New Zealand. Second, this chapter will evaluate why despite reports of numerous telehealth projects piloted in New Zealand (Kerr & Norris, 2004), telehealth has not been adopted more widely nationwide. It will examine the past and current state of telehealth in New Zealand, evaluate where New Zealand maybe heading, and consider if the proposed home telehealth service should be implemented. Third, this chapter will briefly discuss how the role of nurses has evolved worldwide, including in New Zealand. This chapter will especially focus on the rapid changes that have occurred in the field of primary care nursing, particularly the roles these nurses may be expected to play in the future of chronic care management in New Zealand.

### **2.2 From Telemedicine to Telehealth**

The oldest and most commonly known term when referring to the convergence of telecommunications technology and healthcare, is the term *telemedicine*. First coined during the 1970s (World Health Organization, 2009, p. 246), much dispute still continues over how

this term may be framed. A 2007 study for instance, found 104 peer-reviewed definitions of this term worldwide (Sood et al., 2007). With the prefix *tele-* meaning ‘far off’ (Sharpe, 2001, p. 4), *telemedicine* has been defined by WHO as the incorporation of telecommunications technologies for curative medicine over a distance (Darkins & Cary, 2000, p. 3).

*Telemedicine*, however has been seen as fitting within a biomedical perspective of healthcare, with its application limited to physicians and only for clinical settings (Brown, 2005; Hu, et al., 1999). *Telemedicine* has been heavily developed by clinical health care sectors worldwide, with its main uses being in four fields: teledermatology, telepsychiatry teleophthamology and teleradiology (World Health Organization, 2009, p. 7). The first three fields all involve clinicians making diagnoses from a distance, with health professionals able to view their patients by the use of video cameras. The fourth field does not involve clinical diagnosis, but rather transmitting radiology images over a distance to specialists.

Nevertheless, all of the four major fields of telemedicine involve the use of technologies predominantly by clinicians for clinical forms of health services only.

As the concept of health became more holistic worldwide (Raeburn, 2007) the term *telemedicine* expanded to become *telehealth* (Nickelson, 1998). This was to reflect a shift from the traditional biomedical model that forms the basis of the health systems across many countries. Reflecting a more comprehensive and inclusive approach towards the meaning of health, and how it should be promoted, maintained and cared for, *telehealth* has been defined by WHO as the integration of communications and information technologies into the practice of promoting and protecting health (Darkins & Cary, 2000, p. 3). Seen as having broader scope that includes disease prevention and health promotion, *telehealth* has been applied across arenas of public and community health, epidemiology, and health education (Darkins & Cary, 2000). For example, the use of telehealth by community health organisations to monitor patients at home or to deliver relevant health advice has increased greatly within the

last two decades (Koch, 2006). Although the scope of *telemedicine* was initially limited to physicians, the pool of *telehealth* users has broadened over the years to include nurses and the general public (Bellazzi, 2007). Such changes in both the types of its users and applications reflect how the field of *telehealth* is likely to evolve as health needs faced by the society changes.

## **2.3 Emergence and development of Home Telehealth**

### **2.3.1 Context for the development of Home Telehealth**

One of the most modern applications of *telehealth*, is *Home TeleHealth* (Home Care Management Associates Ltd, 1998). Described as a two way telecommunications between a healthcare provider and a patient at their place of residence, *Home TeleHealth* involves health education programmes with strong emphasis on self-management of chronic conditions (Polisena, Coyle, Coyle, & McGill, 2009). It may or may not involve physical assessment of the patient, such as checking for lung sounds or blood pressure (Home Care Management Associates Ltd, 1998). *Home TeleHealth* has been viewed as one of the most accessible forms of telehealth, as less complex technologies such as the telephone can be used (Finkelstein, Speedie, & Potthoff, 2006). The proposed service in question for this thesis could therefore be classified as a *Home TeleHealth* service. The term *Home TeleHealth* is frequently interchangeably used in the literature with terms such as *telecare*, *telehomecare* or *home telemonitoring* (Dansky, Palmer, Shea, & Bowles, 2001; Demiris, Speedie, & Finkelstein, 2001a; Paré, Jaana, & Sicotte, 2007). Therefore, the four terms will also be interchangeably used throughout this thesis, although predominantly the term *Home TeleHealth* is used.

Users are agents of technological changes (Oudshoorn & Pinch, 2003). However, the relationship between users and technologies has not always been free from social, political

and economic forces. In 2003, the United Nations released a report predicting there would be a significant rise in ageing populations across the developed countries (United Nations Department of Economic Social Affairs Population Division, 2003). At about the same time, chronic conditions were declared by WHO to be the leading health challenge of the century. In particular, the developed countries were warned of an escalating shift of major health problems from infectious conditions to chronic conditions (World Health Organization, 2002, p. 12). While most developed countries had built their health system on the acute needs health model, this model had limitations. With the acute model no longer seen as appropriate for meeting the growing chronic health challenges of the future, countries worldwide were urged to reorganise the health system into three levels of networks: micro, meso, macro (World Health Organization, 2002, p. 30). As noted in section 1.2.1, the three levels refer to the patient level, health organisations and community level, and policy level in health care services. Each of these levels was seen as interacting and influencing each other (World Health Organization, 2002). Therefore, collaboration and communication across all three levels are integral to the future of effective health care services. A holistic approach towards health care services is therefore important.

## **2.4 Global overview of Home TeleHealth development**

The global development of home telehealth has been a reflection of the wider societal changes. During the early 1990s, North America saw a trend of rapid development of audio and videoconferencing technologies (Koch 2006, p.4). As such technologies began to infiltrate various public sectors, the use of technologies for public health also began. The 1990s saw a surge in research publications on virtual or audio based home health care projects across USA and Canada (Allen, Roman, Cox, & Cardwell, 1996; Brennan, Moore, & Smyth, 1991). Similar projects were also extensively trialled in UK (Klecun-Dabrowska &

Cornford, 2002, p. 1209). Japan also made significant contributions during the 1990s, second only to the United States and the UK in the number of publications on home telehealth produced (Koch 2006, p. 4).

Throughout Europe (European Commission, 2003), the drive for supportive policies and funding for home based telehealth projects were led by the European Commission resulting in a surge of home telehealth projects across Europe from late 1990s onwards (European Commissions, 2003; Koch, 2006). Initiatives to implement such projects were further encouraged by different governments and by the late 1990s, several European countries such as Sweden, Greece and Spain had produced publications on home telehealth projects for the first time (Ekman et al., 1998, p. 23; Gonzalez & Castro, 2005). However, a review of this early research shows that worldwide, the majority of publications on telehealth were focused on assessing technical details of telehealth (Allen, et al., 1996; European Commision, 2003; Peeke & Levett, 1992). Telehealth projects typically involved implementing off-the shelf inventions for the first time and focused on obtaining physiological data of the patient's conditions (Peeke & Levett, 1992). In some sense, while separate from telemedicine, early home telehealth projects were hybrids of telemedicine and clinical health care, in a home setting. Importantly, they were often projects lacking a holistic approach towards healthcare (Koch 2006, p. 9).

International research on how to improve communication across health workers, patients, and their local communities, or how to address the potential political, legal and ethical issues arising from implementing home telehealth was scarce during the 1990s (Bauer, 2001; Kerleau & Pelletier-Fleury, 2002; Whitehouse, George, & Duquenoy, 2011). Evaluation studies investigating the views of potential users prior to implementation of new projects were rare. Due to lack of communication and consultation between different stakeholders, the

state of home telehealth projects implemented worldwide during the 1990s was a fragmented one. Projects were often run parallel to each other, and rarely integrated (Koch, 2005, p. 5). As a consequence, many of those projects became short term.

#### **2.4.1 Convergence of home telehealth and chronic diseases management**

The merging of home telehealth with chronic diseases management services increased significantly around the turn of the millennium. Such a global trend though, is a reflection of the wider societal changes. With chronic diseases heralded as the greatest global health challenge of the century (World Health Organization, 2002), public health policies emphasising the importance of preventive care, community health care services, and health education began to sprout worldwide. It is also around the turn of the millennium that the use of home telehealth for chronic diseases gained most attention. Significantly, two changes occurred in the field of home telehealth at that time: the applications of home telehealth became diversified; and the amount of research on home telehealth for managing chronic illnesses increased significantly.

The use of home telehealth for the purpose of providing health education, or simply monitoring conditions was identified as having increased worldwide between 2000 and 2003 (Koch 2006, p.6). This perhaps reflects the increased global interest in chronic diseases and lifestyle management, and a growing acceptance of a holistic approach towards healthcare. The use of home telehealth for health education or preventive care purposes is significant for the following reason: it encourages increased involvement by patients and local community health care workers. It also reflects the key principle of future health care system as envisioned by WHO: the need for collaboration and communication across all three levels of

the health care system (micro: person; meso: community; macro: policy) (World Health Organization, 2002, p. 30).

The second important change that occurred is that the amount of research specifically focused on the use of home telehealth for chronic diseases increased dramatically around the beginning of the new millennium. It appears that the developing trend of home telehealth worldwide has been mirroring the global health needs (United Nations Department of Economic and Social Affairs Population Division, 2002; World Health Organization, 2002), and the process of developing appropriate services to meet such needs. Globally, the number of international publications on home telehealth increased by about 100 publications between year 2002 and 2003 alone (Koch 2006, p. 4). Of journal articles published between 1990 and 2006 worldwide on the use of home telemonitoring specifically for chronic diseases, it was found that more than half of all European publications, and nearly half (46%) of such projects conducted in the United States were produced between 2002 and 2006 (Paré, et al., 2007, p. 270). The following section will further discuss the global trend in home telehealth, and also discuss some of the significant home telehealth projects utilised that have been trialled in different countries for meeting the needs of people with chronic illnesses.

## **USA**

Following the introduction of the Chronic Care Model (World Health Organization, 2002), hundreds of telehealth projects have been trialled in the United States for the purpose of aiding patients with chronic conditions (Koch, p.5). Currently in the US, five major forces are driving telehealth further into homes: an ageing population, pandemic of chronic illnesses, advances in technologies, interest in health care and self management of health, and the escalating expenditure in health care (Landers, 2010). In the US, a health system which

functions predominantly on a private 'business model', home telehealth projects have competed across both urban and rural areas. The health conditions that have placed greatest demand for home telehealth projects has been the following: diabetes, hypertension, and cardiovascular diseases (Paré, et al., 2007, p. 270).

A majority of the projects that are currently in place, and have been implemented since around 2002, have typically involved adult patients from the general population, with few projects focused on the needs of specific subpopulation, such as children or minority groups (Bondmass, Bolger, Castro, & Avitall, 2000; Liesenfeld, Renner, Neese, & Hepp, 2000).

While some of these piloted projects have been small scale involving only a handful of participants, many have also been implemented on regional levels (Johnston, et al., 1997; Starren et al., 2002). In 1999, home telecare was identified in the US as likely to dominate the healthcare delivery sector over the next decade. As predicted, while the market of home telecare was estimated to be worth between \$12 to 20 billion in 1999, this figure had risen to \$66 billion by 2003 (Demiris, Speedie, & Finkelstein, 2001b).

One of the reasons why home telehealth has been able to expand so rapidly in the US, could be due to the fact that attempts have been made to encourage its development across all three levels of the health sector: micro (patients), meso (health organisations), and macro (policy). Besides health organisations competitively trialling a diverse range of telehealth services, the policy makers in the US also drove legislation to provide some form of legal and ethical guidelines for the rapidly booming industry. For instance, the passing of the Health Insurance Portability and Accountability Act in 1996 (Schanz, 1997), saw private agencies required to submit reports to Congress that had to include cost analysis of telemedicine services, data compiled from any current projects and a proposal should they seek for reimbursement from the State. The passing of this legislation was soon followed by the Health Centre

Consolidation Act (Schanz, 1997). This allowed existing telehealth projects nationwide to apply for governmental grants, with financial support often given to community health providers such as nursing homes and primary care practices wishing to expand telehealth across rural communities. Although criticised at the time of implementation as being broadly framed and needing further development (Schanz, 1997), such legislation reflects the significant interest shown by the US government from the early stages in encouraging the growth of telehealth, while also closely monitoring its growth process.

However, such policy developments did not remain at government levels only. Legislation relevant to regional needs was also passed. The Telemedicine Development Act for instance, was passed in California during 1996 (Medical Board of California, 2010; Schanz, 1997). The passing of this bill also coincided with the year Kaiser Permanente implemented a large home telehealth project on a regional level for the first time in California (Johnston, et al., 1997). The passing of this bill was critical as it somewhat addressed the ethical issues of telemedicine, including patient privacy. This bill required health professionals to obtain verbal and written consent prior to delivering telemedicine, and also required the consent statements to become part of the patients' public medical record. Upon reflection, such legislation was significant, as the passing of such bills required communication and collaboration between stakeholders from macro, meso and micro levels of the healthcare system.

It is interesting to note that such legislation relevant to telehealth was created and passed in the 1990s, prior to the significant expansion of telehealth projects in the US after 2002 (Koch, 2006, p. 5). While these policies were criticised during the implementation stages as irrelevant or too broad (Schanz, 1997) the early protocols provided a sense of structure and guidance for many pioneering telehealth projects. The following section will now discuss

home telehealth projects by Kaiser Permanente that have had major implications for both the US and elsewhere.

### **Kaiser Permanente Tele-Home Health Projects**

Kaiser Permanente (KP) is the largest nonprofit health maintenance organisation in the US and the operator of 11 home health care agencies in California (Johnston, et al., 2000, p. 40). Such agencies in New Zealand would be equivalent to community nursing organisations, hospice or nursing homes. Home Telehealth projects initiated by Kaiser Permanente are significant, because they were pioneering tele-home health projects in the United States (Johnston, et al., 2000). Kaiser-Permanente's projects have been adapted and implemented by other health organisations around the world (NHS Direct, 2010). At the same time, Kaiser-Permanente has also revised and adapted their own projects numerous times to better meet the needs of their local population (Enguidanos, et al., 2003; Karter et al., 2001).

As early as 1996 - 1997, KP found that a majority of the referrals to their home health organisation were due to chronic illnesses. Predicting a growth in this demand, KP conducted a quasi-experimental study from 1996 to 1997 for approximately 2000 people (Johnston, et al., 2000, pp. 40-41). This study involved targeting patients newly diagnosed with diabetes, COPD, cardiovascular illnesses or anxiety. The patients received regular home visits from nurses, but also scheduled telephone calls on a regular basis. The intervention group in the study was also given access to a video system that would allow the patients to visually interact with nurses. The purpose of this study was to assess whether using simple everyday technologies to both monitor and provide education for patients at home, would result in preventing exacerbation of chronic conditions. The outcome of the study found that, patients overall benefited from being able to have regular contact with nurses, and that technology based home health care was cost effective for the organisation (Johnston, et al., 2000).

Another similar study by KP on diabetic patients also found that individuals being able to

self-monitor their own glucose level resulted in patients reporting greater sense of empowerment, with improved clinical results (Karter, et al., 2001). This study on diabetic patients found that such forms of home telehealth resulted in significant clinical benefits for the patients, even after adjusting the results for age, sex, ethnicity, income and occupation (Karter, et al., 2001, p. 7).

However, perhaps the most significant home telehealth project initiated by KP is its geriatric care management project. Between 1996 and 1997, KP launched a four year project in partnership with two local health agencies in Southern California. The project was financially supported by the district health foundation (Enguidanos, et al., 2003, p. 710). The project was initiated to determine whether four forms of geriatric care management, focused on preventive care and self-management using the telephone, would lower health expenditure at the secondary health care level, improve patients' perceived quality of life and increase adherence to care plans by patients. In this project, four models of community-based long term care services were trialled. The availability of the services was limited, with the specific criteria being set up to determine eligibility of participants. In this study, only those aged 75 years and older, who have had more than three visits to the emergency department during the last 12 months, had required more than two visits by a medical practitioner over a period of 3 months, and have had the regular caregivers reporting greater distress with the patient displaying cognitive or behavioural problems were included (Enguidanos, et al., 2003, p. 711). Therefore, it could be criticised that the findings from this study may not be applicable for elderly patients of all age types. Overall though, the focus of this study was on elderly patients recently diagnosed with chronic illnesses who were at risk of exacerbating their conditions.

The first model in this project, involved a four week telephone based intervention conducted by social workers of bachelor's level. The social workers, who were titled *telephone care*

*managers*, acted as a mediator between geriatricians, primary care givers and patients. The care managers were required to review the patient's history of health service use, illnesses and medications prior to contacting both the patient and primary caregiver to discuss referrals given by physicians. About two to four weeks after the initial phone calls, the care managers would conduct a telephone follow-up to encourage access to the referred services (Enguidanos, et al., 2003, p. 713).

The second model in this KP project involved registered nurses who were assigned care manager's roles. The roles were designated according to the geographical location of both the nurses and the patients. This second model was much more comprehensive than the first, as it involved home visits, telephone assessments, and ongoing monitoring and follow up for at least eight months. The care plans delivered by registered nurses were personalised programmes to address both physical and psychosocial needs of the patients arising from having long term illnesses. This second model of care also involved multiple stakeholders. It involved assistant managers from community health organisations to provide administrative and clinical supervision. The model also involved social workers and geriatricians, with clinicians offering recommendations such as medication adjustments or options of alternative services, if needed. The patients continued to make regular visits to their physicians (Enguidanos, et al., 2003). The families of the patients were also involved, with regular interactions between the community partners and care managers encouraged (Enguidanos, et al., 2003, p. 713). Overall, the intervention was holistic in its approach to chronic health care services, involving parties across micro (patients and families), meso (community health organisations) and macro levels (the district health foundation). The other two interventions trialled in this project were variations of the two interventions discussed above (Enguidanos, et al., 2003, pp. 712-713). Of the four models, it was found that the second model involving nurses was most successful, with the nurses able to effectively address identified concerns

from the patients (Enguidanos, et al., 2003, p. 713). Overall though, Kaiser Permanente's community health project was successful with more patients referred (Enguidanos, et al., 2003, p. 712). Upon further review of the project, it was found that the telephone was effective for delivering a prevention focused intervention.

Upon reviewing the project however, a number of internal and external barriers were also identified. Frequent miscommunication between care managers and Kaiser Permanente was found as one of the most significant barriers encountered during the first year of the project (Enguidanos, et al., 2003, p. 713). The care managers were not separately consulted prior to implementing the home telehealth project. Since the first launch of KP's home telehealth services though, many similar projects have been implemented in the US (Koch, 2006).

The future direction of home telehealth services in the US seems to be currently pointing towards a multimodal form of care similar to that initiated by KP (Hoving, Visser, Mullen, & van den Borne, 2010; Landers, 2010). Such form of care would involve incorporating telephone services, face to face home assessments and visits to physicians to create one seamless, health service for the patient (Enguidanos, et al., 2003). This multimodal form of service for patients with chronic illnesses has also been recommended by other studies worldwide (Bellazzi, 2007; Chan, Campo, Estève, & Fourniols, 2009; Liss, Glueckauf, & Ecklund-Johnson, 2002). However, implementation of such services would require in depth discussion with relevant community stakeholders prior to implementation.

## **Canada**

The state of home telehealth in Canada is somewhat different from the situation in USA. Such differences can be explained by a different population make up, geographical boundaries, health system, and past history of telehealth that different countries have (Koch

2005, p. 5). Currently in Canada, most home telehealth services are telephone or computer based and on a regional scale (Tran et al., 2008). Instead of a private organisation initiating a series of specific projects (Johnston, et al., 2000), the publicly administered health care system in Canada has seen home telehealth undergo a series of trial and error initiatives to reach its current state of stability.

The extreme Canadian climate and dispersed population have been noted as being suitable for encouraging the use of communication and information technologies to provide health care services (House, Roberts, & Canning, 1981). With a long history of telehealth, three telemedicine projects were recorded by the Ministry of Health as operating nationwide as early as 1976 (House & Roberts, 1977). The delivery of medicine and health services via technological innovations was a necessity for many rural communities particularly in Northern Canada. For this reason, there has always been wide use of simple everyday technologies such as the radio, or the telephone by physicians and nurses (Picot, 1998). The initial drive for home telehealth in Canada therefore has been its rural health needs, not necessarily a pandemic of chronic health. With the rapid development worldwide of technologies, Canada made great efforts to implement internet, or video technology based home telehealth projects nationwide between the 1980s and the turn of the 21<sup>st</sup> century (Cornish et al., 2003; Health Canada, 2000). Projects were highly concentrated on piloting new forms of telehealth services across rural provinces such as Québec, Newfoundland and Labrador (Gagnon, Cloutier, & Fortin, 2004; Peddle, 2007). However, such projects were often met with strong reluctance by health professionals and local communities (Michaels, 1989, p. 614), who were concerned with the potential cost of new technologies.

In addition, such projects suffered from lack of government leadership. Although a number of organisational bodies (National Initiative for Telehealth, Canadian Coordinating Office of

Health Technology Assessment) were established, such organisations suffered from lack of dedicated funding from the government to address arising issues in health and ICT (NIFTE, 2003; Noorani & Picot, 2001). At the same time, no specific regulations on telehealth had been passed (Noorani & Picot, 2001). By 2003, it was voiced that major barriers to the widespread use of telehealth in Canada were policy and regulatory barriers (NIFTE, 2003, p. 5). At the same time, difficulties of implementing relevant infrastructures needed for internet based health services were becoming a concern across certain regions (Gagnon, et al., 2004).

The recent national review of home telehealth projects in Canada has revealed that home telehealth programmes have now been implemented across six of the ten provinces (Tran, et al., 2008). Formal reviews of the outcomes of such services are yet to be carried out. It has also been revealed that a majority of those services target chronically ill patients, with conditions such as diabetes, COPD, cardiovascular diseases, palliative care or depression (Tran, et al., 2008). This is perhaps a reflection of the growing chronic conditions needs in Canada and a growing recognition of the effectiveness of telehealth in increasing the number of patient-health provider interactions for dispersed communities. Although telehealth devices currently used across Canada vary in complexity, the most popular form of device used for home telehealth services has become the telephone (Tran, et al., 2008, p. 7). In addition, new organisations have been established to address issues arising from implementing home telehealth among the indigenous people in Canada (Health Canada, 2005). In addition, the Canadian Telehealth Forum was established to encourage collection, exchange and discussion of telehealth projects nationwide (Canada's Health Informatics Association, 2010).

Although continuing to move towards integrating home telehealth for chronic illness care, the state of telehealth in Canada still faces many difficulties. Multimodal telehealth projects have been scarce, although a number of individual projects using various technologies, ranging

from the telephone to video conferencing devices have been trialled (Chouinard & Scott, 2009; Gagnon, et al., 2004). Evaluation studies of potential stakeholders and other studies on patient-centred issues such as privacy, confidentiality and informed consents have also been scarce (Tran, et al., 2008, p. 7). In addition, the same provinces that have traditionally reported most difficulty accessing health care services still do not have home telehealth programmes implemented. Rural communities such as Newfoundland and Labrador, the North West Territories, and Yukon still remain isolated (Tran, et al., 2008, p. 7).

## **Europe**

In Europe, there has been considerable investment to fund telehealth initiatives across the continent. By 2007, the EU had already spent more than 650 million Euros to fund such initiatives (Celler, Lovell, & Basilakis, 2007). Such a level of support from the policy level has, in turn, seen a rise in the use of home telehealth for both educational and clinical purposes across many European countries. In Finland, projects have been carried out across health centres and hospitals for the purpose of delivering continuous education, and patient consultation (Vuononvirta et al., 2009). In Scotland, a telephone health service with a preventive health care focus was led and fully implemented by community nurses on a national scale for the first time (Roberts, Heaney, Haddow, & O'Donnell, 2009). There also has been an increase in the use of telehealth for the purpose of monitoring diabetes (Paré, et al., 2007; Vuononvirta, et al., 2009). Such projects have been found across the Netherlands (Caris-Verhallen, Kerkstra, Bensing, & Grypdonck, 2000), Italy (Bellazzi, 2007) and Belgium (Del Pozo, De Toledo, Jiménez, Hernando, & Gómez, 2006, p. 9). Such projects have typically involved nurses aiding diabetic patients to monitor their condition in their homes. With the rise of such projects, evaluation studies examining the perspectives of health

professionals such as nurses, on delivering telehealth have begun to surface throughout Europe (Vuononvirta, et al., 2009). In particular, this growing awareness that consultation with key stakeholders in telehealth projects is invaluable has been strongly led by the European Commission (EC). The following section will now discuss some of the recent changes that have occurred within the Commission and what implications they may have, as this thesis seeks to also gauge the prospects of primary care nurses on the possibility of implementing a telehealth service.

### ***European Commission***

The European Commission (EC) has been an active agent for telehealth across Europe for over 20 years (European Commissions, 2003). However, several important changes have been made recently. The EC has gradually been shifting its focus from the technical details of telehealth, to a series of consultation projects involving discussions with a broad range of stakeholders (European Commission, 2009). From September 2007 to June 2008, the EC commissioned over 11 meetings and workshops across the European continent involving representatives from 27 countries. The purpose of these meetings was to better understand the perspectives of three key stakeholders that EC has come to consider significant for the future development of telehealth in Europe.

The three key stakeholders can be broadly grouped as follows: users (health professionals, patients), industry representatives (representative of organisations) and policy makers (state representatives) (European Commission, 2009, p. 9). In essence, these stakeholders mirror the micro (patients), meso (health organisations), and macro (policy) levels that our health system has come to be built on (World Health Organization, 2002).

The consecutive consultations have included a questionnaire based consultation to discuss specific topics in-depth (European Commission, 2009, p. 10), distributing a survey focusing on users' perspective (European Commission, 2009, p. 9), visiting clinics that were operating telehealth services to better understand the current situation (European Commission, 2009), as well as further debate and discussions with the three key stakeholder groups. The consultations concluded that while telehealth has huge economic and clinical potential, further discussions are needed to better understand the ethical, social and political dimension of telehealth. Therefore research focused on assessing the perspectives of potential stakeholders will also be necessary in Canterbury, New Zealand, as the region gauges the prospects of implementing a home telehealth service for the first time.

## **England**

Although more discreet than in the USA and Europe, there also has been a drive for home telehealth in England. While central government through the NHS (National Health Service) has led this drive, it has been developed and nurtured regionally. Between April 2006 and 2008, the Department of Health distributed around £80 million to local health authorities as the Preventative Technology Grant (Milligan, Roberts, & Mort, 2011, p. 347). The grant was designed with the expectation that telecare would eventually become established across the UK. While primarily aimed at older people, home based telehealth has been seen as part of a national strategy to reduce the number of people entering residential care and hospitals, by preventing and minimising the exacerbation of chronic conditions (Bayer, Barlow, & Curry, 2007). At the same time, £30 million has been further invested by the government under the Long Term Condition Grant to fund large scale home telehealth projects (Celler, et al., 2007). Such financial investments have been made, because of the belief that home telehealth could contribute to a reduction in in-patient stays and use of nursing homes usage by approximately

160,000 people nationwide (Department of Health, 2008). While such claims have also been criticised as somewhat radical (Milligan, et al., 2011, p. 348) and needing further research, home based telehealth projects that have been implemented so far at Swindon, Sheffield and Nottingham Primary Care Trusts (PCTs) have resulted in positive outcomes (Marshall, 2009, p. 247). The most notable project perhaps, has been the Birmingham OwnHealth service. The following section will further discuss the significance of Birmingham OwnHealth project, and what implications it has for the proposed Canterbury telehealth service.

### ***Birmingham OwnHealth***

The Birmingham OwnHealth project is one of the largest telephone based long term care services that has been implemented in the UK. The project, is actually an adaptation of the previously discussed home telehealth projects started by Kaiser Permanente. Initiated in 2006 in the Birmingham region, the Birmingham OwnHealth programme involves patients recently diagnosed with chronic conditions who have been identified by their general practitioners as most likely to benefit from the telephone based intervention (Birmingham East and North Primary Care Trust, et al., 2007). The service involves a care manager ringing a pre-identified patient to conduct a telephone assessment for approximately 45-60 minutes. A majority of the patients are rung quarterly. The care managers are able to access any test results released by GPs. If the patient is identified as doing well, they are referred to health coaches who will provide further advice on exercise and diet plans (Johnston, et al., 1997; Wilson, 2010).

A number of positive clinical outcomes have been found from the Birmingham OwnHealth programme including statistically significant mean reduction in blood pressure and cholesterol levels for all members involved in the study (Pfizer Health Solutions, 2008, p. 10)

However, a review of the project in 2009 (Wilson, 2010) has also identified a number of difficulties with the OwnHealth project. The review found a high turnover rate among nurses who preferred to do clinical work, difficulty in screening the potential patients, and miscommunication between the GPs, care managers and the health care organisation involved. As a service similar to the Birmingham OwnHealth service has been proposed for Canterbury based population, it will be important to understand the perspectives of key stakeholders in Canterbury, to encourage better communication.

### **Australia**

The practice of delivering health care over a distance has been a tradition in Australia. This has particularly been due to the health needs faced by much of Australia's rural and remote communities. Technologies have always been used to diagnose, treat, and monitor patients' wellbeing in the Australian health system. The report of a postmaster performing an operation under a surgeon's instruction, transmitted by Morse code was recorded in 1917, and the beginning of the Royal Flying Doctor Services (RDFS) using pedal-powered radio to communicate with the rural communities was also reported in 1927 (Banks & Togno, 1999).

Despite this pioneering history, the home telehealth in Australia has remained in a somewhat fragmented state for some time (Banks & Togno, 1999; Celler, et al., 2007). Telehealth has not yet been fully established in either urban or rural Australia. The key characteristic of the development process of telehealth in Australia, has been the lack of central leadership and support. Although funding initiatives to support the development of IT infrastructures across Australia have been negotiated since the 1990s (Banks & Togno, 1999, p. 4), no specific policies addressing the legal and ethical implications of telehealth have been implemented by the federal government (Celler, et al., 2007, p. 6151). Although the Australian Health

Ministry has encouraged the formation of various external bodies outside the Ministry with a view of developing relevant policies, even such bodies have suffered from lack of central leadership and have dissolved (Australian New Zealand Telehealth Committee, 2002).

Currently in Australia, the *Australasian TeleHealth Society* serves to provide guidance for emerging telehealth projects (Australasian TeleHealth Society, 2009; Hughes, King, & Kitt, 2002).

Since 2001, anecdotes of home telehealth projects have been especially reported across rural areas such as Western Australia (Dillion, et al., 2005) and Queensland (Justo et al., 2004), with few projects in urban areas (Celler & Lovell, 2003). Such projects have been largely driven by local governments. Furthermore, there has only been one home telehealth project that has seen a form of funding commitment by the Federal government – the Extended Aged Care in the Home (EACH) programme. However, even this form of support has only emerged within the last decade (Celler, et al., 2007).

Recently though, there have been growing attempts to develop telehealth projects to address the growing chronic health needs across wider Australia (Celler, et al., 2007). For instance, Western Australia announced its commitment to investing \$36.5 million dollars to telehealth initiatives for their region only this year (Western store reviews, 2011). As long term illnesses requiring ongoing monitoring and intervention escalate, home telehealth is likely to play a vital role in meeting the growing health need (Cartwright, Cosgrave, Gooden, & Carpenter, 2009, p. 33). However, the extension of telehealth in Australia may be difficult without further support and collaboration from both federal and national policy makers.

### **New Zealand**

The state of telehealth is currently somewhat patchy in New Zealand. In New Zealand, there have been some recent initiatives to incorporate telehealth in health promotions. MedText

and QuitSmoking programmes have both focused on the use of cell phones. Although slow in process there have been some trickles of research in New Zealand, investigating the human aspects of telehealth. An example of this would be a pioneering study carried out during 1995 in Canterbury, that tested for psychosocial benefits of a telephone based support programme for pregnant woman (Bullock, Wells, Duff, & Hornblow, 1995). This study found the telephone based service significantly supported woman's psychosocial status, suggesting that telehealth can have mental health benefits. However, such telehealth studies have not been able to further develop due to lack of clear leadership and support from the government level. In 2000, the Australian New Zealand Telehealth Committee conducted a review of telehealth projects across New Zealand only (Kerr & Norris, 2004). In this survey, it was found that as it has been elsewhere around the globe (World Health Organization, 2009), applications of telemedicine such as teleradiology and telepsychiatry were growing in popularity. It was also found that the applications of telehealth were focused on secondary care, with large hospitals acting as hubs for trialling new devices. The survey predicted that such projects will in time, become extended from pilot studies (Kerr & Norris, 2004, p. 62). However by 2003, it was found that around half of the projects identified through the 2000 survey were no longer active. Although a review of why this should be has not been conducted, international research has shown projects involving off-the-shelf technologies are often costly to maintain (Dansky, et al., 2001). In addition, it has been found that technological innovations perceived as difficult to carry out are linked to a lower adoption rate (Sanson-Fisher, 2004, p. 55).

Since the publication of the WAVE report in 2001(WAVE Advisory Board, 2001) which briefly discussed the potential role of telehealth in New Zealand, there has been no specific development from the policy level to regulate, fund, nor address telehealth or its implications. Studies involving the use of technologies in the health sector for non clinical purposes have also been increasing. In particular, research on InterRAI (Gordon, 2008), EHR (Electronic

Health Records) (National Health Committee, 2010, p. 30) and mobile technologies (Mirza & Norris, 2007) have lately generated much interest. Sporadic research has also surfaced on the potential role of telepsychiatry in community settings (Al Qirim, 2006). However, gaps still remain in understanding how technologies may be adapted and adopted by the public. Gaps also remain for further investigating the human aspects of implementing telehealth services in New Zealand.

In light of the escalating chronic health needs and an ageing population, public health policies in New Zealand have recently reflected interest in bringing personalised health care closer to home (Ministry of Health, 2010). However, only one research publication investigating the possibility of using technologies to achieve this mean could be found nationwide (Mirza, Norris, & Stockdale, 2008). A review of this one publication shows the focus of this study was on investigated the prospects of using mobile phones and wireless computer devices to prevent, monitor, treat and support patients with chronic illnesses (Mirza, et al., 2008). This study involved semi-structured interviews with 18 participants who were physicians, employees of technology based companies and community health workers who were asked to discuss the potential role of mobile technologies for the purpose of chronic care in New Zealand. However, neither the general public nor practice nurses were included in the study (Mirza, et al., 2008, p. 315).

Although signs of such publications in New Zealand are promising, a review of the state of home telehealth from overseas has shown home telemonitoring services have been widely delivered by nurses (Johnston, et al., 2000; Maiolo, Mohamed, Fiorani, & de Lorenzo, 2003; Meystre, 2005). Should telehealth be used by the New Zealand health sector to meet the growing prevalence of chronic health needs, nurses in New Zealand will also have a vital role to play. Therefore, studies are needed to understand the perspectives of this key stakeholder group.

## **2.5 Role of Nurses**

### **2.5.1 Nursing practice for chronic care using telehealth: a growing presence**

Nurses have been at the forefront of delivering health services to local communities world wide. Nurses are also currently the largest group of health providers in most countries (Schober & Affara, 2006). According to the Innovative Care for Chronic Conditions model (ICCC) proposed by WHO (chapter 1), nurses are significant stakeholders as they are able to mediate between the micro level (patients), and meso level (health organisations) in the health system. At the same time, nurses have been valuable stakeholders at the macro level (policy environment) delivering the necessary policy implementations across both micro and meso levels of the health care system. The ICCC framework places the micro level as the core of its model, but still sees collaboration and communication between micro and meso levels as essential for addressing the growing prevalence of chronic conditions. Therefore, nurses are currently a significant stakeholder group in the health system.

Worldwide, nurses have been using the telephone and other technologies as part of everyday nursing practice for decades. The telephone has been widely used to monitor treatment, offer advice about health care issues and medication management, and to offer emotional support (Coyle, Duffy, & Martin, 2007). In particular, telephone based nursing has been especially useful for vulnerable patients with mobility or transport issues, rural based communities, or more recently, patients who require continuous monitoring of chronic diseases (Coyle, et al., 2007; Roberts, et al., 2009). As a readily available technology already widely used by the public, the telephone has been found to be a convenient and inexpensive tool for providing ongoing support and education.

For New Zealand based nurses however, the scope to deliver such health promoting behaviours using the telephone has been largely limited to teletriaging at general practices and telephone help lines (George, Cullen, Gardiner, & Karabatson, 2008). As the need for

innovative services to prevent and manage chronic conditions increase in New Zealand, it is highly likely that nurses will play an important role as the mediator between the local communities, and the health sector. Therefore, it would be important to consult this crucial group of key stakeholders.

### **2.5.2 Nursing practice in New Zealand: recent developments**

The landscape of nursing practice in New Zealand has experienced some significant changes within the last few years. As the policy titled '*Better, Sooner, More Convenient*' prepares to reshape the landscape of primary health care and community health for the next decade, it is vital that key stakeholders, such as nurses are consulted on just how health care services may become more personalised and also brought closer to homes (Ministry of Health, 2010). As this section will discuss, there already have been rapid, significant changes that have occurred.

Practice nursing is sometimes interchangeably called primary health care nursing in New Zealand (New Zealand Nursing Organisation, 2007, p. 5) although there are many other nurses engaged in primary care (Plunket nurses, district nurses). Practice nurses are registered nurses who work in a primary health care practice to promote, improve and maintain health by practising population health, health promotion, disease prevention as well as providing treatment and care (New Zealand Nursing Organisation, 2007). Practice nurses are found at general practices throughout New Zealand. Practice nurses currently play an important role in community health, often being the first-point-of-contact for their local communities (New Zealand Nursing Organisation, 2007).

District nurses also make a significant contribution to community health in New Zealand. Employed by district health boards and community nursing organisations, district nurses currently provide a wide range of services to the elderly, and patients requiring either short

term or on-going monitoring in their own home (NZNO, 2011a). With the New Zealand government planning to expand preventive care services into people's homes (Ministry of Health, 2010), it is likely that both the scope, and the role of district nurses will expand further in the future. This has already been occurring, with the decision by the Nursing Council of New Zealand in 2010 to apply the title of '*enrolled nurse*' (NZNO, 2011b) to all formerly second level nurses. This decision was made as a recognition that a growing demand is already being placed on the nursing sector by a population that is increasingly diagnosed with life style induced chronic conditions. This updated scope of practice enabled the enrolled nurses to make a broader contribution to health services, and give greater support to registered nurses. With over 2000 enrolled nurses now found nationwide across nursing homes and community nursing organisations, the dimension of district nursing is continuing to expand (NZNO, 2011b).

In New Zealand, community based nurses (practice and district nurses) have been making a significant contribution towards promoting and monitoring the state of health of their local population. While practice nurses have been the first-point-of-contact for their local communities, the district nurses have also been playing a significant role, being a key on-going contact for many elderly, and those confined to their homes. As discussed previously then, these two groups of nurses are currently important parties in the health care system as they are well established in both the micro and meso levels of the health system and increasingly playing a role in the policy level (chapter 1). Therefore, it is crucial that the perspectives of both groups of nurses are gauged, as part of efforts to assess the possibility of implementing a community based home telehealth service for people recently diagnosed with chronic conditions.

## 2.6 Conclusion

This chapter has focused on reviewing trends in home health from both international and national perspectives. Home telehealth was defined as the use of telecommunications technologies from home, for the purpose of monitoring and promoting health. Telehealth projects were found to flourish best in countries with high level of support from macro (policy), meso (local community health organisations), and micro (patients, health professionals) levels of the health care system. New Zealand was found to be lacking support most from the macro level, but receiving growing interest from the meso level.

Overall, three important global trends were identified as home telehealth is increasingly being used to meet the challenges of chronic conditions. First, as well as being used to monitor chronic conditions, home telehealth services are also used to prevent further exacerbation of these conditions, with health care providers using the service to provide health education. Second, nurses have become the primary agents of home telehealth, and are more likely to deliver home telehealth services than any other health professionals. Third, worldwide, research focusing on understanding the human aspects of implementing telehealth services is on the rise. The need to evaluate the perspectives of key stakeholders, such as the community health professionals is also on the rise (European Commission, 2009).

This study intends to gauge the perspectives of local nurses (practice, district) on the possibility of implementing a community based home telehealth service. The focus of the next chapter will be on the research methods deployed by the researcher to understand the perspectives of this important group of key stakeholders.

## **CHAPTER THREE: Research Methods**

### **3.1 Introduction**

This chapter describes the methodological approaches used in this study to understand the nurses' perspectives on the possibility of implementing telehealth chronic care intervention in Canterbury, New Zealand. As explained in Section 1.5, the proposed intervention would involve a locally based telephone based chronic care intervention project. It has been suggested that practice nurses from general practices, and district nurses from a major community nursing organisation in New Zealand could deliver the proposed service. Therefore, this research will be approached from the perspectives of two groups: practice nurses from a range of general practices across the Canterbury region; and district nurses (both registered and enrolled) from a major community nursing organisation. A mixed methods approach will be used, with qualitative semi-structured interviews used for the practice nurses, and quantitative self report questionnaire for the district nurses. The study overall is grounded in the health services research paradigm.

### **3.2 Research Paradigm**

This study is grounded in the health services research (HSR) paradigm. A multidisciplinary mode of scientific enquiry, the health services research approach involves investigating how a range of social factors, such as the social system, organisational structures and processes and health technologies can affect access, cost and quality of health care (Lohr & Steinwachs, 2001, p. 16). Primarily used for developing public health policies, the primary goal of this paradigm is to understand the most effective way to plan, administer, fund and deliver high

quality health care (Institute of Medicine, 1979; Lavis, Ross, & Hurley, 2002). The focus of the HSR is not on administering clinical medical treatments and their effects (Lohr & Steinwachs, 2001, p. 16), but more on decisions that can affect health service delivery.

The research domains of the HSR are broad. Partially rooted in the field of organisational behaviour and management research, HSR sees individuals, organisations, communities and the wider public as interlinked (Lohr & Steinwachs, 2001, p. 16), and whose perspectives need to be understood to comprehend the full effect of a health service. As the nature of this research is on understanding the possibility of implementing a new phenomenon into an existing health organisation on a regional scale, the HSR paradigm will be particularly appropriate. HSR is also a paradigm that allows the research methods to be mixed (Lavis, et al., 2002, p. 130).

### **3.3 Research Strategy: Mixed methods**

This study was framed by the mixed methods triangulation model. Mixed methods can be defined as using qualitative and quantitative methods in sequential or parallel orders (Adamson, 2002, p. 230). Recognised as having the advantage of two different forms of methods complementing each other's strengths and weaknesses, the multi methods mode of research has become increasingly popular within the last three decades (Arnon & Reichel, 2009, p. 177). This has also been so in the field of health care services research (Bowling, 2009; Creswell, Fetters, & Ivankova, 2004).

This has probably occurred because as Bowling (2009, p.433) argues, mixed methods has the advantage of allowing the researcher the flexibility to adapt and adjust when investigating complex or delicate issues in health care. As mixed methods can involve both narrative and numerical data sets being explored, it has been further argued that the multi methods mode of

research offers the researcher the potential to obtain deeper understanding of people and events (Borkan, 2004; Bowling, 2009). The possibility of implementing a new health service is always complex, with the perspectives of different parties being multi layered and overlapping (Peddle, 2007; Scott, Chowdhury & Varghese, 2002). As the key objectives of this thesis are to explore the perspectives of nurses from two different settings (general practice and community nursing organisation) utilising the mixed methods will be particularly appropriate.

### **3.4 The triangulation model**

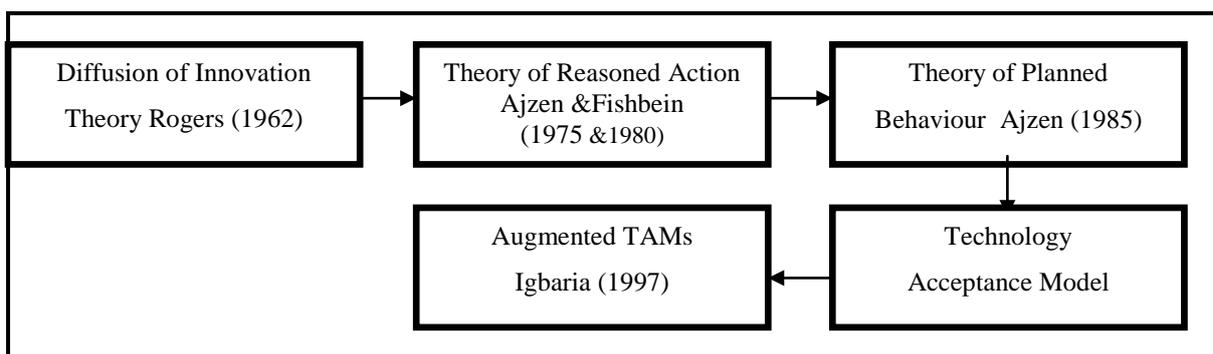
There are many typologies of mixed methods. In particular, the triangulation design model has been widely used in health services research (Creswell, et al., 2004). Although the triangulation model may involve gathering both quantitative and qualitative data at the same time, this is not always the case (Tashakkori A & Teddlie C, 1998). However, it does always involve giving both forms of data equal priority. One set of data is not favoured over the other (Creswell, et al., 2004, p. 11). As key objectives of this thesis are to understand the overall perspectives of two groups of nurses, with the perspectives of each group given equal weight, the triangulation model will be particularly appropriate. In the triangulation model, the results are typically reported separately for each method. Although separately collected and reported, all forms of data are integrated at the interpretation and discussion stage, to best understand the principal research problem (Borkan, 2004).

### **3.5 The theoretical guidance**

The self-complete survey questions for the quantitative study were broadly guided by both the principles from the Technology Acceptance Model and suggestions from the nursing organisation. Adopting an innovation (eg. a new health service, new technologies) has been

shown to be affected by precursors and other related factors (Rogers, 2003). The possibility of implementing a new health service is always complex. The perspectives of different parties can be multi layered, yet often be embedded within one another (Peddle, 2007; Scott, et al., 2002). As discussed in Chapter 1, there are three key stakeholders in the public health system: the patients and their families, the community partners, and the local health care teams. Yet as the following diagram illustrates (Figure 3.1.), over arching the three parties are also three external environmental factors that can influences people’s perspectives: the existing policies, the surrounding communities, the existing health care organisations and their structures.

Knowing then, that the principal objectives of this thesis are to better understand the perspectives of Canterbury nurses on the possibility of implementing a new innovation, relevant theories that may aid shaping the questions to be used for the mixed methods research, and also for the subsequent data analysis were reviewed. In this section, a summary review of three key theories related to innovation adoption, behaviours and technology adoption is presented below. These theories are: diffusion of innovation theory, theory of reasoned action, theory of planned behaviour and technology acceptance model (Figure 3.1).



**Figure 3.1 An overview of the theories.** (Ajzen, 2002; Davis, 1986; Igarria, Zinatelli, Cragg, & Cavaye, 1997; Rogers, 2003; Sheppard, Hartwick, & Warshaw, 1988)

### **3.5.1 The Diffusion of Innovation Theory (DIT)**

The diffusion of innovation theory can be defined as a theory which asks why and how new innovations may be accepted and become adopted (Rogers, 2003). Maximising evidence based practice has been argued to be a major factor in determining the health outcome. Despite this, gaps often result between the evidence based recommendations and the actual health care service. As Sanson-Fisher (2004, p. 56) notes, “bridging the gap will not be achieved by simply informing clinicians about evidence”.

One theory that has been suggested over the years to understand how this gap may be met, is Roger’s Diffusion of Innovation Theory (Rogers, 2003). The theory suggests that individuals or organisations go through a five stage process, prior to making a decision on an innovation. They are: awareness, interest, evaluation, trial and adoption (Sanson-Fisher, 2004).

According to this theory then, the state of home telehealth in New Zealand is between the first and second stages: awareness and interest. Therefore, this thesis is a relevant and appropriate study for understanding the potential role of home telehealth for chronic care intervention in New Zealand.

The DIT also suggests that to successfully introduce an innovation into an environment, better understanding is needed of the potential user’s internal and external influence. Key examples of such factors are: time, the social system, as well as the compatibility of the introduced innovation as perceived by the potential user. The needs and values already in place, as well as complexity of the innovation may also be evaluated. Such principles from the DIT then, may provide useful insights as to why some innovations are adopted, while others are not. The principles could also be used to guide forms of research trying to encourage adoption of best-evidence practice (Sanson-Fisher, 2004).

Innovation, has been defined as “an idea, practice, or objectives perceived as new by an individual or other unit of adoption”. Examples of innovations can be new technological devices, or new forms of health service. As the DIT is multidisciplinary in origin (Rogers, 1983), it has come to be widely used across various fields including health services studies (Helitzer, Heath, Maltrud, Sullivan, & Alverson, 2003). In New Zealand for instance, the DIT has already been used to evaluate the utilisation of telemedicine upon trial for a North Island based hospital, and also to evaluate the possibility of adopting eCommerce (Al Qirim, 2006, 2007) by small businesses in New Zealand. For such reasons, it will be appropriate that the key principles DIT will be used to guide the process of designing the research instruments, and the subsequent data analysis.

### **3.5.2 The Theory of Reasoned Action (TRA)**

A branch of the diffusion of innovation theory, the theory of reasoned action (Ajzen & Fishbein, 1977) has come to be widely recognised as a model that predicts consumer adoption intention. Most studied in the field of social psychology, the TRA suggests that three factors determine a person’s behaviour of choice: attitude, subjective norms and behavioural intentions (Taylor & Todd, 1995a, p. 2). Although the TRA has undergone modification, the essence of this theory is that an internal variable, such as a person’s attitude, is influenced by external factors (Taylor & Todd, 1995a, 1995b). Overall, it is a theory that has been widely used across disciplines to help explain people’s attitude and behaviours (Ajzen, 2002). In this aspect, the principles of TRA could aid this thesis study better understand the nurses’ responses.

### **3.5.3 Technology acceptance model (TAM)**

The 1980s was an era of new technological innovation (Goldman & Nagel, 2009). The technology acceptance model (TAM) was first proposed to aid understanding of consumer acceptance of new technologies in 1986 (Davis, 1986). An extension of the TRA and the theory of planned behaviour, TAM proposed set factors (Holden & Karsh, 2010, p. 161), that may specifically measure how and why individuals may respond when asked to trial new technologies. The first TAM however, was first criticised in 1997 (Lee et al, 2003) as being limiting and has since undergone further augmentation (Holden & Karsh, 2010, p. 161). Variables that may be measured, such as people's Perceived Compatibility, Perceived Usefulness and Attitude when asked to adopt new innovations are now part of augmented models of TAM. TAM has been successfully used in evaluation studies for telemedicine overseas (Chau & Hu, 2002; Holden & Karsh, 2010; Hu, et al., 1999). Therefore, the researcher believes the principles from TAM will also be useful for telehealth and related studies in New Zealand. TAM however, has been traditionally used for quantitative survey study designs (Hu, et al., 1999). For these reasons, the general principles from an augmented TAM will be used to aid the structure of the self report questionnaires for the district nurses in this study.

However, the researcher also believes a combination of principles from the DIT and the TRA could add value to this research (Table 3.1). Although in essence all the theories (DIT, TRA) are precursors of TAM, it has been argued that the DIT and the TRA provide more flexibility than TAM (Holden & Karsh, 2010). For such reasons, the ideas from the two theories will be used to aid the designing of the semi-structured interview questions. For the subsequent data analysis, which will involve a combination of both the interview data and the survey sheets, the principles from both the DIT and the TRA will be applied to aid a broader understanding of the nurses' perspectives.

**Table 3.1 An overview of the theories.** (Ajzen, 2002; Davis, 1986; Igarria, et al., 1997; Rogers, 2003; Sheppard, et al., 1988)

THEORY	KEY PRINCIPLES
The Diffusion of Innovation Theory	Internal& external factors can influence decisions about ideas or new technologies:  Examples: Time, the social system, the compatibility of the innovation, existing values.
The Theory of Reasoned Action	Internal factors are influenced by external factors:  Examples: Attitude, Subjective norms, Behavioural intentions may all be influenced by other background factors.
The Technology Acceptance Model	A measurement of certain internal variables can be useful for finding out how accepting the individual maybe of utilising new technologies.  Examples: Perceived Compatibility, Perceived Usefulness, Attitude

### 3.6 Research process

This mixed methods thesis research involved qualitative semi-structured interviews with practice nurses and quantitative self-complete survey of district nurses. As previously discussed, mixed methods study allow two different forms of methods to compliment each other’s weaknesses (Adamson, 2002). In-depth interviews for example, can provide more rich and detailed information than other quantitative data (MacDougall & Fudge, 2001). However, quantitative forms of research such as questionnaires, can also allow numerical data on specific questions relevant to the thesis objectives to be obtained. Therefore, a mixed methods study was used.

Both forms of studies used in this research can be classified as health services research, framed by the mixed methods triangulation approach. The questions for both the semi-structured interviews and the self-complete survey questions were both shaped by key

themes, or issues, identified as being relevant to the three key thesis objectives. The principles from the Diffusion of Innovation Theory and the Theory of Reasoned Action were then used to broadly guide the semi-structured interview questions and the subsequent data analysis. Both the principles and the suggestions were then equally used for the subsequent data analysis.

### **3.6.1 Practice nurses**

A qualitative study using semi-structured interviews was used to study Canterbury based practice nurses' views on the possibility of implementing a telehealth chronic care intervention service. Qualitative methods are an ideal method for exploring new concepts or research areas (Bowling, 2009, p. 380). In semi-structured interviews, the interviewer and interviewee are also able to engage in a more informal dialogue. This may lead to the interviewee being more forthcoming (Hawtin & Percy-Smith, 2007, p. 86). Another major advantage of the semi-structured interview is its adaptability. While having a check list of questions around specific topics allows the researcher to consistently investigate specific issues with multiple participants, being semi-structured still allows the researcher the room to be flexible (Bell, 2005, p. 157) . Consequently, the interviewer can probe any new emerging themes and investigate motives and feelings, yielding richer material. As the purpose of the study was to explore the perspectives of practice nurses on a new form of health service that has not been previously implemented locally, a semi structured interview was seen as an ideal method.

## **Selecting the Participants**

The participants were recruited through the white pages telephone directory, then by the snowball sampling method. The snowballing method is a method that can be used when the total population list is not available (Payne, 1999, p. 64). The study was also advertised through the Rural Canterbury Primary Health Organisation. Participants were recruited from several sources to achieve maximum variation sampling to obtain a broad range of perspectives. The total number of Canterbury based practice nurses working in medical centres could not be confirmed (NZNO, 2010a). Interested persons could contact the researcher directly expressing an interest for more information, or to participate in the study.

## **Ethics Approval**

The Ethics approval for this study was received from the University of Canterbury Human Ethics Committee (re: 2010/60/LR). Participants were required to give informed consent and were also given a written background information sheet prior to being interviewed. The contact details of the researcher were also provided on the sheet (Appendix 2).

## **Research Instrument**

A check list of open ended interview questions was structured around the first two thesis objectives (Appendix 3). This meant specific topics could be consistently investigated with multiple participants. However, the flexibility of the semi-structured interview format enabled the participants to elaborate or introduce relevant new topics. In structuring the interview questions, the following key principle from the Theory of Diffusion of Innovation and the Theory of Reasoned Action was consulted: to successfully introduce an innovation

into an environment, better understanding is needed of the environments' internal and external influences. Internal variables, such as a person's attitude maybe influenced by external factors (Rogers, 1983; Taylor & Todd, 1995b) such as the social system, the mode of communication, and the nature of the introduced innovation. Therefore, it is important to understand factors such as people's attitudes, and behavioural intentions prior to implementing any new innovation.

### **Data Collection**

Interviews were conducted either face to face or by the telephone, according to the participant's convenience, with 49 practice nurses. Although it has been criticised that people maybe more reluctant to speak to an unseen 'voice' for telephone interviews (Hawtin & Percy-Smith, 2007, p. 87), the researcher found providing the two options useful. It was found that while some participants preferred the sense of anonymity that telephone interviews gave, others wanted the option of being able to have a face-to-face interview with the researcher. Both types of in-depth semi-structured interviews took around 20 minutes. All interviews were conducted at a time of the participant's choice. All face to face interviews were conducted individually in a private and convenient room of the nurse's choice. This was for the purpose of building rapport and trust with each participant. All interviews were conducted in English. Interviews were audio taped with participant's permission. Notes were also taken during the interviews with participant's permission. Following the occurrence of two significant earthquakes in Christchurch, the process of data collection was interrupted. Therefore, the views of practice nurses presented in the next chapter are limited to interviews conducted just prior to occurrence of earthquakes.

## **Data Analysis**

Data analysis was undertaken by the principal researcher. While some literatures recommend an external agency or individuals should transcribe qualitative data (Bertrand, Brown, & Ward, 1992), this was not possible for this research due to financial and ethical constraints. Furthermore, it has also been suggested that with in-depth studies, the researcher may be best suited to transcribe, taking opportunity to explore data to identify major themes most relevant to the key research questions (Pearson Education, 2010). All recorded interviews were transcribed by the researcher. All data were classified, coded, categorised and then analysed according to previously determined or emerging themes. The analysis of the interview transcripts were guided by the Interpretive Phenomenological Analysis approach (IPA). This method involves reading one transcript in detail, prior to moving onto the next transcripts. The transcripts were read a number of times, with important thoughts or comments noted in one margin. Any emerging themes were then identified, listed on a separate page, coded and categorised. Attention was paid to the predetermined themes, which connected the emerging themes.

The primary themes identified in the interviews included the following: the current practice in the prevention and management of chronic conditions by the Canterbury based general practices; the key needs faced by the general practices in meeting the health needs of their population, identifying the key user groups, the idea of a telephone based chronic care intervention; the perceived compatibility of such services; the role of telehealth in primary health care, and the evolving role of the practice nurses.

### **3.6 2 District nurses**

A quantitative study using a structured questionnaire survey was used to understand the

perspectives of the district nurses from a major community nursing organisation in Christchurch. The strength of a structured questionnaire is its capacity to systematically ask specific questions with set objectives, leading to the opportunity for robust statistical data analysis (Bowling, 2009, p. 18). It is also economical and convenient for studies with specific timeframes (Rossi, Wright, & Anderson, 1983, p. 196). Utilising a quantitative study in this case was considered appropriate because it provided the opportunity to focus on TAM variables, critical to understanding the potential for telehealth with a specific professional group. As one of the objectives of the self complete survey was to assess the nurses' level of experience and comfort with technologies, the surveys were distributed via paper copies only. Internet or computer based surveys were not used. This was to avoid potential sample biases (not everyone may have access to a computer, or be comfortable filling out a survey via the internet).

### **Selecting the Participants**

Unlike the practice nurses, the district nursing cohort were all contracted to one community nursing organisation. The nursing organisation is privately owned. This nursing organisation had previously expressed interest in implementing a home telehealth chronic management service, similar to the one first trialled by Kaiser Permanente (Johnston, et al., 1997) and subsequently by Birmingham OwnHealth (Birmingham East and North Primary Care Trust, et al., 2007). In all, 75 district nurses were identified by the nursing organisation as employed either full or part time. The district nurses employed at this organisation were identified as belonging to two sub groups: registered or enrolled nurses.

## **Ethics Approval**

The Ethics approval for this study was received from the University of Canterbury Human Ethics Committee (re: 2010/60/LR) prior to developing the survey questionnaires (Appendix 2). Each survey sheet contained written background information of the study and the contact details of the researcher.

## **Research Instrument**

A questionnaire was developed, asking a series of questions based on the principles of TAM. The questionnaire was then piloted by a small group of nurses attending a postgraduate course at the University who would not be involved in the main study. This led to minor modification. Input into the design of the questionnaire was then obtained from a research nurse and a management staff member from the nursing organisation. The final questionnaire focused on demographic information; four variables from an augmented TAM (behavioural intention, attitude, perceived compatibility, perceived usefulness) to gauge the receptiveness to a telephone based chronic care intervention, and the district nurses' perspectives on the nature of the service, the delivery mode and their own ability. The questionnaire also assessed the receptiveness of the district nurses to the role of technology (past and the future). The wording of the three variables from the TAM was constructed according to the guidelines first proposed by Ajzen for the TRA, a precursor to TAM (Ajzen, 2002). All questions from the self complete questionnaire could be categorised according to the four categories mentioned above. In total, 46 closed questions using a 5 point Likert scale was included in the survey. The questionnaire was written in English only (Appendix 5).

## **Data Collection**

Paper copies of the self complete questionnaire were distributed by the nursing organisation to all district nurses employed by the organisation. The nurses were given a period of two weeks to return the survey via either a self-stamped envelope, or by a returning box placed within the organisation's building. Following the occurrence of two significant earthquakes in Christchurch, a formal follow up study for those who did not return the survey was not possible due to the organisation's protocols.

## **Data Analysis**

Returned survey sheets were numerically coded. Data collected were entered into a spreadsheet using Excel, before being transferred into a Statistical Package for Social Sciences (SPSS) format version 19.0. The descriptive statistics included frequencies and percentages of responses. The Mann-Whitney U test was used to test for reported past experiences with different technologies; and with different characteristics of district nurses (examples used: enrolled or registered; overseas work experiences or New Zealand only; test for age; or work experience differences). Chi-square test was used to assess relationships between past experience with a particular technology (ie. cell phones) with future intention of using the same or similar technologies. An alpha level of  $p < .05$  was adopted for all of the statistical tests (Santosh & Crampton, 2009).

## **3.7 Conclusion**

This chapter outlined the research instruments, and the method of participants' selection, data collection and data analysis used in the thesis to evaluate the nurses' perspectives on the possibility of implementing a telehealth chronic care intervention service in Canterbury. The next two chapters will summarise the findings from the mixed methods study used to meet

the three key thesis objectives. The first two objectives were relevant to practice nurses. The third objective was relevant for district nurses.

## **CHAPTR FOUR: Practice nurses' interviews**

### **4.1 Introduction**

This chapter presents the findings from the qualitative semi-structured interviews conducted with the practice nurses. The results from the interviews are presented according to the order the interview questions were asked. Background information, including the work experiences of the practice nurses are presented first. This information was asked to examine the past and current context of the practice nurses' experiences, and to recognise that previous and current experiences shape our views (Chapter Three). The health system for both the patients and the professionals are multilayered, and not free from wider socio-economic and political implications. If such influences were not to be discussed, this study would be less informed.

This chapter also present the current practices utilised by Canterbury based general practices to prevent and manage chronic conditions, as identified by the practice nurses. The key health needs facing the general practices, and the additional related needs faced by the primary health care teams to meet the needs of their populations are also discussed. Practice nurses' views on both the proposed telehealth service and the broader spectrum of telehealth and its wider implications for the primary health care sector are also presented.

### **4.2 Background Information**

In total, 49 Practice nurses participated in the semi structured interviews. More interviews with other practice nurses who had expressed interest in participating in the study were cancelled due to significant earthquakes that took place in Christchurch during September 2010 and February 2011. The participants from this study were either full time or part time practice nurses. All participants were female. Two participants reported working at more than one general practice at the time of the interview. The general practices the nurses worked in

were located across the wider Canterbury region. Figure 4.1 presents the location of the general practices for the forty nine participants. The practice nurses were first asked about the number of years they had worked as a nurse, and the nature of their working experience. Forty six participants reported between 20-30 years of work experience as a nurse. Upon being asked about the number of working years, one nurse recalled:

*I've been a practice nurse for 27 years...prior to that, had 10 years of home bringing up 5 children...and prior to that, was hospital trained. That was when the training came in, at the polytech...was working in couple of places here and there, with the night shifts...and this was when the children were small...(Practice Nurse 39)*

More than two thirds of the total participants reported being New Zealand trained. Of the participants who reported overseas training, all reported the UK as the country of their initial training. The nurses who reported between 20-30 years of work experience or more reported wide forms of nursing experience overall, prior to becoming a practice nurse. The forms of experience ranged from having worked as a NZ Army nurse, in a psychiatric ward at a hospital, district nursing on the West Coast, as a prison nurse, in a dermatology and urology ward at public hospitals, in rest homes and community nursing organisations, as well as district nursing in community nursing organisations. The nurses who reported less than 20-30 years of experience on the other hand, reported less diverse forms of work. Previously having worked at a hospital was the most common form of work experience reported.

Upon being asked about the nature of their experiences as a practice nurse, the participants reported a broad range of answers. Some reported having practised in the UK prior to relocating to Christchurch, while others reported having practice nursed within the Canterbury region only. Those who mentioned having practice nursed within the Canterbury region only, reported having practised across a number of general practices over the years.

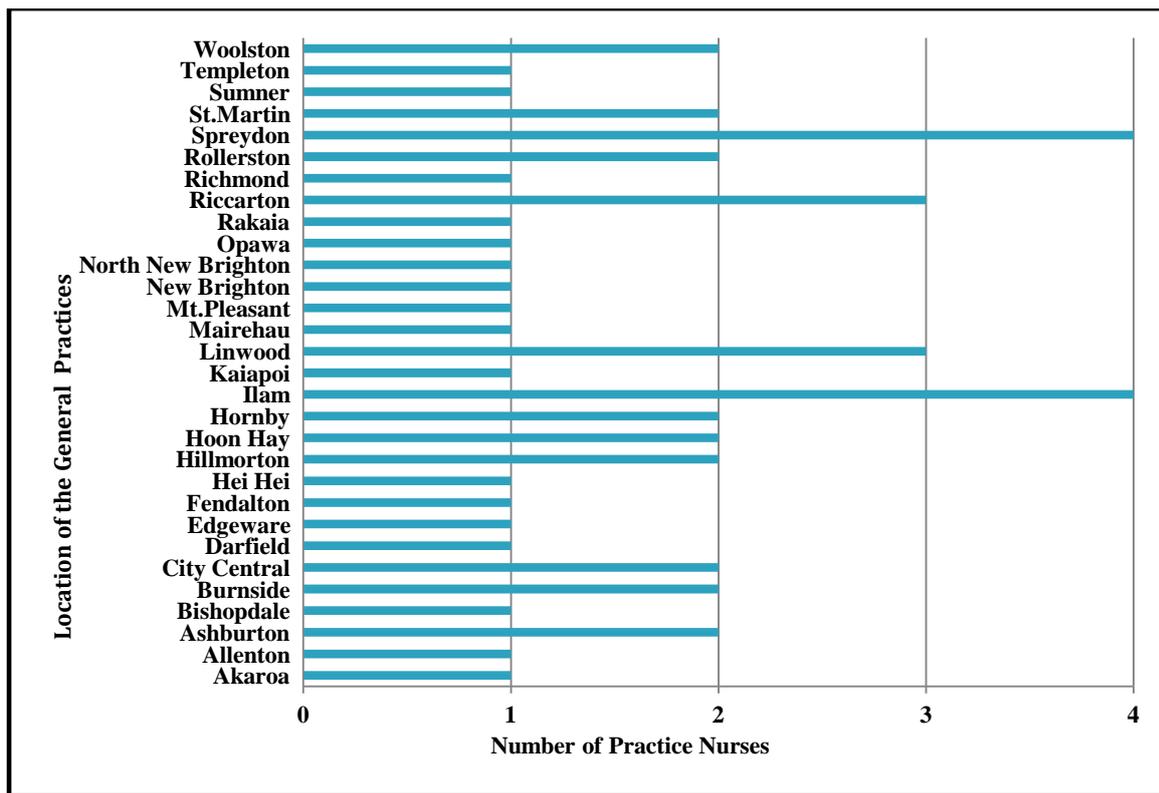


Figure 4.1 Locations of the General Practices for the 49 participants.

### 4.3 Current Practices in the prevention and management of chronic conditions

#### Introduction

The first thesis objective could be divided into two parts. The first part was to identify the current practices in the prevention and management of chronic conditions. Therefore, the practice nurses were asked to identify any services their general practice was currently providing to prevent or manage chronic conditions for their population. This was to understand what services already exist. As discussed in chapter 3, a key principle from the Diffusion of Innovation Theory (DIT) was also broadly applied here, as the DIT suggests an understanding of the existing social systems prior to introducing a new practice or idea is crucial (Rogers, 1983). The services mentioned were categorised into three groups: national, regional, and local. Table 4.1 summarises the answers given.

**Table 4.1 The Current Practices utilised by general practices for preventing and managing chronic conditions, as identified by the practice nurses**

Provider Level	Services
<b>National</b>	Care Plus The Green Prescription The Diabetes Annual checkup HEHA Appetite for Life Before School Check Smoking Cessation projects
<b>Regional</b>	Active Canterbury PEGS Smoking Cessation Programme The Access Project
<b>Local</b>	Teletriaging Home assessments by the practice nurses for the elderly in rural communities Free drop in sessions with the nurses or general health information

While there was consistency in the way the nurses reported the national services they identified as being directed towards prevention and management of chronic conditions, there was slight variation across the regional level programmes. The reported differences could be partly explained with different general practices being affiliated with different local health bodies. An example of this would be the Access project, initiated by Pegasus Health Independent Practitioners' Association (IPA). The Access project was mentioned only by the

nurses working at general practices affiliated with the Pegasus Health IPA. Active Canterbury on the other hand, is driven by the Canterbury DHB. For this reason, there was no difference in the way Active Canterbury was mentioned by the practice nurses, regardless of to which PHO/IPA they belonged.

### **Local Initiatives**

From the interviews, practices were identified as providing forms of additional services unique to the general practice to meet the growing needs of their population. These services were context specific, with two rural based practices identified as providing either home assessments for the elderly in the community, or free drop in sessions with practice nurses to answer enquiries about general health information. The small size of the community, the large elderly population, and not being able to have a separate phone line to provide triage service, were identified as the key factors that had driven the pragmatic initiatives.

*Because this is a small area...the GPs get concerned about those who may not be well, not coming into the practice. He sends one of us out to do home visits... (Practice Nurse 47)*

### **Teletriaging**

However, the most common form of additional service identified by the practice nurses was teletriaging. The telephone was seen as currently playing a significant role in the everyday day-to-day operation of the general practices. It was noted that many nurses thought the proposed service would be an extension of telephone triage services they were already providing. While the telephone was seen as playing an important role for administrative

purposes, what emerged from the interviews was the way the role of the telephone and the importance of teletriage in primary health care had evolved over the years.

*We have always done it, but now we have a direct phone line for the patients and they press one and go through to the nurse...and there is a message system so if we can't answer the call, they can leave a message and we can ring them back. So we've had that for about three...or four years. But before that, they could always contact a nurse available, just that we didn't have one specifically doing that all day. We've been doing this because in the recent years, we have just become so much busier...we have more patients...so it has become streamlined. (Practice Nurse 1)*

Almost all the nurses (45/49) reported having a separate telephone line in their general practice, where patients could call during the practice opening hours and ask to speak to a practice nurse. The patients were found to use the teletriage service for various needs, including results about their blood tests, medication prescription, to general health advice. The operating nature of teletriage service slightly varied across different practices. While most practices had a nurse rostered to answer the phone line, one nurse reported that in their general practice, the last hour of the day was additionally set aside exclusively to contact any patients who had left messages on the answering machine.

## **Summary**

The practice nurses were asked to identify the current practices used in Canterbury based general practices to aid their populations prevent and manage chronic conditions. National, regional and locally initiated services were identified. In particular, teletriage was identified as an important service by a majority of the nurse involved in the study. The next section will

present the user groups most and least likely to be currently accessing primary health care services, and their key health needs.

#### **4.4 Identifying the user groups**

##### **Introduction**

The first thesis objective could be divided into two parts. The second part of this objective was to identify any potential problems faced by the general practices in meeting the needs of their population. In order to address this, it was important to first identify this population.

Therefore, this section will first present the groups identified as more likely to come in late to general practices, and then discuss the health needs of specific groups.

##### **Identifying the high user groups**

While some believed there was a relationship between people's personalities and being more likely to seek primary health care,

*Like I said, some are just over anxious...some are very concerned of their health, when others put it off, hoping it will go away. (Practice Nurse 2)*

People with higher socio-economic status, and mothers with children emerged as most likely to access primary health care. Being able to afford the cost of the visits to the general practice was identified as an important factor determining people's ability to access primary health care. Other factors such as being more educated and aware of one's own health state were reported as being likely to influence people's tendency to seek primary health care:

*They are the ones who are more educated...and have more money...and they recognise it...and often business people, because they need to be at the top of their game. (Practice Nurse 39)*

### **Identifying the late user groups**

On the other hand, the nurses were asked who they thought were most likely to delay accessing primary health care. Delayed access to primary health care consequently delays access to the existing services in place to prevent exacerbation of major chronic conditions. The nurses reported the following groups as most likely to delay accessing primary health care: low socio economic groups, Maori and Pacific peoples, refugees and migrants, including the elderly Asian migrants. Men were also identified as being more likely to delay coming into general practice than women overall. Age was not identified as a differentiating factor for males, with both the younger and the older men noted by the nurses as less likely to access primary health than women, overall.

### **Low socio-economic groups**

Nurses based at practices situated at neighbourhoods with higher deprivation needs (New Zealand Index of Deprivation Levels 9-10; Appendix 5) were more likely to mention financial issues as a prime barrier preventing their population from accessing primary health care. The lower socio-economic groups were identified as facing two following additional barriers: financial constraint, as well as time constraint. For example, one nurse discussed how for a population working in factories and living on low incomes, a visit to the general practice was seen as an unaffordable service beyond the financial scope and the working hours:

*...because it's hard to get hold of, and if they are working in factories and things like that... remember that I think 62 per cent of our population are low decile. (Practice Nurse 43)*

### **Maori and Pacific population**

Maori and Pacific population were mentioned by most nurses (45/49) as being highly likely to come into general practices at later stages of multiple chronic conditions. Financial and cultural barriers were cited as the primary reasons for such cases. For many Pacific peoples, language and cultural differences, including differences in the communication methods were identified as presenting additional barriers between the primary health care professionals and the patients during the consultation process:

*Pacific Islanders tend to be quietly spoken. If you know...you can understand them better. I still have trouble with some of their names...but you sort of work it out.* (Practice Nurse 48)

### **Refugees and migrants**

One practice nurse in an area with high Asian migrant population commented,

*They come in for the smallest sniffle. Asians. They come in for everything.* (Practice Nurse 34)

It is highly likely that the geographical location of the general practice, could have influenced this view. This specific general practice was located at a suburb in Christchurch where Asia was most commonly identified as the residents' birthplace. Overall though, Asian elderly in particular, were identified as being hesitant of coming into general practices due to language difficulties:

*I tend to see, like in the Asian immigration group... some groups are difficult, like the over 75...They don't usually come in unless their children have asked them to come in, or bring them in. It is often difficult, because of the language thing...* (Practice Nurse 20)

However, the language barrier was a health barrier not limited to the Asian migrant population. During the course of the interview, three practice nurses discussed the language barrier as extending to refugee groups. Cultural differences were cited as another barrier between the primary health care providers and the non-English speaking population.

*We take nearly 1000 refugees and they are very hard work...they require more work and management. Their understanding of things is quite, quite different...especially if they have not been educated in New Zealand...It has to be put into very simple terms often...fortunately we have interpreters available and things like that. (Practice Nurse 36)*

### **Men**

Men were also identified as a population group more likely to access primary health care at later stages of their chronic conditions. The nurses commented during the course of interview that men overall, were more reluctant to use primary health care than women. Men were seen as being reluctant to use general practice for prevention purposes only and more likely to come in at later stages of their chronic conditions. Age was not reported as a differentiating factor, with both older and the younger men being cited as less likely to come into general practices than women of the same age groups. The opening hours of the general practices coinciding with people's working hours was identified as one reason why men may be less likely to come into the general practices. It was noted by one nurse that Maori, Pacific and Indian men were seen coming into this specific practice at later stages of obesity and diabetes.

### ***Rural population***

Two rurally based nurses reported that the elderly rural population may be coming into general practices at later stages of their chronic conditions. Distance was seen as a potentially contributing factor. These nurses commented that their views were based on their years of practice having worked across both urban and rural areas in the Canterbury region. However, the rural population and their health needs were not seen as homogeneous, with some differences noted between different age groups. For instance, young mothers with children based in rural areas were seen as a very proactive user group by the practice nurses. It was specifically the rural elderly who were identified as being most likely to come into general practices at later stages of their chronic conditions:

*We have a lot of older population. You know, rural farming area...basically, they don't come in until they are absolutely stuffed...It's a really stoic population. (Practice Nurse 19)*

### **Summary**

People with higher socio-economic status and mothers with children, were identified by the practice nurses as most likely to be currently accessing primary health care. People with proactive personalities, educated and concerned about health were also identified as being more likely to access primary health care. On the other hand, people of lower socio-economic status were identified as being less likely to access primary health care. Specific population groups, such as Maori and Pacific peoples, refugees and elderly migrants, the rural based elderly were also identified as being less likely to access primary health care. Men were also identified as being less likely to access primary health care services than women of their same age group. The next section will present the key health needs faced by the Canterbury

based population, and the problems faced by the general practices to meet these needs, as identified by the practice nurses.

#### **4.5 Identifying the key needs**

##### **Introduction**

The second part of the first thesis objective was to identify any problems faced by the general practices in meeting the needs of their population. The user population, and its sub groups were identified in the previous section. To identify any problems in meeting the needs of the user population, an overview of the key health needs first was necessary. Therefore, the practice nurses were asked what type of chronic conditions the patients present with most in their general practices.

##### **Current Trends**

Diabetes, COPD and related illnesses were reported by almost all (47/49) of the nurses as the key chronic conditions that patients present with most frequently at general practices. This was regardless of the areas in which the practice was based. The additional chronic conditions reported included heart diseases, sleep apnoea, depression. However, there was a slight variation across the practice nurses on the additional chronic conditions reported, depending on the location of the general practice and its level of neighbourhood deprivation. For example, a nurse based at a rural practice reported chronic conditions related to farming injuries and the need for on-going wound care. A nurse practising at an urban practice in an area of high socio-economic deprivation reported on the other hand, chronic conditions such as kidney failure. This particular nurse also reported high mental health needs in her area:

*Infact, I should've mentioned that in the first question, but chronic mental health conditions are huge in this practice...borderline personalities, schizophrenia, bipolar, lot of overdose, history of overdose and self harm... (Practice Nurse 44)*

Such chronic mental health needs, including depression were also discussed by nurses from other general practices. Therefore, while diabetes, COPD and related illnesses were identified as major chronic health needs faced by the general practices, other health concerns such as chronic mental health needs were also identified. There were also variations depending on characteristics of the general practice.

### **Past Trends**

The nurses were asked to reflect on patterns of major chronic health needs. A majority of the participants (40/49) reported during the course of the interview, that the pattern of chronic health needs reported was not new. Instead, the participants reported that they had seen a growth of patients presenting with such conditions during the time they have worked at their current general practices. However, there was some dispute among the nurses on the cause of this growth. While some thought the growth was due to a rise in the number of such chronic conditions, others thought it was due to a combination of better public awareness, and an evolved health system that had come to recognise the importance of preventive care. Such thoughts are well summarised by this participant:

*I'd say, with testing and new structure of the health system, that probably these problems have been around. Like COPD would've been bronchitis. Diabetes was probably under detected, blood pressure was under checked. I mean, there is obesity, cholesterol...but it's modern testing giving these diagnoses now. (Practice Nurse 46)*

## **Summary**

A majority of the practice nurses involved in this study identified the key chronic health needs faced by the Canterbury population as Diabetes, COPD and related illnesses.

Additional health needs were also identified, such as chronic mental health conditions. Slight variations were found, depending on levels of neighbourhood deprivation and other characteristics of general practices. The next section will discuss some of the key challenges faced by the practice nurses to meet the growing chronic health needs from their population.

## **4.6 Meetings the key needs: challenges faced by practice nurses**

### **Introduction**

This section presents the key challenges, as identified by the nurses in meeting such health needs of their population.

### ***Workload***

There was a general consensus from the practice nurses that the workload faced by the general practice teams had increased over the years. In particular, the nurses noted that the workload for the practice nurses had both increased and had become diverse. The nurses attributed such changes as being due to an increase in the number of people coming in with chronic conditions, as well as growing expectations placed on the practice nurses to fulfil a wider range of both clinical and non-clinical roles. As one nurse commented:

*Nowadays, I find spending more and more time doing administration and office work and that is not why I started nursing...It's not about money but about time. Nurses are being asked to do more and more things, but within the limited time and space they are employed at*

*their workplace. We are supposed to talk for 5 minutes and tell people to leave...and working with people is not like that... (Practice Nurse 25)*

While reviewing how the demands of non-clinical work have come to gradually increase over the years, many of the more experienced nurses have also commented on the gradual increase of autonomy they had seen in the field of practice nursing:

*I have been a practice nurse for 27 years. Yes, a lot more...a lot more sicker people needing huge amount of input... (we get) questions around chronic illness, education, medication...we have a nurse triaging the telephone and we are frantically busy... I have been a practice nurse for 27 years, but altogether, about 40 years. The amount of work we are allowed to do, within our scope...it's just amazing compared to the day when I started nursing. Okay, there is the knowledge and the time factor, but the things that we are allowed to do is just unbelievable. It's increased just so much...and widened our ability to up skill and train and learn new ways of doing things... (Practice Nurse 39)*

### ***Funding***

Having sufficient funding to provide for the growing health needs of the population was another important challenge identified by the practice nurses, as currently facing Canterbury based general practice teams. While a number of funding streams are in place to aid the high needs population gain access to primary health care were identified (examples: Green Prescription, Care Plus, Services to Improve Access to Care); nurses from higher deprivation index areas were more likely to report that their general practices were constantly running out of funding to provide for the needs of their population.

*Careplus is another one. Which we overused and lost access to...but we've got some more funding for that now. We had such a high number of people needing various things, that they just couldn't pay for... (Practice Nurse 43, Deprivation Index of the Area:10)*

### **Cultural**

During the interview, several nurses specifically discussed the challenges of providing health care services for people of different cultural backgrounds. For example, nurses discussed how in some cultures women will only see a female doctor. Different communication methods and languages differences were also discussed by the practice nurses as some of the key challenges faced by the practice nurses in meeting the needs of the migrants and refugee groups. The following comment made by one nurse illustrates a situation similarly described by other practice nurses:

*And also here we have a population of refugees that come here now...they are Afghani, Butanese...we are becoming more culturally aware of different people's health needs and how you know, how the ladies don't see the guy doctor, they've got to have a female doctor...and we need translators (Practice Nurse 46)*

### **Summary**

During the interviews with the practice nurses, it was revealed that the nurses were facing a broad range of challenges to meet the growing chronic health needs of their population. There was a general consensus from especially the more experienced nurses, that the workload faced by the practice nurses had both increased and diversified. Some nurses also discussed the impact of this change, and the challenges the evolving role of the practice nurses can bring, in everyday situations. Financial and cultural challenges were also identified.

## **4.7 Gauging the idea of a telephone based chronic care intervention service**

### **Introduction**

The second of the three thesis objectives was to assess the receptiveness of the practice nurses to the idea of telehealth. This thesis objective was also the last objective specifically relevant to the practice nurses. Perceived compatibility has been identified as an important factor to influence peoples' willingness to adopt a new practice (Sanson-Fisher, 2004). It was important to incorporate some of the key principles from the theory of diffusion of innovation (Chapter Three). For these reasons, the participants were read a hypothetical scenario about the proposed service (Appendix 3) and asked to comment on the perceived compatibility of such service as part of their own practice or delivered by an external agency. This section will now present the findings on the nurses' thoughts on the compatibility of the proposed service for themselves, and their own patient population.

### **Perceived compatibility of the service if provided by nurses within the general practice**

The most common form of the initial responses given by the nurses was to assert that they were already doing something similar to the proposed service. The telephone was seen as a form of familiar, yet valuable technology currently playing a major role in the primary health care sector. The majority of the practice nurses perceived the proposed telephone based chronic care intervention service as an additional form of the teletriage services that they were already providing. The nurses who did not see the proposed service as being compatible with their current situation were found to be concerned by: the loss of face to face relationships with their patients; the existing workload; and the spatial limitations of their current general practices.

### **Loss of face to face contact**

The loss of face to face contact was identified as the biggest source of concern for the practice nurses. This was identified as having many implications for the nurses. Some discussed how they felt it would affect their job satisfaction.

*I'm not sure, I can't quite imagine it. It'd be sad to lose face to face contact with people.*

(Practice Nurse 42)

While the nurses maintained that teletriage was already an important part of their everyday nursing practice, they discussed not wishing to replace clinical work, with what was perceived as with additional telephone work. Others felt that it would create barriers to good clinical decision making. As illustrated by the comment below, the nurses questioned the ability to provide accurate health advice when you could not see the body language of their patients. Body language, was seen as being an important part of making accurate clinical decisions.

*And as I said, I can tell a lot from somebody's face, and they can have a big wallie on the phone. "Yeah, I have been having a really good diet this week", you know. But inside, they are thinking, "Actually, I did have fish and chips three times...". So yeah, you can tell a lot from face to face. So if you can get them to come, and then we've got it. (Practice Nurse 46)*

### ***Existing workload***

The existing workload, and its effect on the practice nurses was previously discussed in 4.6. The nurses who did not view the proposed service as being compatible, reported that they saw the proposed service as adding to their existing workload. Nurses based at smaller general practices also questioned how they could allocate time to provide the proposed

service, when often they were the only nurse present at the practice. Even at general practices with two nurses, the participants questioned their ability to balance their time.

*That'd be quite difficult...unless you are purely dedicated to the telephone. It would take people out of their workload and we have only two nurses in this practice... (Practice Nurse 42)*

### ***Physical barriers: Spatial limitations***

The physical size of the general practice and the allocation of space were discussed by several nurses during the course of the interviews. The physical space available to the nurses was seen as having many implications for telephone services. While some saw the lack of space actually being a physical barriers for implementing the proposed service,

*It would depend on the building they are working, how many rooms they've got...sometimes, you just need that physical space to do something and a lot of the practices don't have that space... (Practice Nurse 32)*

Others saw the lack of physical space having additional implications. Issues such as privacy and confidentiality were discussed. The nurses were concerned that in a new, separate service involving the telephone, there would have to be means to ensure that the patients' private information would be kept fully confidential. The nurses saw the lack of physical space in their general practices as being of substantial barrier for achieving this.

*In this work environment space, it would be hard...it's just a small building...and you would have to make sure you can get complete privacy. It could be something left set up and in our own environment here, it would be quite hard for us to do something like that... (Practice Nurse 32)*

### *Perceived compatibility of the service for patients*

The most common form of the initial responses given by the nurses was to assert that while services of preventive and management in nature would further benefit their patients, they saw the proposed service as being compatible for specific population groups only. The greatest benefit of the proposed service was that it was seen as being cost effective, and time efficient. The elderly and those with mobility issues were identified as being most likely to benefit from the service. People with specific personality traits or with mental health conditions were also seen as being more likely to benefit from the service:

*It would benefit only the few...those who are motivated and interested. They are the ones likely to come in anyway. (Practice Nurse 16)*

*You know, I am thinking of one of our patients and he is agrophobic. He has major chronic conditions. So you know for him to come to the doctor, it is such a battle for him. We skyped him to talk about his asthma...triaged him when he was having a major chest infection than having to send a doctor around or a nurse...you know from a cost point of view, from a time point of view, it's a lot better... (Practice Nurse 9)*

While the nurses had previously discussed the difficulty of providing clinical services over the telephone and expressed reluctance to do so, some nurses saw the telephone being used for motivation purposes only, as a potential benefit of the proposed service. Several nurses also discussed the perceived benefits of other telephone services in place, such as the Quit Smoking Helpline. The nurses also discussed strongly how the proposed service should be used to encourage the public to further encourage access to primary health care, instead of being seen as a replacement service.

### *Perceived compatibility of an external service provider*

The practice nurses were asked who they thought should provide the proposed service. They were further asked about the option of having a health professional from outside the general practice providing the service. The nurses expressed strong views, with the majority stating that it should be the practice nurses providing the service for the enrolled population. This was seen to have several implications, with many nurses discussing the importance of the relationship between patients, and nurses. They discussed how a health professional who has already built a strong relationship with the patient is more likely to understand the patients' health needs. The nurses noted how being able to know the patients' background such as the family health history, an individual's medication history, as well as people's personalities meant the nurses could better diagnose and communicate with the patients.

However, some did express hesitation for the same reasons. One practice nurse based at a smaller rural community noted that having an external party would strengthen the service, in her case. This nurse expressed that due to the small size of the community, and the years of personal relationships she had built with her patients, that the patients may welcome an alternative provider:

*We are a small community, so I think it's good to have a variety- because otherwise, you get to know people too well... (Practice Nurse 47)*

### **Summary**

A majority of the nurses did not perceive the proposed service as being compatible with their current work situation. The nurses were most concerned about the loss of face to face contact, the size and the scope of their existing workload. Many nurses also saw the spatial limitations of their current general practices as being of additional barrier, with little space to work and

compromising patient privacy and confidentiality. The proposed service was viewed by the practice nurses as being compatible for specific population groups, such as the elderly and those with mobility or mental health needs. However, they expressed strong views that the proposed service should not be seen as a replacement service, but further encourage the public to utilise primary health care services. The nurses believed that should the proposed service be implemented, the patients would more benefit from the practice nurses being the key providers of the service.

#### **4.8 Assessing the receptiveness to telehealth**

The second objective of this thesis was to assess the receptiveness of the practice nurses to the idea of telehealth. As the proposed service was a telephone based chronic care intervention, the nurses were first asked about their perspectives on this specific service. However, as the second objective of the thesis was to gauge the nurses' views on telehealth overall, the nurses were also asked in their interviews about their views on implementing a chronic care intervention using different technologies. This was also necessary as it has been suggested that the characteristic of the innovation may influence its adoption (Rogers, 1983; Sanson-Fisher, 2004).

After the telephone, the texting service was reported to be the most common modern technological tool already widely used across a number of general practices. However in addition to the telephone and the texting service, other technologies were also discussed. One nurse from a rural practice described taking digital pictures of patients' wounds as part of her home assessments in the community. Another nurse described using Skype to contact patients with mental health or mobility issues.

The nurses were asked about the type of technologies they were currently using at their work places, and thought could be further used in primary health care for the purpose of chronic care intervention services. Such suggestions are summarised in table 2. However, a number of nurses expressed concerns that not all forms of such new technologies may benefit all age groups, cultural groups or socio-economic groups. Many nurses also questioned the issue of funding for such telehealth services, as well as the proposed telephone based service.

**Table 4.2 Summary of suggestions provided by the practice nurses on how technology may be further used in the primary health care sector**

Technology	Suggestions
Emails	<ul style="list-style-type: none"> <li>➤ Currently underused, when compared with cell phones.</li> <li>➤ Nurses commented on how emails could be further used for non-clinical forms of health services, such as to remind the patients about appointments.</li> <li>➤ It was discussed that this could be a very useful technology, particularly for the younger population.</li> </ul>
Skype	<ul style="list-style-type: none"> <li>➤ Educational purposes.</li> <li>➤ It was discussed by some nurses that they had seen it used at their monthly meeting with the Pegasus Independent Practitioners' Association (IPA), particularly in reference to providing health education services.</li> </ul>
Digital Photography	<ul style="list-style-type: none"> <li>➤ Could be further use in the rural based practices, although already being used.</li> <li>➤ Need to review the extent of the current use.</li> </ul>

#### 4.9 Summary

Through using a qualitative study method, the researcher was able to explore what strategies were currently being utilised across the Canterbury based general practices to prevent and manage chronic conditions. Here, it was found that national, regional, and local initiatives were having a number of positive effects. In particular, the teletriaging was seen as an important form of service practiced by number of practice nurses. The practice nurses were asked to identify the high and low user groups of primary health care. People with financial

difficulties, or with cultural and language barriers were identified as more reluctant to seek access to primary health care. Elderly based at rural areas were also identified as possibly delaying access to primary health care. In addition, men were also identified as less likely to visit to general practices than women overall.

The practice nurses identified diabetes, COPD and heart diseases as forms of health needs having most demand on the general practices and discussed how this demand had increased over the years. Other health concerns such as chronic mental health needs were also identified although there were variations depending on characteristics of the general practice. On being asked about the possibility of implementing a telephone based chronic care intervention service, the nurses seemed reluctant to provide this service as an alternative to their current clinical workloads. The loss of face to face contact was identified as the key barrier. The practice nurses also discussed the spatial limitations of the physical structure in the building they were currently working in presented them with. They also seemed somewhat uncomfortable with someone from outside the general practice providing the proposed service to their population. The nurses also discussed a number of ideas on how technologies may be used in the future as part of everyday nursing practice, with technologies such as emails and skype identified as potentially useful for delivering non-clinical forms of services.

## **CHAPTER FIVE: District nurses' survey results**

### **5.1 Introduction**

This chapter reports the results from a self-complete questionnaire completed by district nurses (registered and enrolled nurses) employed by a private community nursing organisation. The third objective of the thesis consisted of two parts. The first part was to understand the receptiveness of district nurses within a large community nursing organisation to the possibility of implementing a home telehealth service for chronic diseases management. The second part was to assess the possibility of using various everyday technologies as part of their everyday work practice (chapter 1). Therefore, the district nurses were first asked about their perspectives on a specific telephone service designed to provide support for people recently diagnosed with chronic conditions. The nurses were then asked about their views on a range of everyday technologies. This was to gauge the nurses levels of interests in future use of various forms of technologies for the purpose of telehealth as part of the district nurses' daily nursing practice.

The results are organised as follows: Background information of the participants are presented first. This is followed by findings from the survey questions that utilised four TAM variables (Behavioural Intention, Attitude, Perceived Compatibility of the service for the nurses, Perceived usefulness of the service for the patients). Further findings of the nurses' perspectives on the nature and mode of the proposed telephone service are presented. The nurses were also asked about their perceived abilities to deliver the proposed service. Finally, the district nurses' views on six forms of technologies are presented. The forms of technology included in this survey were: cell phones, cell phones with cameras, email, personal digital

assistant (PDA), Skype/web cameras and also Facebook/new technologies that have not been trialled previously.

## **5.2 Background information**

From a total of seventy five district nurses working at the community nursing organisation, twenty seven (n= 27) returned the survey. A summary of the respondents' background information are presented below (Table 5.1). From those who returned the survey, the response rate of the registered nurses was more than twice (RN= 42.59%; EN= 19.05%) that of the enrolled nurses (table 5.1). Only 4 enrolled nurses responded. Therefore, the small sample size should be taken into consideration when interpreting results. However, it must be noted that this research took place in the highly disrupted period of the Canterbury earthquake 2010 - 2011. Due to the period being a stressful time for participants, a standard research protocol of sending further reminders to return surveys could not take place.

All respondents were females. This finding is similar to the results from a national survey of primary health care and community nurses which also found an overwhelming majority of respondents were female (92.4%) (Ministry of Health, 2003, p. 5). The two groups of district nurses reported similar years of work experience. A majority of respondents reported having more than 16 years of work experience (RN=78.26%; EN=75%).

However, the two groups of district nurses reported slightly differently for the following: places of previous work experience (countries, geographical areas); and age groups. For example, the registered nurses were more likely to report having overseas experience than the enrolled nurses (RN= 56.52%; EN=25.00%). For those with overseas experience, the nurses reported having worked in the following countries: UK, Australia, South Africa, Zimbabwe, Mozambique and Thailand. Among the six countries reported, the nurses were most likely to

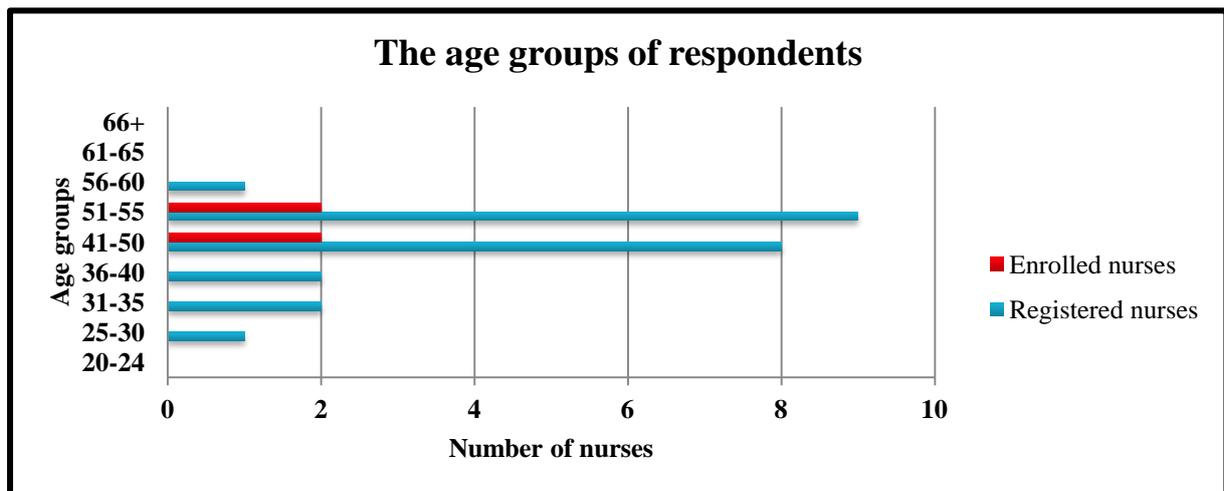
report UK and Australia. This finding is somewhat reflective of results from a 2008 national survey undertaken by the New Zealand Nursing Organisation (NZNO) that found overseas trained nurses in New Zealand are most likely to report England and Australia as countries of their original training (Brinkman, Wilson-Salt, & Walker, 2008, p. 9). The national survey did not separately examine countries of work experience for the New Zealand trained nurses.

From our survey distributed to the district nurses from one community nursing organisation, it was found that the registered nurses were slightly more likely than the enrolled nurses (RN=65.21%; EN= 50%) to report having worked at urban areas only (table 5.1). Overall however, more than half (59.25%) of the total 27 respondents reported urban only work experience. According to the national survey by the NZNO, fifty-four percent of primary health care and community nurses in New Zealand are based at an urban location (Ministry of Health, 2003, p. 11). Therefore, the workforce experience of our sample of district nurses is reflective of the national trend of work location.

From the survey distributed to the district nurses, it was found there was greater variation in the age groups reported by the registered nurses, compared with enrolled nurses (Figure 5.1). Such variations could not be seen in the enrolled nurses' group (Figure 5.1). However, the small sample size of enrolled nurses should be taken into consideration. Overall, a majority of all respondents reported being aged between 51-55 years old (77.78%). This is consistent with the findings from the latest national nurses' membership survey (NZNO, 2010b, p. 46) which found almost 75 percent of practising nurses in New Zealand are over 45 years of age. In the NZNO survey, it was found that those aged 51-55 years old made up the largest proportion of the working nurses in New Zealand (NZNO, 2010b, p. 46). Therefore, our sample population is reflective of the national trend in its age groups.

**Table 5.1 Respondents' background information (n=27)**

Characteristics	Registered Nurses (n=23)	Enrolled Nurses (n=4)
<b>Gender</b>		
Male	0	0
Female	23	4
<b>Work experience (years)</b>		
Less than 1	0	0
1-5	3	0
6-10	3	0
11-15	2	1
16 and more	15	3
<b>Place of work experience</b>		
New Zealand only	10	3
New Zealand and Overseas	13	1
<b>Place of work experience</b>		
Urban only	15	2
Mainly urban, but some rural	6	2
Urban and rural equally	2	0



**Figure 5.1 The respondents' age groups (n=27)**

### 5.3 TAM Variables

#### Introduction

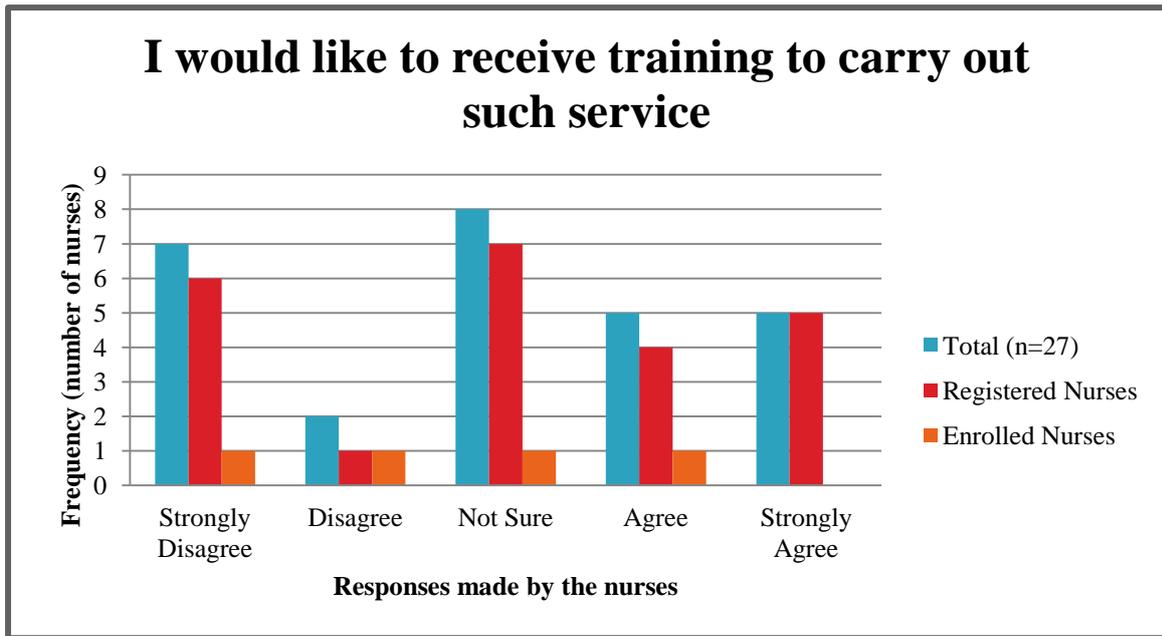
The third objective of this thesis was relevant to the study of district nurses and consisted of two parts. The first was to understand the receptiveness of district nurses from a major

community nursing organisation to a proposal for a specific telephone service proposed to provide support for people recently diagnosed with chronic conditions. The TAM has been found to be a useful tool in quantitative studies for assessing the health professional's responses when asked to trial new technology based innovations in health settings (Hu, et al., 1999). Therefore, four TAM variables (behavioural intention, attitude, compatibility and perceived usefulness) were included in the survey to aid meeting the thesis objective.

### **Behavioural Intention**

An individual's behavioural intention has been shown as an accurate predictor of the person's actual behaviour (Hu, et al., 1999, p. 98). The nurses were asked if they would like to receive training to carry out the proposed service. As illustrates below, the district nurses showed a mixed response (Figure 5.2).

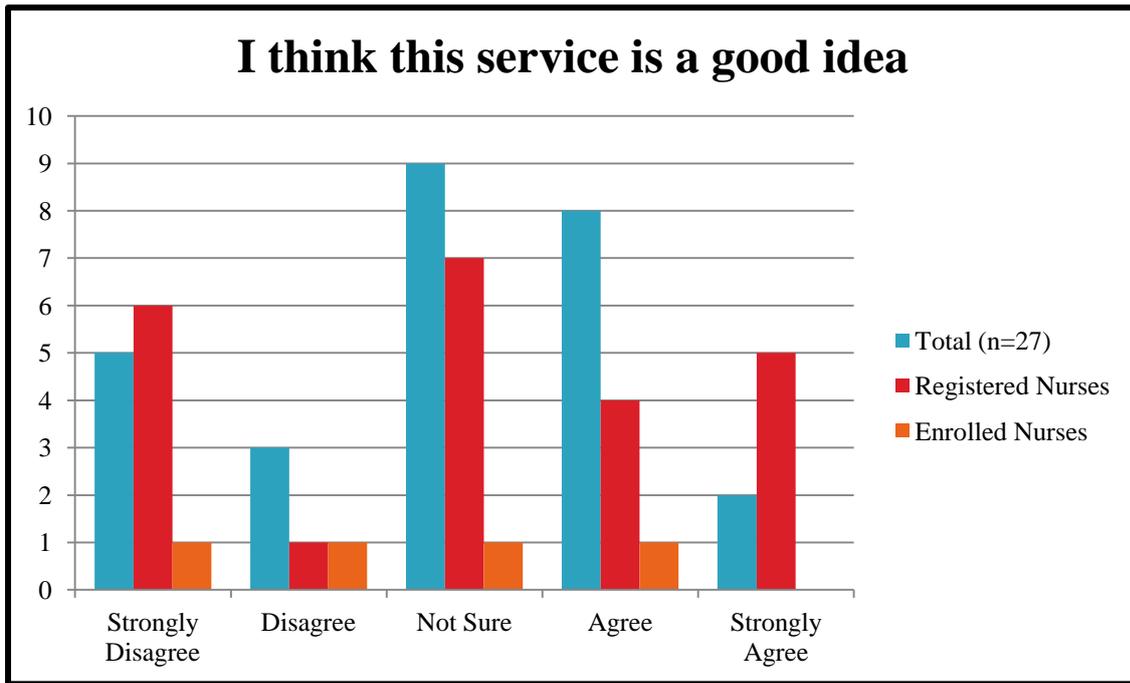
While one third of the sample agreed or strongly agreed that they would like to receive training (n=9; 33.3%), another third disagreed or strongly disagreed (n=9; 33.3%). The remaining third were not sure (n=9; 33.3%). There was a slight difference between the registered nurses and the enrolled nurses, with registered nurses more likely to agree or strongly agree that they would like to receive training (RN=9; 39.13%) than the enrolled nurses (EN= 1, 25%). The responses made by the enrolled nurses were overall more dispersed, suggesting a larger sample was needed to provide a clearer picture (figure 4.3).



**Figure 5.2 Perspectives of district nurses on whether they would like to receive training to carry out the proposed telephone service (n=27)**

### *Attitude*

Attitude can be defined as the measurement of degree to which an individual may have either a favourable or unfavourable evaluation of the proposed behaviour in question (Ajzen, 1991, p. 188). A TAM model variable, *attitude* was included in the survey to gauge the nurses' evaluation of the proposed service. The district nurses showed a somewhat mixed response overall. While more than a third (n=10; 37.04%) of the total sample either agreed or strongly agreed that the proposed service was a good idea, a further third were not sure (n=9; 33.33%). Eight district nurses either disagreed or strongly disagreed (Figure 5.3). This was more than a quarter (29.63%) of the total sample of district nurses.

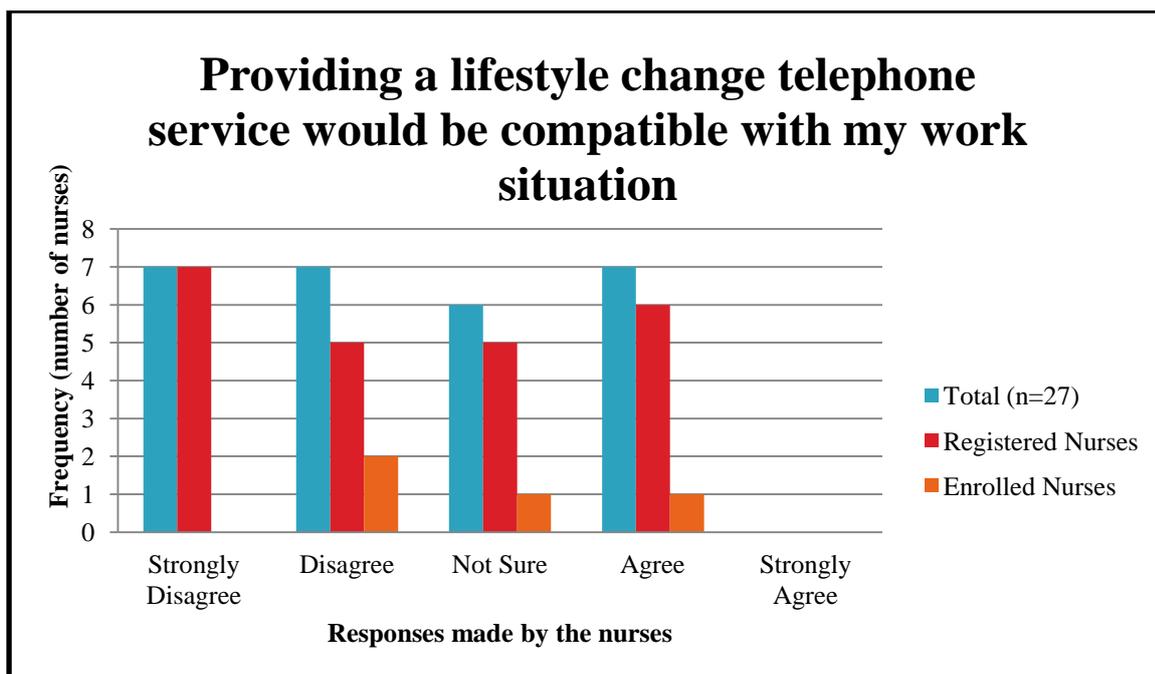


**Figure 5.3 District nurses' approval of the proposed service (n=27)**

*Perceived Compatibility of the Service for Nurses*

Compatibility has been defined as the degree to which the potential adopter perceives the innovation to fit with their current needs, existing values and previous experiences. It has been recognised as an important factor governing the eventual adoption of an innovation by both the TAM and the DIT (Lee, Kozar, & Larsen, 2003; Sanson-Fisher, 2004).

Nearly half of the total respondents disagreed to some extent (n= 14; 51.85%) that the proposed telephone service would be compatible with their work situation. The remaining half were nearly equally divided, either not being sure (n=6; 26%) or agreeing to some extent (n=7; 30%). When the data were analysed according to nurses' qualification, it was found that, the proportion of the registered and the enrolled nurses who had disagreed to some extent was similar (RN= 52.17%; EN= 50%). However, the enrolled nurses were less likely to have circled extreme answers in the survey (Figure 5.4).

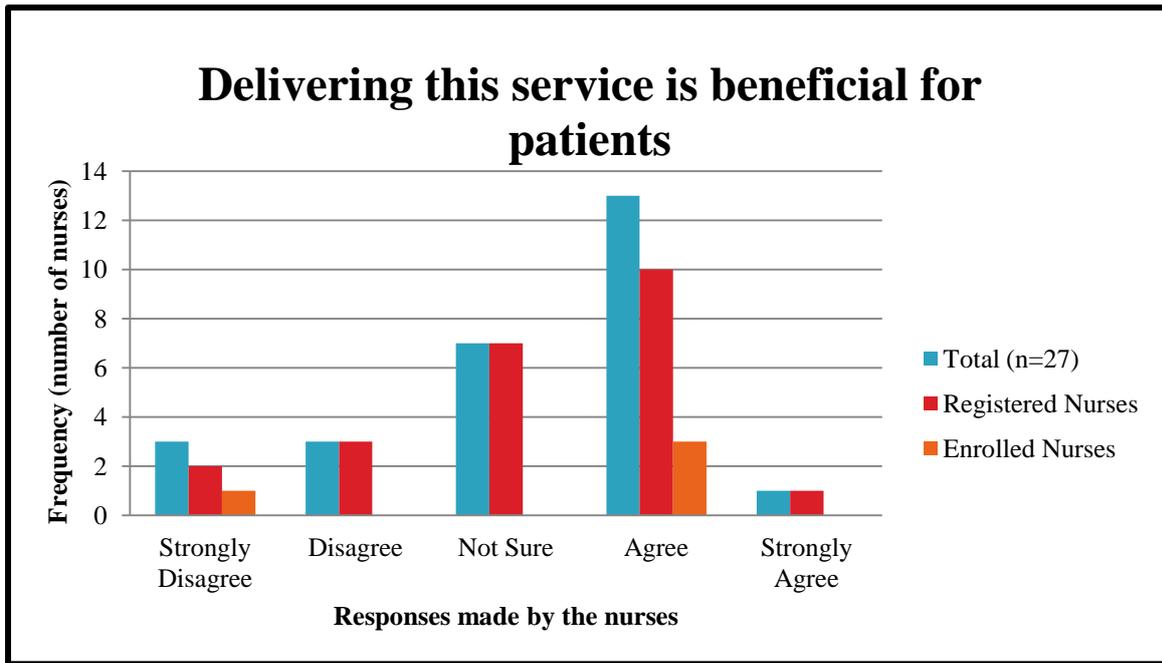


**Figure 5.4 Compatibility of the proposed service for district nurses (n=27)**

### *Perceived Usefulness of the Service for the patients*

Perceived usefulness has traditionally been found to be a key variable by the TAM in determining the acceptance of an innovation (Holden & Karsh, 2010). This question was asked to gauge the district nurses' views on how beneficial they thought the proposed service would be for their own patients. The nurses were most likely to agree to some extent that the proposed service would benefit the patients (mean=3.22; sd=1.043). More than half of the respondents (n=14; 51.9%) agreed or strongly agreed that the proposed telephone service would benefit their patients (Figure 5.5).

The findings revealed there was little difference between the two groups of nurses in the way that they had responded, with nearly half of both the registered nurses (RN= 11; 47.8%) and the enrolled nurses (EN=2; 50%) either agreeing or strongly agreeing (Figure 5.5). Overall, the remaining district nurses were similarly divided over between either being unsure (n= 7; 25.9%), or disagreeing to some degree (n=6; 22.2%).



**Figure 5.5 Perceived usefulness of the proposed service to patients (n=27)**

### Summary

Four TAM variables (Behavioural Intention, Attitude, Compatibility, Perceived Usefulness) were incorporated into the self complete questionnaire. This was to aid the survey gauge the district nurses' perspectives on the proposed telehealth service. District nurses showed mixed responses when asked if they would like to receive training to carry out the proposed service (Figure 5.2). Again, district nurses showed mixed responses when asked if they thought the proposed service was a good idea (Figure 5.3). Nearly half of all district nurses either disagreed or strongly disagreed that the proposed telephone based service would be compatible with their work situation (Figure 5.4). However, more than half of district nurses also agreed to some extent that the proposed service would be beneficial for their patients (Figure 5.5).

## **5.4 Further views of district nurses**

### **Introduction**

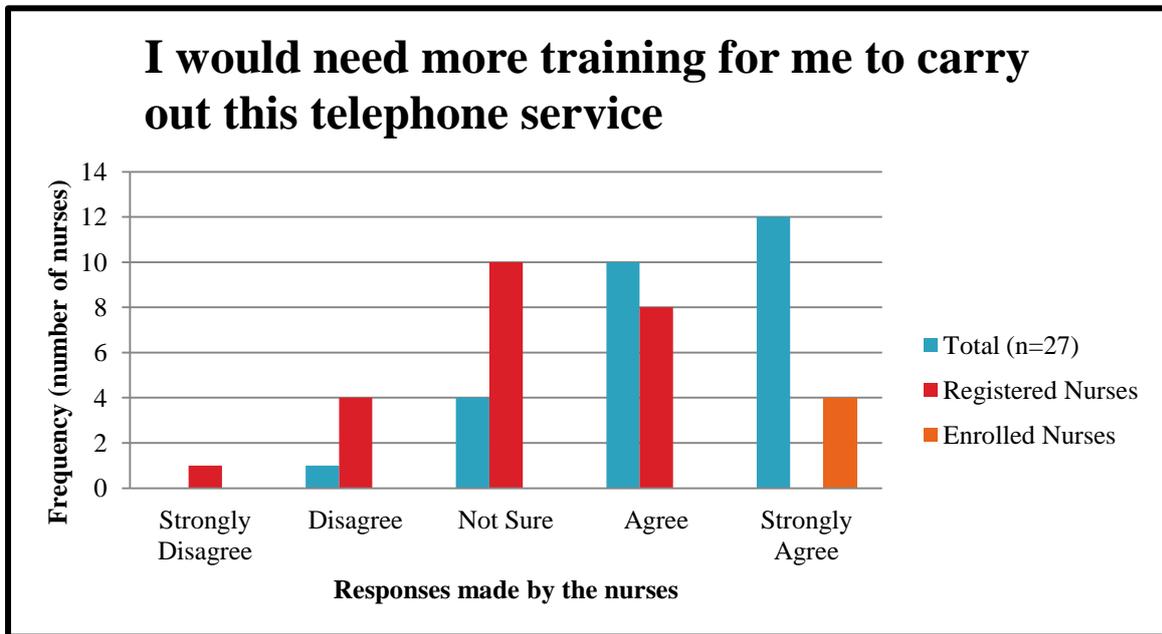
The participants were asked further questions regarding the nature and the delivery mode of the proposed service. The nurses were also asked about their perceived ability of delivering the proposed service. Such questions were asked to incorporate a key principle from the diffusion of innovation theory (Chapter Four). This theory suggests the characteristics of the innovation may affect the rate of its adoption (Sanson-Fisher, 2004). For instance, innovations viewed as too difficult to understand or use are more likely to be rejected (Sanson-Fisher, 2004, p. 55).

### ***The nurses' perceived ability***

The nurses were asked given their current training and work experience, whether they felt they were capable of providing the proposed service or if additional training would be necessary. This question was asked to better understand the possible reasons behind the nurses' responses to other questions that had been previously asked (ie. intention to deliver the service; whether the proposed service is a good idea). In health services research, it has been found that when clinicians believe they have insufficient expertise to provide a new service, they may be more reluctant to adopt the service (Sanson-Fisher 2004, p. 55).

District nurses were most likely to report that they agreed to some extent that additional training would be necessary. A majority of the total respondents (n=22; 81.5%) responded that they either agreed or strongly agreed that additional training would be necessary. There were no major differences between registered and enrolled nurses. Most of the registered nurses (RN=18; 75. 35%) agreed to some extent that additional training would be necessary. Of twenty-three respondents, only one nurse answered that additional training would not be

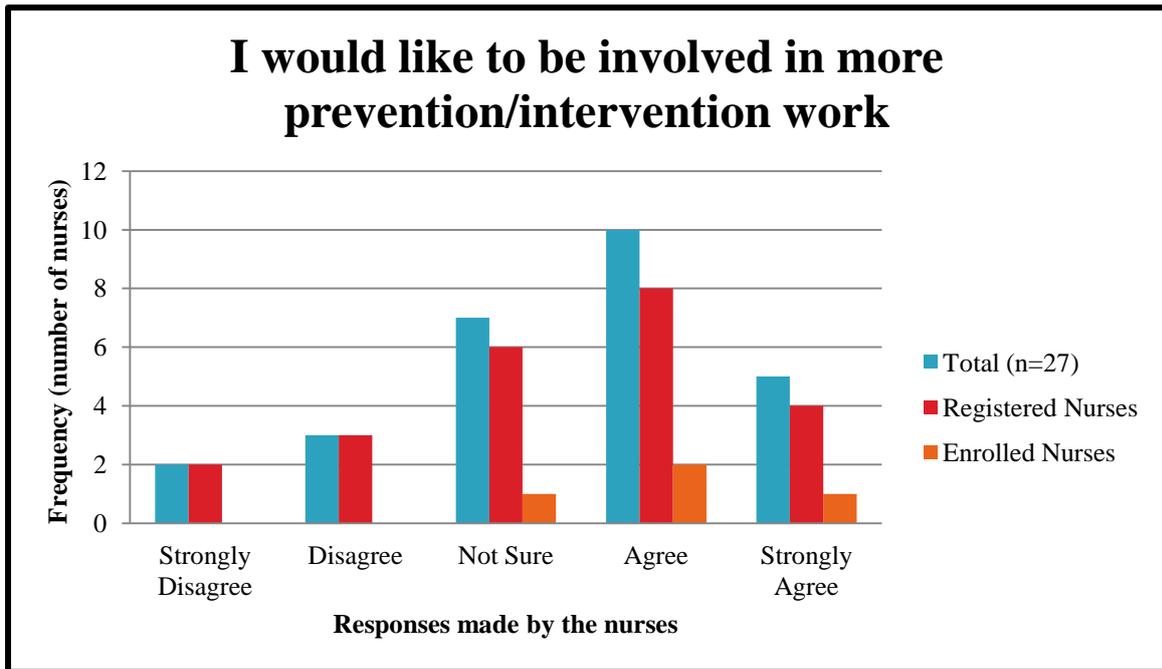
necessary. All of the enrolled nurses strongly agreed they would need to receive additional training to carry out the proposed telephone service (Figure 5.8).



**Figure 5.6 Necessity of additional training to deliver the proposed service (n=27)**

***The nature and mode of the service***

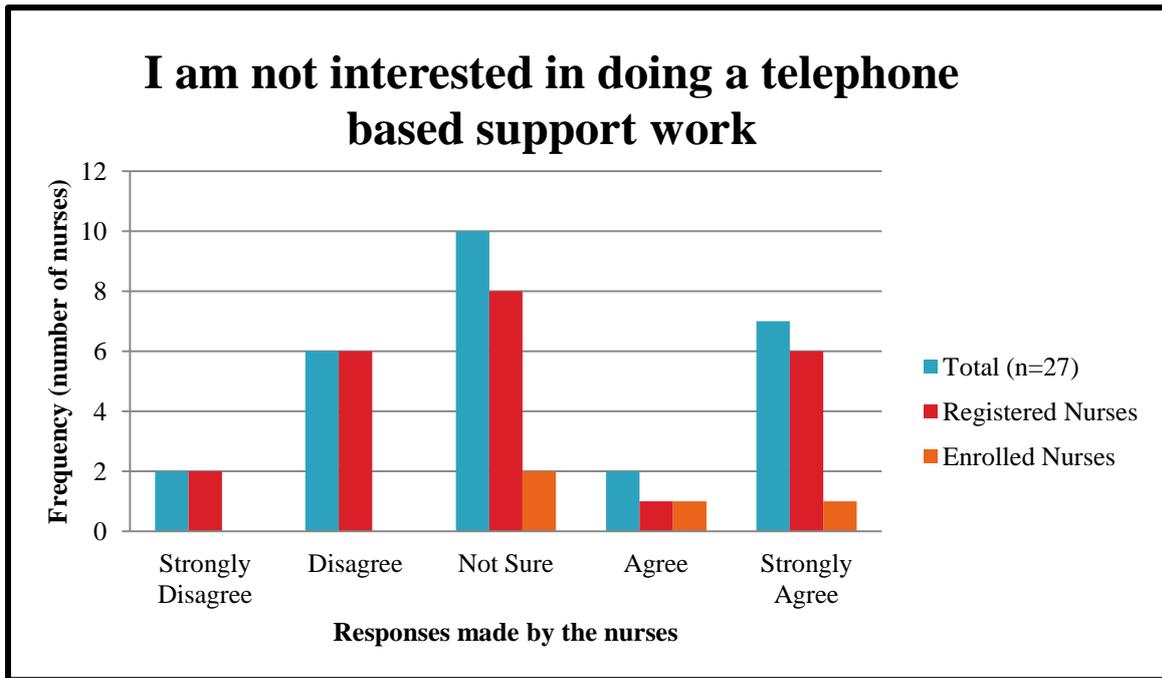
To separate the nurses’ perspectives on the nature of the service being proposed (ie. intervention) versus the nurses’ views on the specific technological tool proposed to deliver the service (example: the telephone), the nurses were first asked if they would be interested in delivering more services of a preventive nature. From the twenty seven respondents, the majority agreed or strongly agreed (n=15; 65.2%) that they would like to be involved in delivering more services of a preventive nature. The enrolled nurses were more likely to agree or strongly agree (n=3; 75 %) than the registered nurses (n= 12; 44.4%). However, the small sample size of the enrolled nurses must be taken into consideration (Figure 5.6).



**Figure 5.7 Interest by district nurses in being involved in more prevention/intervention work (n=27)**

The district nurses were asked if they would be interested in doing telephone based support work. The district nurses were most likely to reply that they were not sure. Around a third of the total sample agreed to some extent that they were not interested in doing telephone based support work (n=9; 33.33%). A slightly smaller proportion of the total participants however, disagreed (n= 8; 29.63%) to some degree (Figure 5.7).

When the answers given by the two groups of district nurses were compared, it was found that none of the enrolled nurses had disagreed to any extent that they would not be interested in doing telephone based support work (Figure 5.6). The registered nurses on the other hand were somewhat equally divided in their responses. A third (n=8, 33.3%) disagreed to some extent, while another third (n=8, 33.3%) reported being unsure. A slightly smaller proportion of the registered nurses agreed (n=7, 30.4%) to some extent that they would be interested in delivering telephone based support work (Figure 5.7).



**Figure 5.8 District nurses' interest in doing telephone based support work (n=27)**

### Summary

To further gauge the district nurses' views on the possibility of implementing a telephone based chronic care intervention service in Canterbury, the nurses were asked how they perceived their ability to deliver the proposed service. The district nurses were also asked questions regarding the nature and the delivery mode of the proposed telephone service.

From the twenty-seven respondents, it was found that the majority agreed to some extent that additional training for the nurses would be necessary, should the proposed service be implemented (Figure 5.6). A majority of district nurses agreed to some extent that they would like to be involved in delivering more services of a preventive nature (Figure 5.7). When specifically asked about being involved in a telephone based support service, district nurses were most likely to disagree to some extent or be unsure (Figure 5.8).

## **5.5 Technology and primary healthcare: The past and the future**

### **Introduction**

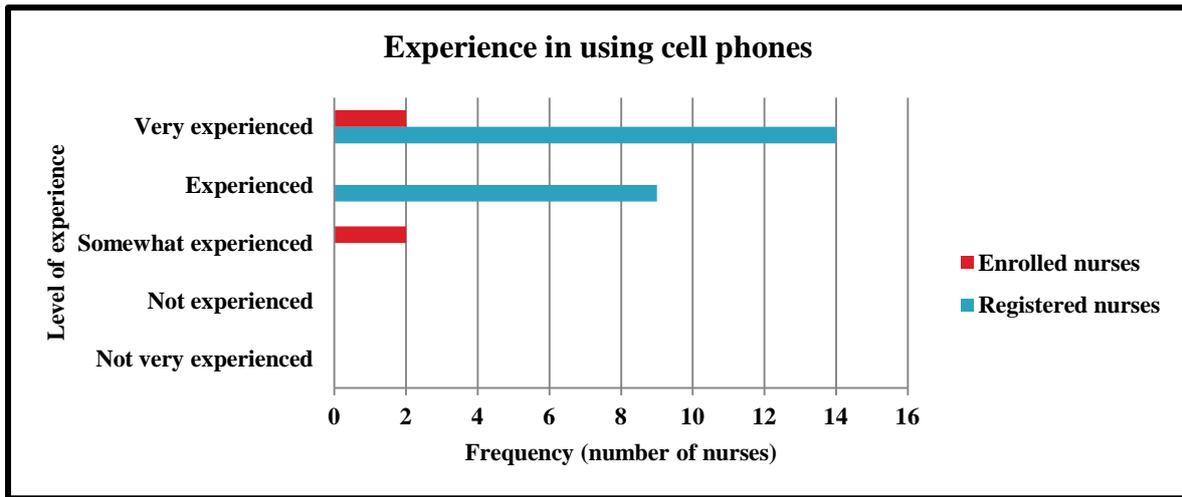
The second part of the third objective of this thesis was to assess the future possibilities of district nurses using various everyday technologies as part of everyday work practice (Chapter 1). Therefore, the nurses were asked about their views on a range of everyday technologies. Fundamentally, this was to gauge district nurses' interests in using various forms of everyday technology for the purpose of telehealth, as part of nursing practice.

The nurses were asked to rate their past experiences with the following technological devices: cell phones, cell phones with cameras, email, personal digital assistant (PDA), facebook and skype. The technologies included in the survey were selected because they were either reported by the management team as currently being used in the nurses' workplace, or were perceived as popular forms of technology, commonly found across many New Zealand households. After being asked to rate their experience with six different forms of technologies, the district nurses were then asked to rate their level of interest in using same or similar forms of technologies in the near future as part of their everyday nursing practice.

### ***Cell Phones***

All nurses were first asked about their levels of experience using cell phones. Both groups of nurses (registered and enrolled) reported high levels of experience using cell phones.

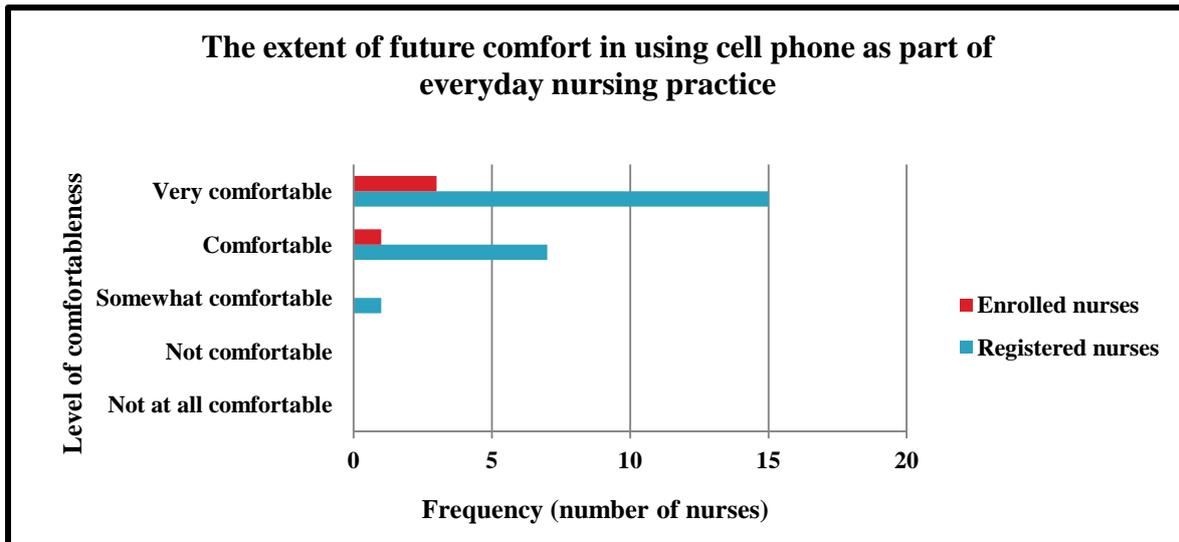
Descriptive statistics showed that the registered nurses were more likely to report being very experienced with using cell phones than the enrolled nurses (Figure 5.9).



**Figure 5.9 Levels of experience using the cell phone (n=27)**

However, Mann-Whitney *U* test found no statistically significant relationship between the level of previous experience using cell phones and the qualification background (registered or enrolled) of district nurses. Similarly, no statistically significant relationships could be found between district nurses' previous experience of using cell phones and their age groups, years of work experience, and whether they had overseas work experience or not.

District nurses were asked to what extent they would feel comfortable using cell phones in the future as part of everyday nursing practice, both registered and enrolled nurses reported high levels of comfort using cell phones in their work (Figure 5.10). None of the participants reported not being comfortable with using cell phones. Results from a Chi-square test between levels of past experiences and the extent of future comfort using cell phones as part of everyday nursing practice show a statistically significant relationship ( $p = .000$ ;  $df=1$ ) could be found.

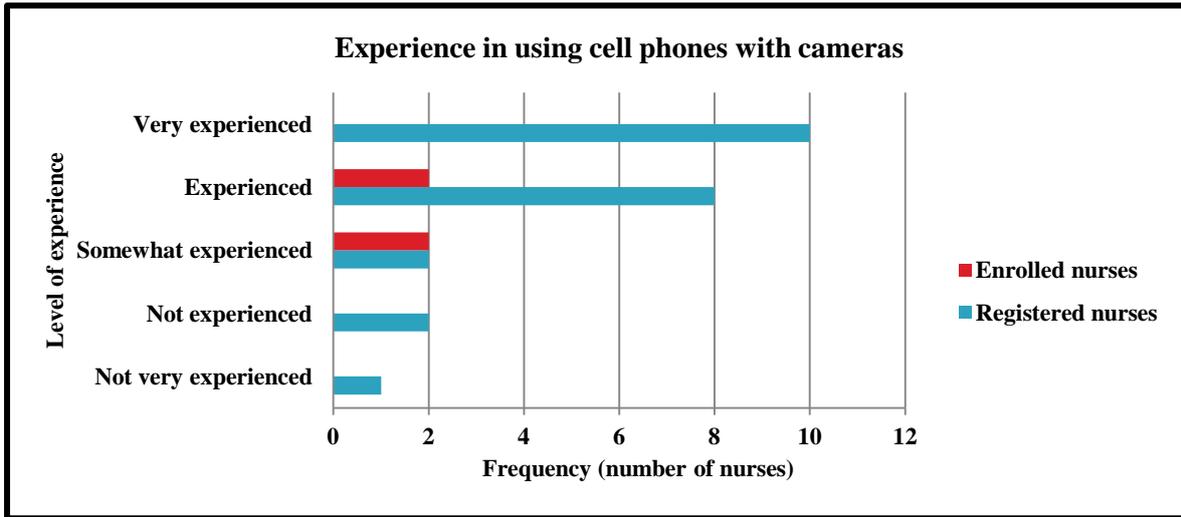


**Figure 5.10** The extent of comfort in using the cell phone in the future as part of everyday nursing practice (n=27)

#### *Cell Phones with cameras*

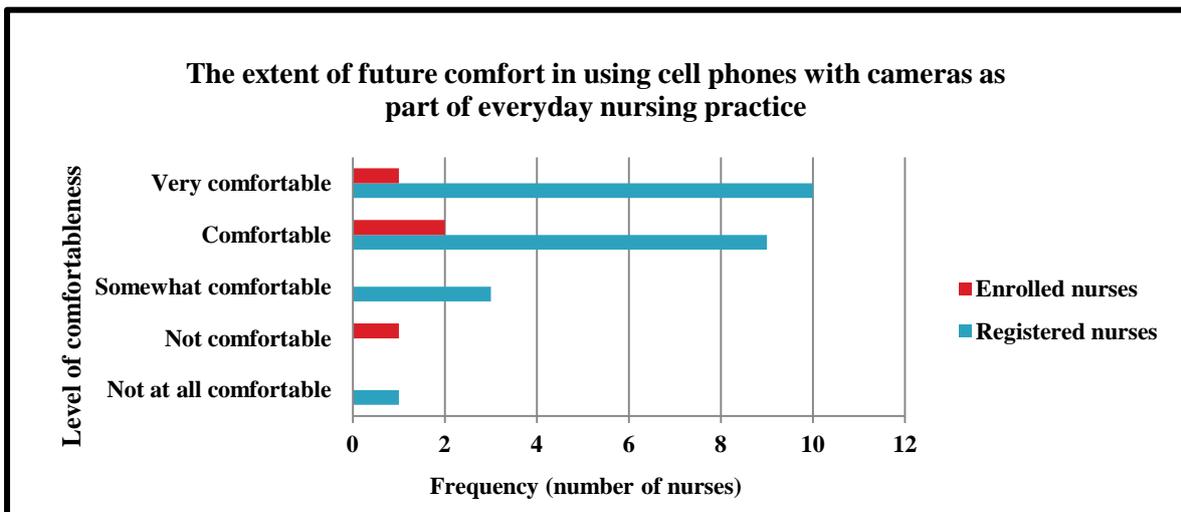
All nurses were most likely to report some level of experience (n=20, 86.9%) with using cell phones with cameras, than report no forms of experience (Figure 5.11). However, none of the enrolled nurses reported being very experienced. Registered nurses were most likely to be very experienced or experienced (Figure 5.11). A small number of registered nurses (n=3, 11.11%) reported no levels of experience with using cell phones with cameras.

Using the Mann-Whitney *U* test, a statistically significant relationship could not be found between the level of previous experience using cell phones and the qualification background (registered or enrolled) of district nurses. Statistically significant relationships could not be found between the district nurses' previous experiences of using cell phones with cameras and their age groups, whether nurses had overseas work experience or not. However, a statistically significant relationship ( $p = .027$ ;  $z = -2.215$ ) could be found between the respondents' past experiences using cell phones with cameras and the number of years of work experiences.



**Figure 5.11 Experience using cell phones with cameras (n=27)**

Chi-square test found a statistically significant relationship ( $p= .024$ ;  $df=1$ ) could be found between levels of past experiences using cell phones with cameras and the extent of future comfort using this technology as part of everyday nursing practice. A large majority of the district nurses reported being comfortable to some extent (RN= 95.7%; EN= 75.00%) with using cell phones with cameras now and in the near future as part of everyday nursing practice. However, there were small numbers of both registered and the enrolled nurses who reported not being comfortable with using cell phones with cameras in the near future (Figure 5.12).



**Figure 5.12 The extent of future comfort in using the cell phones with cameras as part of everyday nursing practice (n=27)**

## Email

All nurses were most likely to report some levels of experience rather than no experience with using the email (Figure 5.13), with registered nurses most likely to report higher levels of experience with using email. However, the registered nurses were most likely to report higher levels of experience with using email. None of the registered nurses reported having no experience. The findings from the enrolled nurses were slightly different. The enrolled nurses were equally likely to report either not being experienced (n=2; 50%), or having experience to some level (n=2; 50%). The small sample size of the enrolled nurses must be taken into consideration though.

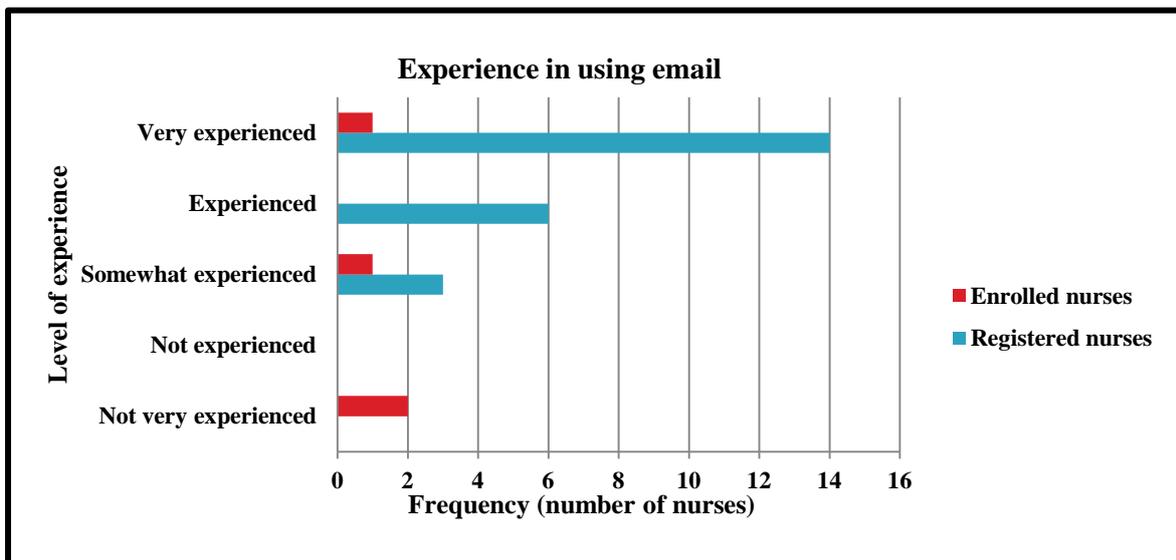
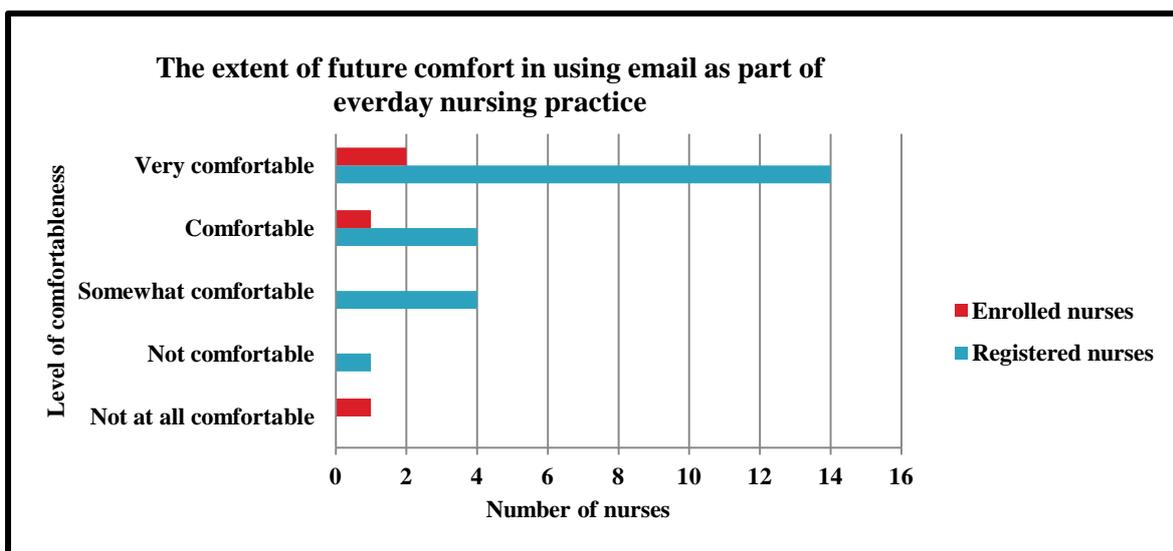


Figure 5.13 Experience using email (n=27)

Mann-Whitney *U* test found no statistically significant relationship between district nurses' previous experiences using emails and their qualification background (registered or enrolled). A statistically significant relationship could not be found between district nurses' previous experience of using emails and their age groups, years of work experience, and whether they had overseas work experience or not.

Chi-square test between district nurses' past experiences using emails and the extent of future comfort reported using this technology as part of everyday nursing practice show a statistically significant relationship ( $p = .024$ ;  $df = 1$ ) could be found. Upon being asked on the extent of the comfort using emails in the future as part of everyday nursing practice, a majority of respondents were most likely to report some levels of experience than no experience (Figure 5.14). A majority ( $n = 23$ , 95.8%) of the registered nurses reported high levels of feeling comfortable and similarly, a majority ( $n = 3$ , 75%) of the enrolled nurses reported feeling very comfortable. A small number of the district nurses (RN=1; EN=1) reported not being comfortable with using emails in the future.



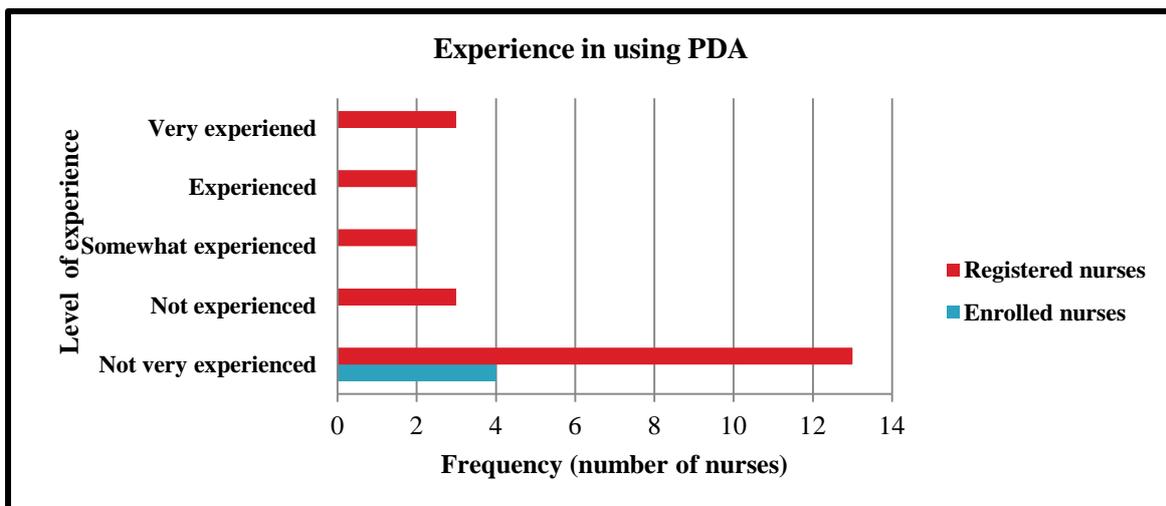
**Figure 5.14** The extent of future comfort in using emails as part of everyday nursing practice ( $n = 27$ )

### *Personal Digital Assistant (PDA)*

Personal Digital Assistance is a form of technological device identified by the management team of the community nursing organisation as being used by some nurses. Descriptive statistics from the survey revealed that the enrolled nurses were clearly inexperienced with this technological device. None of the enrolled nurses reported any levels of experience with

PDA (Figure 5.15). Among the registered nurses, having no forms of experience (n=16, 69.6%) was the most common form of answer reported. A small number of registered nurses reported experiences with PDA, with approximately a quarter of the registered nurses reporting some form of experience (n=6; 26.1%) and three people reporting very high levels of experience (figure 5.6).

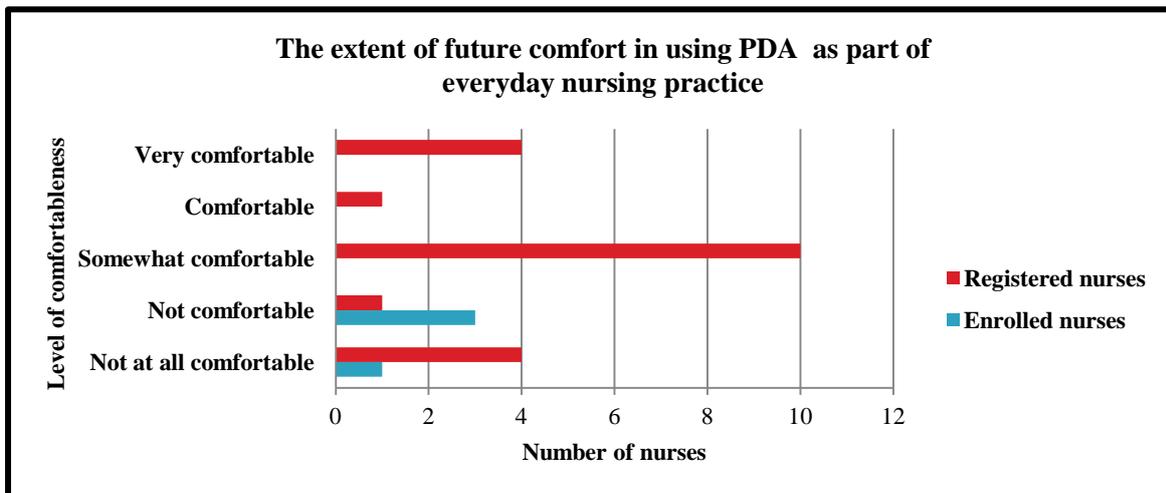
Mann-Whitney *U* test found a statistically significant relationship could be found between district nurses' previous experiences using PDA and people' age groups ( $p=.027$ ;  $z=-2.248$ ) and years of work experience ( $p=-.027$ ;  $z=-2.212$ ). However, no statistically significant relationships could be found between district nurses' reported levels of past experiences and the nurses' qualification background and whether they had overseas work experience or not.



**Figure 5.15 Experience using PDA (n=27)**

Upon being asked about using the PDA as part of everyday nursing practice in the future, the enrolled nurses all reported they would either not or not at all feel comfortable (Figure 5.16). The registered nurses were most likely to report (n=10; 43.5%) that they would feel somewhat comfortable. Chi-square test showed a statistically significant relationship ( $p=.002$ ;  $df=1$ ) could be found between the survey respondents' past experiences using cell

phones with cameras and the extent of future comfort using cell phones with cameras as part of their everyday nursing practice.



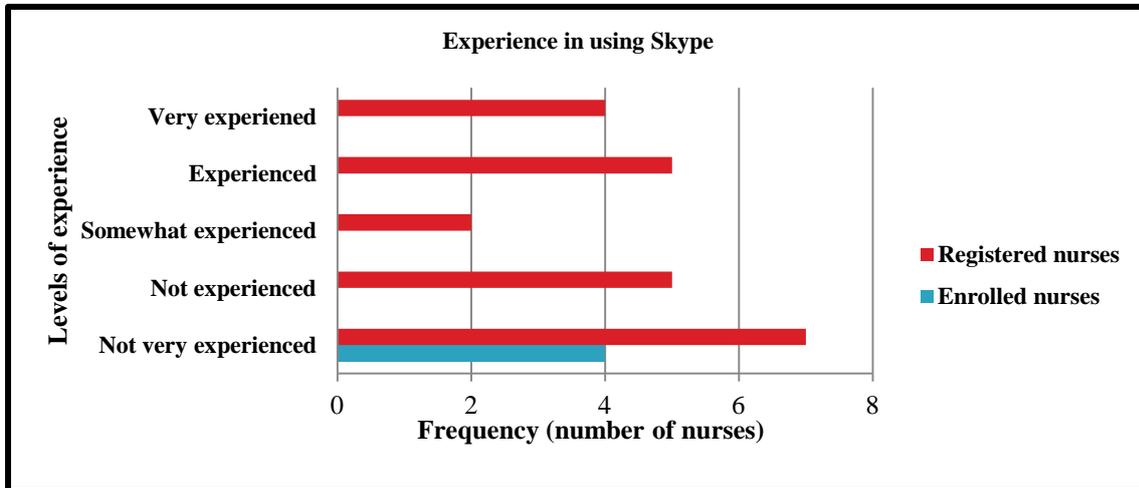
**Figure 5.16** The extent of comfort in using PDA in the future as part of everyday nursing practice (n=27)

### *Skype/Web cameras*

Skype is a form of web camera based technology that has become popular for allowing people to see each other across geographical distances. Web camera based health services have already been widely used overseas for both educational and clinical purposes (Myers, Valentine, & Melzer, 2007). As these form of technologies could also be useful in the Canterbury region for providing support to patients with chronic conditions, they were included in the survey to gauge district nurses’ interests.

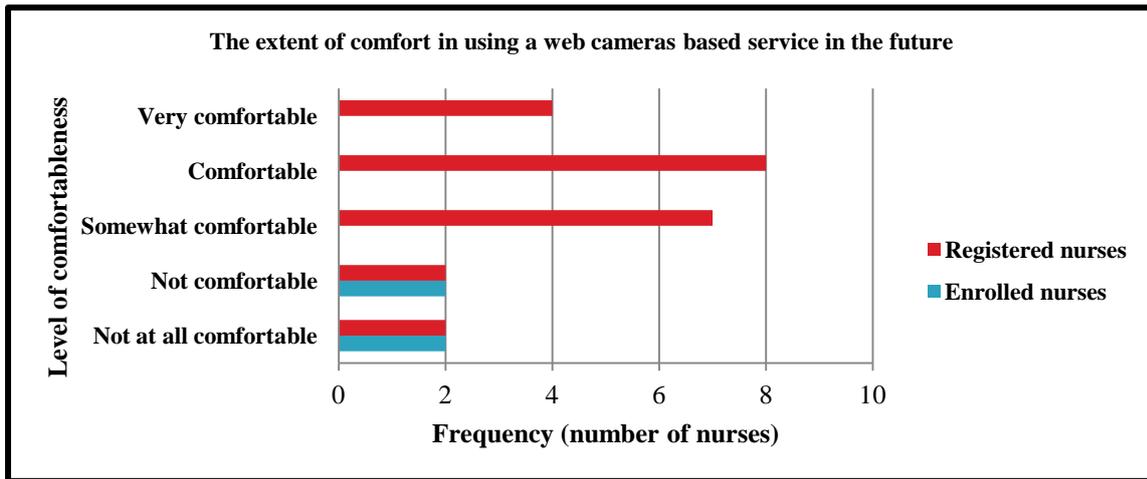
The results from the survey revealed that the registered nurses had higher levels of experience with using Skype than the enrolled nurses (Figure 5.17). Around a half (n=11; 47.8%) of the registered nurses reported some forms of experience with Skype, all of the enrolled nurses reported having no experience with Skype (Figure 5.17). Mann-Whitney *U* test found a statistically significant relationship ( $p=.016$ ;  $z=-.328$ ) could be found between the district nurses’ past experience levels with skype and the nurses’ qualification background. However,

statistically significant relationships could not be drawn between nurses' levels of experiences with skype and the nurses' age groups, years of work experiences and whether they have overseas work experiences or not.



**Figure 5.17 Experience using Skype (n=27)**

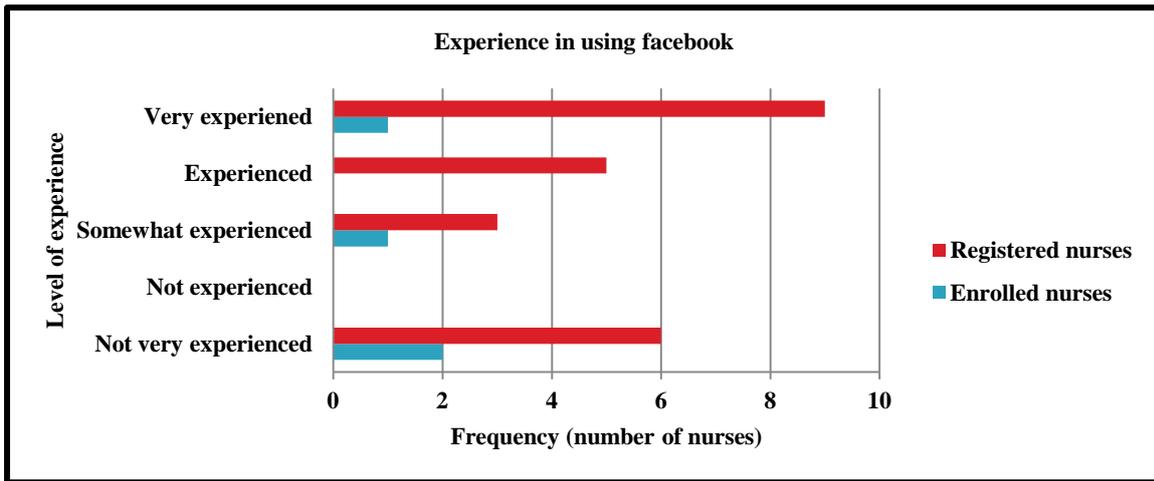
The registered nurses reported higher levels of future comfort using a web camera based service than the enrolled nurses. While a majority (n=19; 82.6%) of the registered nurses reported being comfortable to some degree on the future prospect of using web camera, all enrolled nurses who took part in this study reported not feeling comfortable or not at all comfortable (Figure 5.18). Mann-Whitney *U* test found a statistically significant relationship ( $p= .002$ ;  $df=1$ ) could be found between past experiences using Skype and the extent of future comfort using web cameras for district nurses.



**Figure 5.18** The extent of comfort in using a web based service in the future (n=27)

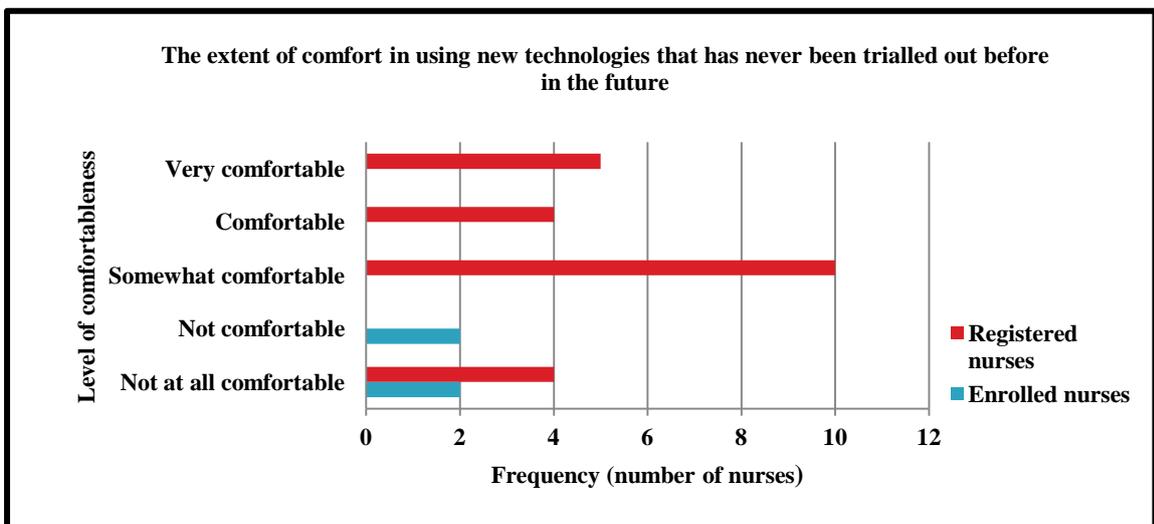
### Facebook/New technologies

Mann Whitney U test did not find a statistically significant relationship ( $p= .318$ ;  $z=-.812$ ) between experiences using facebook and qualification backgrounds of district nurses (enrolled or registered). However, descriptive statistics from the survey show the registered nurses overall reported higher levels of experience with facebook than the enrolled nurses (Figure 5.19). Around three quarters of the registered nurses (n=17; 73.9%) reported some or more levels of experience with facebook. Slightly less than half (n=9; 39.1%) of the registered nurses reported being very experienced. A statistically significant relation could not be found between the reported levels of experiences using facebook and district nurses' age groups, years of work experiences and whether they have worked overseas or not.



**Figure 5.19 Experience using facebook (n=27)**

Chi-square test shows that a statistically significant relationship could not be found between district nurses' past experiences using facebook and the extent of future comfort using new and untried technologies as part of everyday nursing practice ( $p = .100$ ;  $df=1$ ). When district nurses were asked about using new, untried technologies in the future (Figure 5.20), a large majority ( $n=19$ ; 82.6%) of the registered nurses reported feeling comfortable to some degree. All enrolled nurses from this study reported feeling not comfortable or not at all comfortable about such situations. However, the small sample size of enrolled nurses must be taken into consideration (Figure 5.20).



**Figure 5.20 The extent of comfort in using new, untried technologies in the future (n=27)**

## Summary

The district nurses were asked about their views on a range of everyday technologies.

Fundamentally, this was to gauge the district nurses' interests in using various forms of technologies for the purpose of telehealth, as part of everyday nursing practice.

The nurses were first asked to rate their past experiences with the following technological devices: cell phones, cell phones with cameras, email, personal digital assistant (PDA), facebook and skype. It was found that district nurses consistently rated higher levels of experiences for technologies that have been around longer and are widely available publicly (cell phones, cell phones with cameras, email). On the other hand, nurses reported lower levels of experiences with the more recent (skype) or specialised (PDA) technologies. At the same time, greater variances of experiences could also be found for the more recent and specialised technologies. Bivariable analysis by Mann-Whitney *U* test found that statistically significant relationships could not always be drawn between characteristics of district nurses (qualification, age group, years of work experience, overseas work experiences) and how nurses reported their previous experiences with technologies. A majority of the time, statistically significant relationships could not be drawn.

However, statistically significant relationships could be drawn between the following: nurses' years of work experiences and levels of experiences with PDA; nurses' years of work experiences and levels of experiences with cell phones with cameras; nurses' age groups and levels of experiences with PDA; nurses' qualification background and levels of experiences with skype. Chi-square analysis found a statistically significant relationship could be drawn between district nurses' levels of past experiences and levels of future comfort for most technologies included in the survey: cell phones, cell phones with cameras, email, PDA, and skype/web cameras. However, a statistically significant relationship could not be drawn

between district nurses' levels of past experiences with facebook and levels of comfort using new, untrials technologies in the future.

## **5.6 Conclusion**

This chapter reported the results from the survey completed by district nurses employed by a private community nursing organisation. The third objective of the thesis consisted of two parts. The first part was to understand the receptiveness of these district nurses to the possibility of implementing a home telehealth service for chronic diseases management in the Canterbury region.

Four TAM variables (Behavioural Intention, Attitude, Compatibility, Perceived Usefulness) were incorporated into the self complete questionnaire. District nurses showed mixed responses when asked if they would like to receive training to carry out the proposed service (Figure 5.2) and if they thought the proposed service was a good idea (Figure 5.3). Nearly half of all district nurses either disagreed or strongly disagreed that the proposed telephone based service would be compatible with their work situation (Figure 5.4). However, more than half of district nurses also agreed to some extent that the proposed service would benefit their patients (Figure 5.5).

To further gauge the district nurses' views on the possibility of implementing a telephone based chronic care intervention service in Canterbury, the nurses were asked how they perceived their ability to deliver the proposed service and were also asked questions regarding the nature and the delivery mode of the proposed telephone service. It was found that the majority agreed to some extent that additional training would be necessary (Figure 5.6). A majority of district nurses agreed to some extent that they would like to be involved in delivering more services of preventive nature (Figure 5.7) but were most likely to disagree to some extent or be unsure about being involved in a telephone based support service.

The second part of the third thesis objective was to assess the possibility of using various everyday technologies as part of everyday work practice for district nurses. The nurses were asked to rate their past experiences with different technological devices, as well as how comfortable they would be using these technologies in the future as part of nursing practice. The technologies were: cell phones, cell phones with cameras, email, personal digital assistant (PDA), facebook and skype. It was found that district nurses consistently rated higher levels of experiences for technologies that have been around longer and are widely available publicly.

While district nurses overall reported lower levels of experiences with the more recent or specialised technologies, greater variances of answers were also reported for these more recent technologies. The Mann-Whitney *U* test found that statistically significant relationships could not always be drawn between characteristics of district nurses and levels of experiences with different technologies. However, statistically significant relationships could be drawn between few cases. These relationships were mostly between nurses' years of work experiences and levels of previous experiences with the more recent technologies. Chi-square analysis found a statistically significant relationship could be drawn between district nurses' levels of past experiences and levels of comfort using the same or similar technologies in the future as part of everyday nursing practice for most technologies included in the survey.

## **CHAPTER SIX: Discussion**

### **6.1 Introduction**

In the absence of research evidence assessing the possibility of implementing a home telehealth service for preventing and managing chronic conditions in New Zealand, the key purpose of this thesis was to assess the prospects of implementing a home based telehealth service for chronic care intervention in Canterbury. In particular, this prospect was assessed from the perspectives of practice and district nurses who would be strong contenders to deliver such service for the local communities. A majority of practice nurses and district nurses indicated that they did not perceive the proposed service as compatible with their current work situation. Practice nurses were most concerned about the loss of face to face contact with their patients. Practice nurses were also concerned about the ethics of telehealth, including potentially compromising patient privacy and confidentiality. The proposed telehealth service was seen by practice nurses as more beneficial for some population groups, such as the rural based elderly. A majority of district nurses thought the proposed service would benefit their patients, whom are largely elderly. While discussing who should deliver the proposed service, it was identified that practice nurses have strong relationships with their communities and have in-depth knowledge of their patients' health. Telephone triaging was identified as a form of valuable service currently provided by practice nurses. Different technologies were identified by practice nurses as more likely to be suitable for delivering telehealth services. Cell phones for example, were seen as a potentially popular technology for the younger population. From the self-questionnaire sheet distributed to district nurses, it was found that district nurses were more likely to be comfortable using forms of technologies

in the future that they are already more familiar with. For certain population groups such as the migrants and the refugee population however, the telephone was not seen as the most effective form of technology for the nurses, due to potential communication barriers it presented. It was also found that while a majority of district nurses did not perceive the proposed service as compatible with their work situation, they were also likely to report that additional training would be necessary to provide such a service.

The purpose of this chapter is to discuss the findings from the qualitative and quantitative research conducted between 2010 - 2011. This mixed methods research was framed by the triangulation model. In this model, one set of data is not favoured over the other (Creswell, et al., 2004, p. 11). Although data may be separately collected and reported, all forms of data are integrated at the discussion stage to best understand the principal research problem (Borkan, 2004). For this reason, this chapter will collectively discuss results of both qualitative and quantitative research, weaving in the key themes found most relevant to the key thesis objective. This will take place within the context of various literatures discussed throughout Chapter One, Chapter Two and Chapter Three.

## **6.2 Canterbury and potential for telehealth**

Canterbury is a geographically dispersed region with varying geographical characteristics (Canterbury District Health Board, 2010, p. 9). Although much of its population can be found in the urban areas of Christchurch, nearly a quarter of the Canterbury population also resides outside Christchurch. Therefore, it is a region where telehealth services have much potential to further expand in the future. The Canterbury situation is also somewhat reflective of the national statistics that suggests approximately 22 percent of the total population nationwide can be found at rural settings (National Health Committee, 2010, p. 53). Therefore, findings

from this study could have valuable implications for future studies wishing to explore how telehealth may be used across the rural regions throughout New Zealand. Home telehealth services have the potential to empower the rural based patients with chronic illnesses to make positive health behaviour changes and also to better understand their illnesses on a daily basis (Pfizer Health Solutions, 2008).

During the interviews with practice nurses, the rural population and in particular, the rural based elderly were identified as more likely to be coming into general practice at later stages of their chronic conditions (Chapter Four). Although stoicism was discussed as a potentially contributing factor, so was distance. With a majority of district nurses indicating that the proposed service could be beneficial for their patients whom are predominantly the elderly (Chapter Five) and practice nurses indicating that many rural based elderly may be currently coming into general practice at later stages of their chronic conditions (Chapter Four), the proposed service could be of valuable use for the rurally based elderly population in Canterbury with chronic conditions. However, lack of sufficient infrastructures (broad band internet, broad cell phone coverage) currently in place for the rural communities could mean certain technologies may not be suitable for delivering telehealth services for the rural elderly population. The potential for telehealth across Canterbury may be currently suffering from lack of support and leadership from the national level.

### **6.3 Potential for telehealth**

#### ***Telephone triage: Extending the use***

Telephone triaging has been considered a form of telehealth service overseas (Edwards, 1994; Gallagher, Huddart, & Henderson, 1998). Although often not formally recognised as a

form of telehealth in New Zealand (Australian New Zealand Telehealth Committee, 2002; Kerr & Norris, 2004), literature shows telephone triaging is currently one of the most widely used form of services provided by general practices across Australasia, indicating wide public acceptance of its value (George, et al., 2008, p. 478). During the interviews, many practice nurses discussed how they perceived the proposed telephone service as an extension of telephone triage services they were already providing for their own population (Chapter Four). Triage was found to be used for various purposes, including counselling and meeting chronic mental health issues (Chapter Four). An important implication is that practice nurses have been identified as having in-depth knowledge of their patients' health, while valuing the strong relationships already established with their communities. In light of significant earthquakes that Canterbury has recently experienced then, the current scope of community based teletriaging by practice nurses and its potential role for addressing mental health issues should be further explored.

#### ***Meeting the health needs of a diverse population: challenges and opportunities***

This study found that for migrant and refugee groups, different communication methods and languages barriers were discussed by practice nurses as some of the key challenges they faced in meeting the health needs of these groups. The telephone service used in the Birmingham OwnHealth project was bilingual (Singh & Ham, 2006) with the service provided in two languages most spoken in the region (Punjabi and English). Further discussion would be needed over how a telephone based service could be used by the non-English speaking population in Christchurch.

During the semi-structured interviews, a number of practice nurses noted how the way which the opening hours of general practices coincided with working hours meant men from higher

deprivation areas, may be more likely to delay accessing the GP services. In this case, a telephone based service provided by nurses outside the standard working hours could be useful for these men. However, questions on how appropriate patients should be screened and referred to the programme will need to be further discussed. In the Birmingham project, patients were selected based on the patient record system and referred by general practitioners (Wilson, 2010). However, if men in Canterbury are currently less likely to visit general practitioners and not be enrolled with a GP, selecting patients based on the patient record system alone may lead to biased selection. On the other hand, practice nurses, may be aware of individuals or families from their local communities who could benefit from such services. In such a case, consulting the community based nurses from the early stages of designing a telehealth project would provide invaluable insight.

### ***Technologies for home telehealth***

When considering the expansion of use of technologies in Canterbury in the future for the purposes of preventive health care services, it must be taken into consideration that different technologies could be more useful for certain population groups than others.

Pacific peoples have been identified as one of several population groups less likely to access primary health services. During the interviews with practice nurses, it was suggested that health services using cell phones could be more widely used for the young population. At the same time, cell phones were identified by district nurses as a form of technology they would be highly comfortable to use in the future as part of everyday nursing practice. The use of cell phones by the primary health sector has increased considerably over the recent years (MedText, Quit smoking). Cell phone remains a potentially useful technology for future chronic care intervention services for the young, urban based population.

#### **6.4 Training opportunities for nurses**

In the self complete questionnaire, it was found that the majority of district nurses agreed to some extent that additional training would be necessary, should the proposed telephone based chronic care intervention service be implemented (Chapter Five). With the introduction of the Policy '*Better, Sooner, More Convenient*', there has been greater interest in community health care and health education (Ministry of Health, 2010). With the findings from the questionnaire suggesting the majority of district nurses agreed to some extent that they would like to be involved in delivering more services of a preventive nature (Chapter Five), this particular group of district nurses should be consulted, should other additional services of a preventive nature be implemented in the future.

#### **6.5 Wider issues for adopting telehealth**

##### *Economic issues*

A positive proposition of home telehealth services has been the potential cost savings (Finkelstein, et al., 2006). However, there are always the capital and operational costs involved. Overseas, these costs have often been shared by many stakeholders involved from different levels of the health care system. In New Zealand, there has been no consideration of how a proposed telephone based service should be funded. In addition, it may take a long period to see positive clinical results for patients with chronic conditions. Literature has shown that concerns remain in some countries about the lack of sufficient infrastructure needed to provide mobile and internet based home telehealth services (Health Canada, 2000). This would also be true for New Zealand (National Health Committee, 2010, p. 29). In this case, then a home telehealth service using accessible, and widely available forms of technologies could be most beneficial.

## **Navigating through the nexus of patients and health professionals**

It has been proposed by the diffusion of innovation theory that if a proposed change is perceived as altering the balance of power in existing relationships by negative means, the innovation may be viewed with greater reluctance (Sanson-Fisher, 2004, p. 55). The potential of telehealth to alter the traditional balance of power between health professionals and patients has been discussed in other research (Milligan, et al., 2011, p. 148). Implementation of home telehealth not only alters the place the health service occurs in from a clinical setting (general practice buildings) to a non-clinical setting (home), but also the delivery mode of the health service. Literature has shown that when providing home telehealth services, the technology is sometimes perceived by nurses as unhelpful for building relationships with patients (Hibbert et al., 2004). Home telehealth offers opportunities to provide health advice to chronically ill patients and reinforce messages on preventive care. However, home telehealth services should not be viewed as purely technical (Milligan, et al., 2011), as they occur within the context of the existing social, ethical, and healthcare dimensions.

Perhaps the most important challenge for telehealth however though, would be the acceptability of the proposed services by both health professionals and patients. In this research, it was found that a majority of both district and practice nurses did not perceive the proposed telehealth service as compatible with their current work situation. As for why this may be so, literature has shown that potential concerns for patients by health professionals will over ride promises of convenience, potential cost savings, and patient empowerment by new forms of health services, such as telehealth (Cornford & Klecun-Dabrowska, 2001). Literature has also shown health professionals may resist the service more if they are faced with the option of losing face to face contact (Mirza, et al., 2008, p. 314). Such concerns were also expressed by practice nurses who took part in the semi-structured interviews. Home

telehealth services for the purpose of chronic diseases management will present health professionals in New Zealand with several challenges. Such challenges will include the potential for automated data collection, management issues of such data, and the need for cooperation and communication with a multidisciplinary team of stakeholders to achieve a seamless and integrated health care service.

### *Ethical issues*

The interface of technology with nursing care provision should not diminish the importance of accountability, competency and ethics in the field of nursing practice (Sevean et al, 2008). International research has shown that nurses often encounter ethical issues when delivering telehealth (Rutenberg & Oberle, 2008). During this research, it was found that nurses expressed concerns about the ethical issues of telehealth, such as privacy of patients, storage, viewing and acquisition of confidential health data (Chapter Four). Such concerns should not be ignored. An international review of the global state of telehealth has shown that such concerns when not addressed, can become a potential barrier for further expansion of telehealth (Chapter Two). It has been shown that in countries where further discussions on the human dimension of telehealth have been encouraged and relevant policies addressing these concerns have been supported and implemented at the policy level, wider communities have been able to benefit from the applications of telehealth. For the Canterbury communities to most benefit from home telehealth, the ethical dimensions of technology based nursing remains an important aspect that needs to be addressed.

## **6.6 Strengths and limitations of the study**

As with all studies, this study had several limitations. A limitation of this research is that it coincided with two major earthquakes in Christchurch which resulted in the disruption of data collection. With severe stress placed on nurses and the building of the community nursing organisation badly damaged, a follow up of potential respondents could not occur. Interviews with practice nurses who had expressed interest in being involved with the study were cancelled. However, one of the key strengths of this research is that it is the first in New Zealand to gauge the possibility of implementing a home telehealth service for chronic care management on a regional scale. It is also the first research to gauge such possibilities from community based nurses' views.

In New Zealand, community based nurses (both practice and district nurses) play an important role promoting health education and monitoring the state of chronic conditions of their local population. Often the first-point-of-contact when local communities are faced with health concerns, the community based nurses are an important group of stakeholders in the health care system. Importantly, nurses are able to transcend all three levels of the existing health system (chapter 1). Therefore, it was crucial that the perspectives of nurses were gauged, as part of an effort to assess the possibility of implementing a community based home telehealth service for people recently diagnosed with chronic conditions.

### ***Practice nurses***

A strength of this study was that the participants were widely recruited from 30 different suburbs throughout the Canterbury region (Chapter Four). Therefore, the researcher believes that she was able to hear from a broad pool of practice nurses throughout the Canterbury region. However, a limitation of this study is that some of the suburbs have recently been ordered to be demolished due to Christchurch earthquakes. Therefore, some findings from

certain suburbs may no longer be as relevant. A positive aspect of this study is that there were more practice nurses who expressed interest in taking part in this study than could be interviewed; with some eventually cancelling due to the impact of earthquakes and continual aftershocks. However, such positive responses from practice nurses suggest that not only are nurses an important group of stakeholders in the health system, but also a group of stakeholders who are willing to take an active part in planning a community based health service in the future.

### *District nurses*

A limitation to this study is that only a small sample of enrolled nurses was acquired. Part of this was due to the fact that a follow up with potential respondents could not take place due to major natural disasters placing severe strain on the community nursing organisation. These small numbers meant that the successful application of statistical tests was limited. Although a statistically positive relationship was found between past experiences and future intention of using same or similar technologies for most technologies included in the survey, no casual inferences can be drawn from the results of the study.

## **6.7 Conclusion**

This chapter has discussed key findings from the mixed methods study of district and practice nurses. The structure of this discussion was framed by the triangulation model. As with any new form of health service, the introduction and diffusion of new health services such as home telehealth, are initially driven by a mixture of health needs and opportunities the new innovation offers (Rogers, 2003). However, the potential adoption and usage of such services may also be dependent on economic, social and ethical matters (Milligan, et al., 2011).

## **CHAPTER SEVEN: Conclusion**

### **7.1 Summary of the key findings**

This study has undertaken research that met the objectives specified in Chapter One. The first objective was to identify the current practices in the prevention and management of chronic conditions by Canterbury based general practices, and any problems faced by these practices in meeting the needs of their population. Services driven by national, regional and local levels were identified, with telephone triaging identified as one of the most widely used forms of services provided by the local general practices, indicating wide public acceptance of its value. However, literature shows that with telephone triaging by general practices, the extent of its use and its clinical implications are currently not well documented nor fully understood in New Zealand (George, et al., 2008).

Diabetes, COPD and related illnesses were reported by the nurses as the key chronic conditions the patients present with most frequently at general practices. Additional chronic mental needs such a depression were also identified. Following the recent earthquakes in Christchurch however, it is possible that such mental health needs may have increased. Practice nurses reported that the workload for them had significantly increased over the years. The nurses attributed these changes as being due to an increase in the number of people coming in with chronic conditions, as well as growing expectations placed on the practice nurses to fulfil a wider range of both clinical and non-clinical roles. Having sufficient funding to provide for the growing chronic health needs of the Canterbury population was another important challenge identified by the practice nurses. In particular, practice nurses from general practices based at areas with higher deprivation index levels were more likely to report that funding was often insufficient to provide for the needs of their population. In

addition, several nurses specifically discussed about the challenges of providing health care services for people of different cultural backgrounds. Language barriers and cultural differences were particularly identified as key challenges faced by the practice nurses in meeting the needs of the migrants and the refugee groups.

The second thesis objective was to assess the receptiveness of practice nurses from general practices to the possibility of implementing a home telehealth service for chronic diseases management. The nurses expressed strong views that the proposed service should not be seen as a replacement service, but a form of additional service to further encourage the public to utilise primary health care services. It was found that a majority of the practice nurses who took part in this research did not perceive the proposed service as being compatible with their current work situation. It was found that many of the practice nurses initially thought the proposed service would be an extension of telephone triage service they were currently providing. When further asked why the practice nurses thought the proposed telephone based service may not be compatible, concerns about the loss of face to face contact and existing workload were identified. Practice nurses also expressed concerns about potentially compromising patient privacy and confidentiality due to the physical spatial limitations of their current general practices. The proposed service was viewed by the practice nurses as more compatible for specific population groups, such as the elderly and those with mobility or mental health needs. The practice nurses also expressed strong views on who should be the potential providers of the proposed service, expressing that patients would benefit more from the practice nurses being the key providers of the service.

The third thesis objective was to understand the receptiveness of district nurses within a large community nursing organisation to the possibility of implementing a home telehealth service for chronic diseases management, and also to assess the future possibilities of using various everyday technologies as part of their everyday work practice. It was found that nearly half of

all district nurses either disagreed or strongly disagreed that the proposed telephone based service would be compatible with their work situation. However, more than half of district nurses also agreed to some extent that the proposed service would benefit their patients. It was also found that the majority agreed to some extent that additional training would be necessary, should they be asked to deliver the proposed service. It was found that a majority of district nurses agreed to some extent that they would like to be involved in delivering more services of a preventive nature but were most likely to disagree to some extent or were unsure about being involved in a telephone based service. These findings suggest that district nurses may be interested in being involved with other health services in the future that are also prevention focused, but may be reluctant to use the telephone to deliver such services.

The district nurses were asked about their views on a range of everyday technologies. Fundamentally, this was to gauge district nurses' interests in using various forms of technology for the purpose of telehealth, as part of everyday nursing practice. When the nurses were asked to rate their past experiences with different technological devices, it was found that district nurses consistently rated higher levels of experience for technologies that have been around longer and are widely available publicly. A statistically significant relationship was found between district nurses' levels of past experiences and levels of comfort using the same or similar technologies in the future for most technologies included in the survey (cell phones, cell phones with cameras, email, personal digital assistant (PDA), and skype/web cameras).

While district nurses reported lower levels of experience with the more recent or specialised technologies, greater variances of responses were reported for these more recent technologies. It was also found that while a statistically significant relationship could not always be found between characteristics of district nurses and levels of past experiences with

technologies, statistically significant relationships could be found between nurses' years of work experiences and levels of previous experiences for some of the more recently developed technologies. This may be because technologies (PDA, cell phones with web cameras) are more likely to be used by the more experienced nurses from the community nursing organisation as part of their everyday nursing practices.

## **7.2 Recommendations**

### ***A. Policy level***

- New Zealand currently lacks specific national policies on how telehealth projects should be regulated. Literature has shown that telehealth has flourished best in countries where both financial commitment, and appropriate legislations have been driven by the national policy makers (Medical Board of California, 2010; Schanz, 1997). Such commitment is also needed from the New Zealand policy makers.
- Ethical and legal implications of telehealth have also not been addressed nor discussed at the macro level of the healthcare system in New Zealand (Chapter One). As long term illnesses requiring ongoing monitoring and intervention escalate, home telehealth is likely to play a vital role in meeting the growing health need worldwide (Cartwright, et al., 2009, p. 33). Therefore, it is recommended that to further expand telehealth in New Zealand, research addressing ethical and legal implications of home telehealth are needed and should be supported by the policy makers
- There is a need for an up-to-date national review of the state of telehealth nationwide. Apart from the 2003 national review (Kerr & Norris, 2004), no further review on the national state of telehealth by the Ministry has been found. Such a review would

encourage collaboration and further sharing of ideas between any existing telehealth projects nationwide.

### ***B. Organisational level***

- When planning for future telehealth research, an open discussion involving all potential stakeholders from *within* any organisation (management, finance, potential users of the service) should be encouraged from the earliest stages of planning for potential projects.
- Further collaboration and communication between different community health organisations should be encouraged to avoid parallel projects.
- Multi-sectoral collaboration and community participation is an important component when planning to implement a new form of health services at a community level (Eyre & Gauld, 2003). As the meso level group of stakeholders in the health system, a recommendation for the community health organisations would be to strengthen the relationship with the government, while also enhancing communication with the local community leaders.

### ***C. Nurses***

- As the prevalence of chronic illnesses continues to rise in New Zealand, the field of nursing will continue to undergo a number of changes. Training and opportunities should be made available for all nurses if needed.
- From the district nurses group, more than half agreed that the proposed service would benefit their population. However, district nurses strongly disagreed that the proposed service would be compatible with their current work situation. It is recommended that

further studies take place to specifically explore why the proposed service was viewed as not being compatible with the existing work situation.

- From the interviews with practice nurses, telephone triaging was identified as one of the most widely used forms of services provided by the local general practices.

Following a series of significant earthquakes Christchurch has recently experienced, it is recommended therefore that research be undertaken into better understanding the full extent of the role of telephone triaging and how the service may be used to meet the mental health needs of the local communities.

#### ***D. Patients***

- Research is needed in New Zealand to understand how patients view home telehealth services. No research publication has been found in New Zealand that investigates how patients themselves feel about the prospect of using home telehealth.
- Patients should be consulted from the earliest stages of planning a locally based telehealth service in the future.
- Public consultation with the local iwi and community leaders of different ethnic groups should be encouraged prior to implementing a telehealth service throughout the Canterbury region. Should the proposed telehealth service be implemented, there would be a need to determine what languages the service should be provided in and who should provide the service.

### **7.3 Reflection**

New uses are always found for familiar technologies (Oudshoorn & Pinch, 2003).

Throughout history, health professionals have consumed, modified, domesticated, and resisted technologies. While physicians traditionally have been the primary agents of the technology-user nexus in the biomedical focused health care system, the gradual evolution of the health care system has now made nurses, and patients important stakeholders to consult.

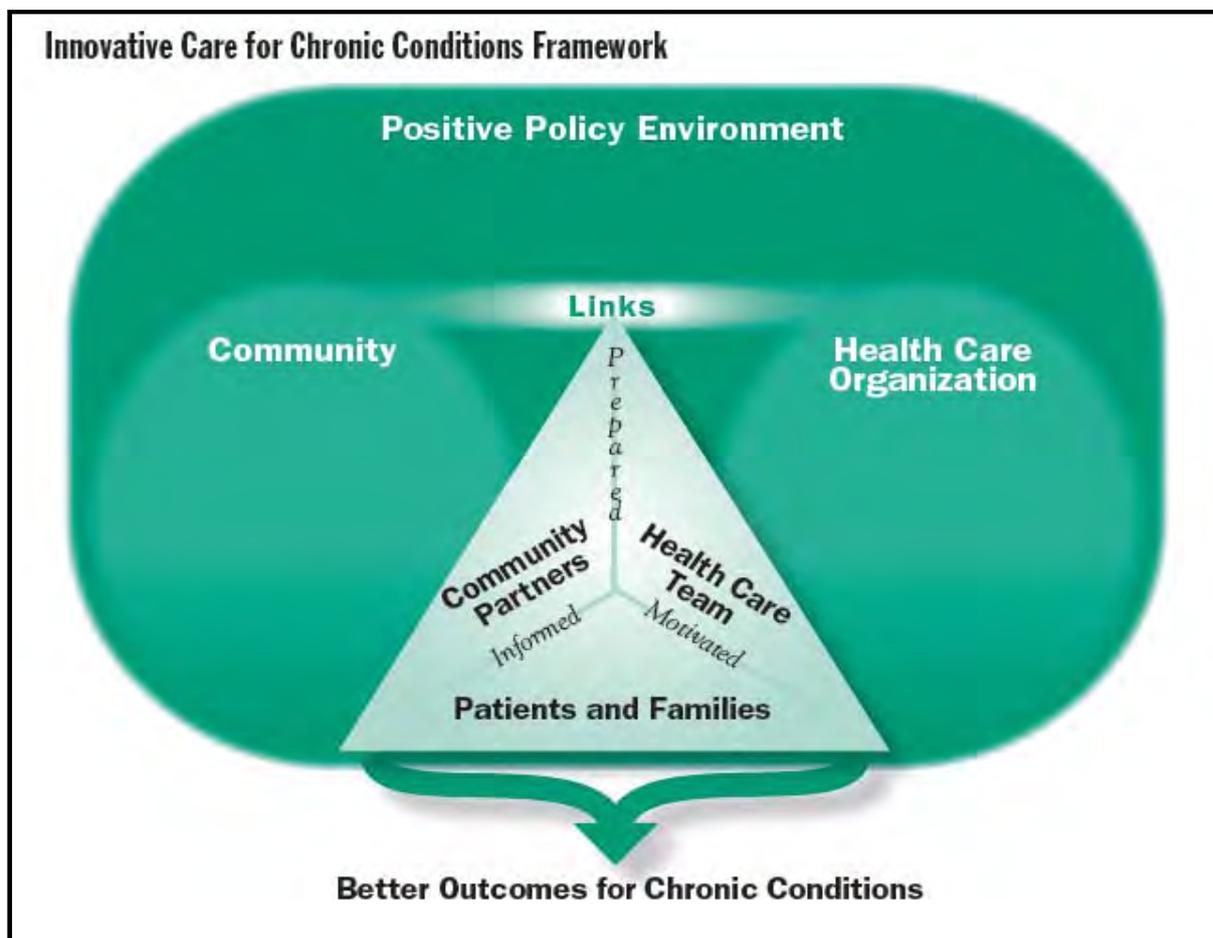
The findings of this study in context with other international research on home telehealth have significant implications. Taken as a whole, the results from this mixed methods study indicate that nurses (practice, district) are interested in delivering prevention focused health services and already have experience using a wide range of technologies. This appears to be especially true for cell phones and internet for both groups of nurses. However, it may be difficult to successfully implement a home telehealth service without sufficient infrastructure at macro, meso and micro level to support the development of such a project.

Users and technology have often been viewed as separate objects in telehealth research (Celler, et al., 2007). Yet health professionals should not be seen as passive consumers of technology (Oudshoorn & Pinch, 2003). As noted by the WHO (2002), nurses are in a unique position in the health care system as the mediator between the policy makers and the patients. This particularly applies for nurses based at general practices or nursing organisations as they are most likely to know and understand the local health needs. Efforts should be made to assist nurses (district, practice) in making informed decisions on telehealth as the application of technologies in the New Zealand health sector further expand.

## APPENDICES

### APPENDIX 1

Innovative Care for Chronic Framework (World Health Organization, 2002, p. 45)



## APPENDIX 2

### Information sheet for the participants

Health Sciences Centre  
Tel: +64 3 364 2987 ext. 8691  
Fax: +64 3 364 3318



#### INFORMATION SHEET

##### *The acceptability of a community based telephone chronic care intervention in Canterbury: Stakeholders' views*

You are invited to participate in the above research project. The aim of the project is to understand the perspectives of stakeholder groups on the feasibility of implementing a telephone based chronic intervention project in Canterbury. The stakeholders included in this project are: general practice teams (particularly practice nurses) and community nurses not in general practice. Such projects have been introduced successfully in other countries and this research is designed to examine the appropriateness of such a service locally.

The purpose of such a service would be to focus on people recently diagnosed with chronic conditions such as diabetes, congestive heart failure, chronic obstructive pulmonary disease (COPD) and cardiovascular disease, and develop telephone-based approaches to providing advice and support for lifestyle change. The aim of the service would be to inform, involve and empower individuals to make positive health behaviour changes and self-manage their care.

Your involvement in this project will be to participate in a semi-structured interview, which will be taped (with your permission). It will take approximately 20 minutes and can be arranged for a time and place to suit you.

This is a voluntary interview. By taking part in this interview, it is understood that you have consented to participate in this research thesis project and that you consent to the publication of the project, with the understanding individual anonymity will be completely preserved. All participants will be offered a summary of the findings and also be provided with a transcript of their interview to review and amend if necessary. Information from this interview will be not for commercial purpose and will be used for the purpose of completing the MHS research thesis only.

All forms of data, including notes and consent forms will be kept secure in a locked file cabinet in the University of Canterbury for a period of five years. After five years, all forms of data will be destroyed.

This project is being carried out as a requirement for a Masters in Health Sciences degree, by Bible Sung Kyong Lee under the supervision of Associate Professor Pauline Barnett. They will be pleased to discuss any concerns you may have about your participation in the project, and their contact details are below:

Bible Lee: 027 343 2892; email: [morning\\_star001@hotmail.com](mailto:morning_star001@hotmail.com)  
Associate Professor Pauline 366 7001 ext 3692; email [pauline.barnett@canterbury.ac.nz](mailto:pauline.barnett@canterbury.ac.nz).

If you have any queries or concerns regarding your rights as a participant in this study, you may wish to contact an independent Health and Disability Advocate, as follows:

South Island 0800 377 766 Free Fax (NZ wide) 0800 2787 7678 (0800 2 SUPPORT).

E-mail: [advocacy@hdc.org.nz](mailto:advocacy@hdc.org.nz)

This project has been approved by the Health Sciences Centre, University of Canterbury.

*The acceptability of a community based telephone chronic care intervention in Canterbury: Stakeholders' views*

## **APPENDIX 3**

### **Guidelines for semi-structured interview with practice nurses**

#### **-Introduction/Experience /Background**

Could you please tell me which medical practice you are currently working in and little bit about your working background as a practice nurse?

#### **- Current practice in the prevention and management of chronic conditions/**

What type of chronic conditions are you seeing the patients come in for the most, in your General Practice?

Upon reflection, has it always been like this? During the time that you have worked here?

What types of services and programmes is your general practice currently providing for patients with chronic illnesses?

#### **-Identifying trends**

What types of patients are you seeing come in, at a more severe state of their chronic illnesses?

On the other hand, what types of patients are you seeing coming in, at more earlier stages of their chronic illnesses? (If no trend identified, move on)

How do you think the needs of your practice may be the same/different to other general practices found throughout the Canterbury region?

### **-Assessing perspective on the proposed service**

The following is a hypothetical scenario, please let me know what you think afterwards:

A patient enrolled at your General practice, becomes identified by a GP as having the potential to benefit from the telephone service discussed in your information sheet. Such telephone services are designed to target patients at early stages of their chronic conditions.

The purpose of the service is to motivate and aid the patients to make positive lifestyle changes to prevent further exacerbation of their conditions, but also to help them manage their condition on a daily basis. A registered nurse, or an enrolled nurse from another community nursing organisation then contacts the patient identified to provide the discussed telephone service programme, in place of the registered nurses from your own General Practice. Any thoughts on this?

How beneficial do you think such programme would be for your patients and how would it affect you in terms of workload? Do you think it matters who provides the service?

Who do you think should provide the service?

### **-Assessing interest to technology**

Would you be interested in using the following forms of technology- skype, the web camera, personal digital assistance, cell phones, cell phones with video cameras, if they were to become available at your workplace? Would you want to use them as part of everyday nursing practice? In what ways?

## APPENDIX 4

A copy of self complete questionnaire distributed to district nurses

<p>The following is a completely anonymous survey that will take approximately 10 minutes to fill out. This survey is designed to assess the feasibility of implementing a Canterbury based TELEPHONE service for patients newly diagnosed with chronic conditions.</p> <p>Each a service would involve providing on a part-time or full-time basis, on-going, lifestyle behavioural change advice, personalised for the individual patient via the TELEPHONE. It is envisaged that such a service would inform, motivate and prepare the patients and their families become active participants in chronic care.</p> <p>With a service of this type, the local GP teams would identify patients newly diagnosed with chronic condition(s) that they believe will most benefit from such a TELEPHONE service. The role of the healthcare provider (who could be nurses) would be to provide structured coaching and individualised support, providing lifestyle change advice to patients newly diagnosed with chronic condition(s) on an on-going basis over the phone. The TELEPHONE service would not involve delivering clinical treatments and tests.</p> <p>The purpose of such a TELEPHONE service would be to aid the newly diagnosed patients <i>make lifestyle changes to reduce risks of deterioration or exacerbation of their condition(s)</i>. This survey seeks information from community nurses on the feasibility of this type of service in Canterbury.</p> <p>This is a voluntary survey. By completing this survey, it is understood that you have consented to participate in the project and that you consent to the publication of the project, with the understanding individual anonymity will be completely preserved.</p> <p>This research is carried out as part of a Masters in Health Sciences degree, by Bible Sung Kyong Lee under the supervision of Associate Professor Pauline Barnett. If you have queries please contact: Bible Lee: 027 343 2892; email: morning_star001@hotmail.com Associate Professor Pauline Barnett 366 7001 ext 3692; email: pauline.barnett@canterbury.ac.nz.</p>	<p>2. Providing a mesyrie change telephone service would...</p> <p>... fit well with the way I like to work. 1 2 3 4 5</p> <p>... fit into my work style. 1 2 3 4 5</p> <p>... be completely compatible with my work situation 1 2 3 4 5</p> <p>3. Using the telephone service can be a good way to help the patients make lifestyle changes. 1 2 3 4 5</p> <p>4. The telephone service will enhance the effectiveness of the nurses' work. 1 2 3 4 5</p> <p>5. Using the telephone instead of face-to-face will mean client needs will get overlooked. 1 2 3 4 5</p> <p>6. The telephone service does not use nursing skills well. 1 2 3 4 5</p> <p>7. Working with the telephone a lot more will limit my job satisfaction. 1 2 3 4 5</p> <p>8. I would find it easy to use the telephone to deliver a programme such as the one proposed. 1 2 3 4 5</p> <p>9. It would not be easy for me to become skilful in delivering a chronic care management via a telephone. 1 2 3 4 5</p> <p>10. For me to carry out such telephone work, I would need more training 1 2 3 4 5</p> <p>11. I have the resources, knowledge and the ability I would need to provide a lifestyle change TELEPHONE service. 1 2 3 4 5</p> <p>12. Providing a lifestyle change telephone service would be entirely within my abilities. 1 2 3 4 5</p> <p>13. I think such a service is a good idea. 1 2 3 4 5</p> <p>14. I think delivering such a service would be beneficial for the patients. 1 2 3 4 5</p> <p>15. I like the idea of delivering a lifestyle change TELEPHONE service. 1 2 3 4 5</p> <p>16. I would like to know more about such a service. 1 2 3 4 5</p> <p>17. I would like to trial delivering such a service. 1 2 3 4 5</p>
<p>STRUCIONS: Please circle the response that most reflects your view.</p> <p>1. If I were providing a Canterbury based lifestyle change TELEPHONE service to provide on-going, lifestyle behavioural change advice, personalised for patients newly diagnosed with chronic condition(s), it...</p> <p>... would enable me to effectively provide advice and support to the patients 1 2 3 4 5</p> <p>... would provide me with job satisfaction 1 2 3 4 5</p> <p>... would enable me to broaden my nursing scope of practice 1 2 3 4 5</p> <p>... would be useful in my role as a nurse 1 2 3 4 5</p>	<p>Strongly Disagree 1 2 3 4 5</p> <p>Strongly Agree 1 2 3 4 5</p>

	Strongly Disagree	1	2	3	4	5	Strongly Agree
18. I would like to receive training to carry out such a service.	1	2	3	4	5		
19. I would like to deliver such a service if it became available at my workplace.	1	2	3	4	5		
20. I would like to do telephone based support work on a full-time basis.	1	2	3	4	5		
21. I would be happy to incorporate a telephone support service such as the one proposed as part of my job, but not as all of my job.	1	2	3	4	5		
22. I am not interested in doing a telephone based support work.	1	2	3	4	5		
23. I would like to be involved in more prevention/intervention work.	1	2	3	4	5		
24. I would like to use other forms of technology as part of my nursing practice, if they were to become available in my workplace	1	2	3	4	5		

	Not very Experienced	1	2	3	4	5	Very Experienced
25. How experienced are you in using the following?		1	2	3	4	5	
... Skype		1	2	3	4	5	
... Personal Digital Assistance (PDA)		1	2	3	4	5	
... Cell phones		1	2	3	4	5	
... Cell phones with cameras		1	2	3	4	5	
... Email		1	2	3	4	5	
... Facebook		1	2	3	4	5	

	Not at all Comfortable	1	2	3	4	5	Very Comfortable
26. To what extent would you feel comfortable using other forms of technologies (such as the ones listed below) as part of your work, if they were to become available at your work place?		1	2	3	4	5	
... Web cameras		1	2	3	4	5	
... Personal Digital Assistance (PDA)		1	2	3	4	5	
... Cell phones		1	2	3	4	5	
... Cell phones with cameras		1	2	3	4	5	
... Email		1	2	3	4	5	
...New technological devices that have never been trialled		1	2	3	4	5	

Finally, just a few demographic questions so that we can understand you better. Please tick the correct response:

27. My age group:  20-24 yrs  25-30 yrs  31-35 yrs  36-40 yrs  41-50 yrs  51-55 yrs  55-60 yrs  61-65 yrs  66+

28. I am:  a registered nurse  an enrolled nurse

29. I have been working as a nurse for:

Less than 1 yr  1-5 yrs  6-10 yrs  11-15 yrs  16+ yrs

30. As a nurse, I have worked in:  NZ  Other countries: \_\_\_\_\_

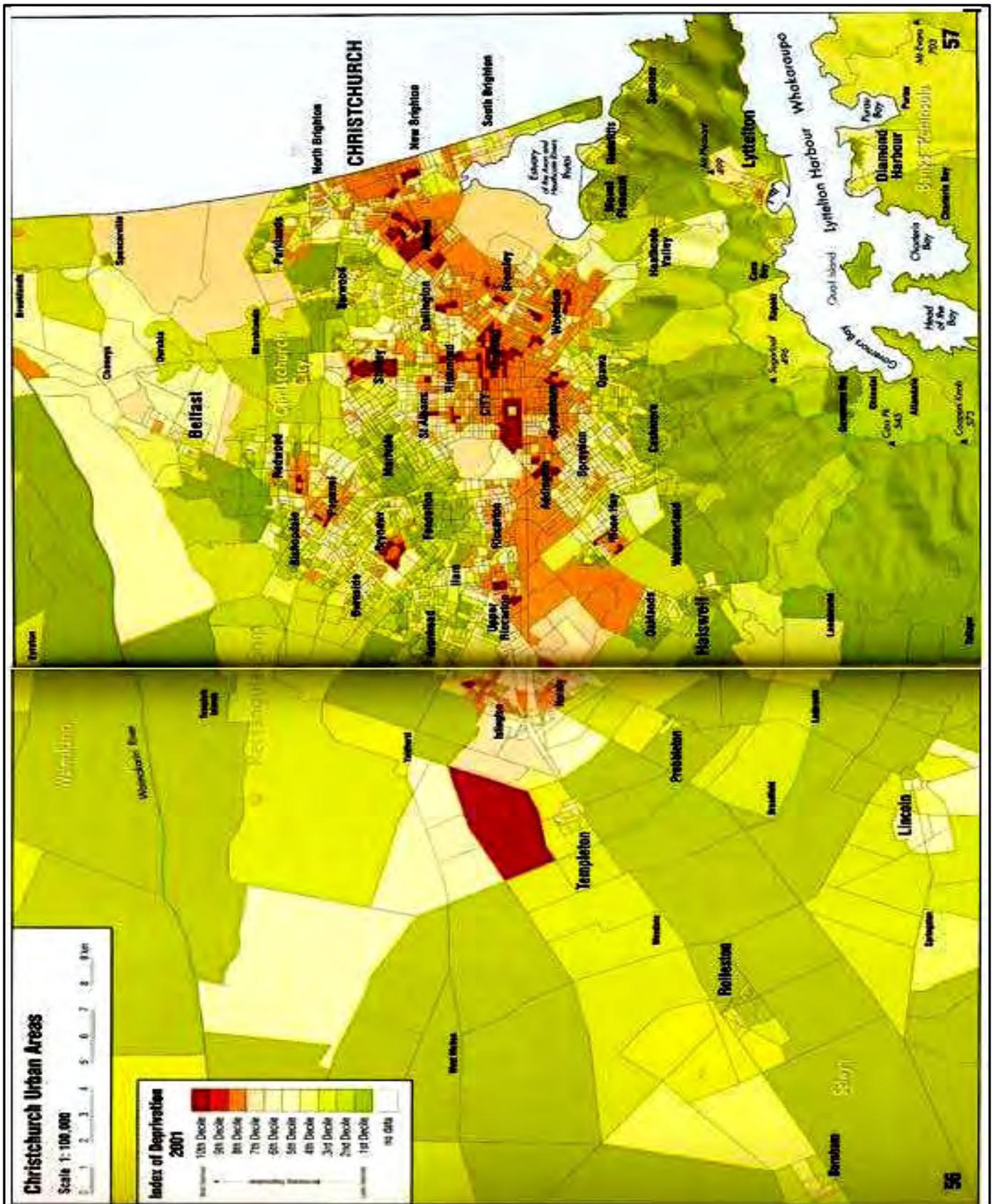
31. As a nurse, I have worked in:

Urban areas only  Rural areas only  
 Mainly urban, but some rural areas  Mainly rural areas  
 Both urban and rural areas equally

Many thanks, please return this survey either to the return box located at the staff work room at Nurse Maude or via the post by using the stamped envelope provided to: B. Lee, The Health Sciences Centre, University of Canterbury, Christchurch by 15<sup>th</sup>, November, 2010.

## APPENDIX 5

Map of Christchurch Urban Areas and its socioeconomic Differences (Crampton, Salmond, & Kirpatrick, 2004)



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