

**Development of an integrated model of care for use by community health workers
working with chronic non-communicable diseases in Khayelitsha, South Africa**

Submitted in partial fulfilment of the requirements for the degree of
Doctor Philosophiae in the School of Public Health,

University of the Western Cape

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WESTERN CAPE

KEYWORDS

Community health workers (CHWs)

Non-communicable diseases (NCD)

Training

Model of care

Roles

Competencies

Prevention and management of NCD

Integrated chronic disease model

Khayelitsha



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ABSTRACT

Non-communicable diseases (NCD) continue to be a public health concern globally and contribute to the burden of disease. The formal health system in developing countries lacks the capacity to deal with these NCD as it is overburdened by communicable diseases. Thus, community health workers (CHWs) have been suggested as a solution for alleviating the burden for primary health facilities, by extending NCD care to the community.

The aim of this thesis is to develop an integrated model of care for CHWs working with patients with non-communicable diseases by describing and exploring current CHW roles, knowledge and practices in relation to community-based NCD care.

The specific objectives for this study included 1) the exploration of the NCD roles of generalist CHWs in the context of a limited resource urban setting; 2) determining the NCD-related knowledge of CHWs, and factors influencing this in a limited resource urban setting and 3) a comparison of actual and envisaged roles in the management and prevention of NCD using the integrated chronic diseases management model (ICDM) as a benchmark, and propose key competencies and systems support for NCD functions of CHWs in South Africa

Mixed methods were used to achieve the objectives of this study. First, a qualitative enquiry was conducted using observations to respond to the first objective. A quantitative cross sectional design was then used to achieve the second objective, and a questionnaire was used to interview CHWs. A comparison of findings from both the quantitative and qualitative studies with policy guidelines was undertaken to address the third objective.

As revealed in the findings, community health workers perform numerous tasks, and these include linking community members with a health facility, provision of care, facilitation of NCD support groups and peer education. Most of the roles they perform are influenced or shaped by the communities they serve.

Also indicated is that almost half (47%) of the CHWs interviewed had NCD. Despite the multiple NCD-related roles CHWs performed, the most reported roles were the distribution of medication, provision of dietary advice and physical assessment. Only 52% of CHWs indicated that they had received NCD training. A further 44% of NCD-trained CHWs received refreshed training. Their knowledge of diabetes and hypertension was poor, and

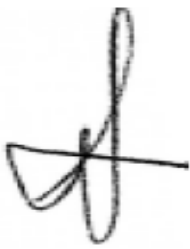
high knowledge scores were associated with having an NCD and the frequency of supervisory contact.

Lastly, actual NCD-specific roles focused on secondary prevention. Further shown in the findings was a misalignment between the current practice and policy. However, there were some agreements between policy and practice especially relating to the supervision of CHW. Neither in-service training nor refresher training is addressed by the policy document. Based on the roles of the CHW, competencies for NCD care were developed using a competency framework, which highlights cognitive, social, functional, and meta-competencies. A proposed model of care that has emanated from this research is shared, incorporating all the components highlighted in the different phases.



DECLARATION

I declare that *Development of an integrated model of care for use by community health workers working with chronic non-communicable diseases in Khayelitsha, South Africa* is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.



Lungiswa Primrose Tsolekile



10 December 2018

ACKNOWLEDGEMENTS

I would like to thank my supervisors (Professors Thandi Puoane and Helen Schneider, and Naomi Levitt) for their valuable mentorship and guidance throughout the entire process of this PhD, from writing my proposal to executing the research. I would not have made it without their patience, persistence and expertise.

I would not have been able to accomplish this work without the financial assistance of the Chronic Diseases Initiative in Africa. I would like to extend my gratitude to the NGOs in Khayelitsha that allowed me to collect my data. I thank them for their time, support, insights into CHW work, and for their tireless help.

To my colleagues at the School of Public Health, especially the NCD cluster team, thank you for your support and encouragement. I do not think I would have finished this process was it not for their assistance and for allowing me the time to complete this body of work.

I would also like to acknowledge my family and friends for their support and patience during the last few years: my father and mother their love and understanding during this period; my siblings for their tireless backing and encouragement; and my friends for continuing to be part of my tribe and for their unchanging support.

Lastly, I would like to thank the Almighty for carrying me through my PhD journey.

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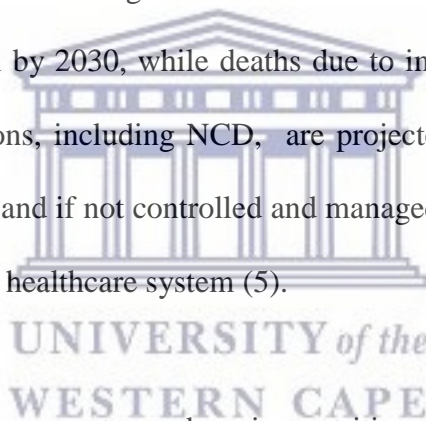
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CHAPTER ONE: INTRODUCTION

1.1 Background

Non-communicable diseases (NCD), such as cardiovascular diseases (CVD), certain types of cancers, type 2 diabetes and chronic lung diseases, are reaching epidemic proportions, particularly in low-income countries and former socialist states (1). An estimated 56 million deaths occurred globally in 2015, 39 million of which were caused by NCD, primarily CVD, cancer and chronic lung diseases and diabetes (2). Approximately 75% of these NCD deaths (30.7 million) are in low- and middle-income countries (LMIC). NCD deaths worldwide have increased in every region since 2000, with the World Health Organisation (WHO) indicating that South-East Asia carries the most significant burden. Annual deaths caused by NCD are projected to rise to 52 million by 2030, while deaths due to infectious diseases will decline (3,4). Also, chronic conditions, including NCD, are projected to be the leading cause of disability worldwide by 2020, and if not controlled and managed well, they could be the most expensive problems facing the healthcare system (5).



South Africa is a middle-income country undergoing nutrition and epidemiological transition characterised by the occurrence of pre-transitional diseases arising from poverty and underdevelopment, and the emergence of NCD, injury and – more recently – the HIV/AIDS epidemic (6–8). The second South African Burden of Diseases Study of 2012 demonstrates this epidemiological transition, in that, nationally, NCD accounted for 43.4% of deaths and HIV/AIDS for 33.4% deaths (9). The same study revealed that the proportion of total years of life lost from NCD was 21%. Furthermore, there were differences in disease prevalence between provinces, although premature mortality affects both the poor and rich. Differences in disease prevalence are also evident within provinces as well as between sub-districts. The Cape Town mortality data provide an illustrative example of these disparities between sub-

districts with different socioeconomic status. A sub-district, such as Khayelitsha, with a predominantly unemployed population, has the highest rate of premature deaths caused by NCD, while it is not spared from other diseases (10).

It has been recognised globally that health and health outcomes are affected by multiple factors that are complex, multidimensional, and often linked to the social determinants of health (SDOH). These factors include social, political, economic, environmental, and cultural factors, as well as human rights and gender equality (11,12). These SDOH, as well as inequalities in South Africa (SA), expose the poor to NCD. In a study assessing health inequalities in SA and describing the relative contribution of each SDOH to health inequalities, it was found that social protection and employment, knowledge and education, housing and infrastructure contributed considerably to the disparities in health (13). A South African study using distinct datasets to explore the relationship between poverty and chronic diseases reported that obesity and hypertension increased with wealth, while risk factors, such as smoking, exposure to fuels that produce smoke, and alcohol abuse, were associated with poverty (14). As shown in findings from a recent review, the paradox of obesity and poverty in developing countries is associated with both the easy availability and a reduced cost of highly processed foods containing no nutritional value (15). Thus, it is evident that people from different economic strata are affected or exposed to different risk factors. A multi-pronged approach that includes multiple sectors is needed to deal with these risk factors.

The management of NCD has mainly been the task of health facilities. However, the health system in many LMIC has been geared towards the management of infectious diseases, with poor monitoring and follow-up (16). The emergence of NCD in a system that is already overburdened by conditions such as HIV and AIDS has further put a strain on human resources

as well as on healthcare resources (17). Moreover, in many LMIC health personnel lack the skills and knowledge to manage NCD (18). Nonetheless, progress has been made as many countries have developed guidelines for the management of NCD (19–21). Despite this progress, the management of NCD at facility-level remains inadequate (22–24). For example, in a study conducted in South Africa, the authors highlighted poor compliance to diabetes guidelines such as lipid examinations were seldom done, while comprehensive foot examinations were performed in only 6% of the patients studied (22). Inadequately managed and controlled NCD pose a burden to the health system, and the management of their resulting complications is costly. There is thus a need for community-level interventions with a strong focus, not just on care but also on prevention and promotion, which will also require the utilisation of community-based health workers, such as community health workers (CHWs), for the prevention and control of NCD.

CHWs have existed for many years and have been used to perform multiple tasks related to healthcare delivery (25). They are referred to diversely as birth attendants, lay health workers, community care workers, village health workers, promoters, community health volunteers, village health guides, to name a few (25,26) CHWs typically have no formal professional tertiary qualification and mostly receive short or informal job-related training. CHW are involved in either paid work or voluntary services.

At the Alma Ata Conference on Primary Health Care in 1978, CHWs as a cadre gained international support and were seen as a critical element to achieving ‘Health for all by 2000’ (27). The implementation of CHW programmes increased afterwards (28), partly because of the importance of the primary health-care approach advocated for in the Alma Ata Declaration, emphasising community participation and the use of CHWs (29). In the 1990s, there was a

renewed interest in CHWs in many developing countries worldwide. This interest was prompted by the AIDS epidemic, the emergence of other communicable diseases and the inability of the formal health system to provide adequate care for people with NCD (30,31).

The growing burden of HIV/AIDS and NCD in LMIC has put a tremendous strain on human resources especially on health professionals working at the frontline of the health system (32). The increased workloads, overcrowding at facilities and poor quality of care at the primary healthcare level (6) led to the exploration of task shifting. Task shifting, formerly referred to as substitution, is the delegation of tasks from one cadre to another (33,34). WHO described it as ‘a process of delegation whereby tasks are moved, where appropriate, to less specialised health workers’ (35). It is essential, however, not to view task shifting as a rapid or easy solution to the human resource crisis but rather as a strategy for strengthening the health workforce so that it is in a better state to efficiently respond to public health needs (35). To deal with the human resource crisis, it is thus imperative to review the possible roles that a non-professional or lesser-trained cadre of workers, such as CHWs, can play in responding to public health needs to ease the workloads of professional healthcare workers.

Two Cochrane reviews by Lewin et al. have found that CHW interventions are effective in promoting immunisation uptake, breastfeeding, improving treatment outcomes for acute respiratory infections, malaria and tuberculosis and reducing child morbidity when compared to usual care (36). Despite the lack of experimental evidence in relation to CHWs and their effectiveness in NCD prevention and management in the two Cochrane reviews, many lessons can be drawn from the health systems’ response and CHWs’ effectiveness in contributing to the successes of other life-long chronic condition programmes, such as HIV/AIDS programmes in LMIC (37,38). However, apart from these reviews, there has been a growing body of

research on how CHWs have been utilised in the prevention and management of diabetes and hypertension in LMIC (39,40). In LMIC contexts, CHWs have shown to be effective in providing education as well as support to people with NCD (41–43) as well as CVD screening (42). For CHWs to perform these tasks, however, they require appropriate and supportive systems. These include, but are not limited to, training (44,45) and supervision (26).

South Africa has made tremendous strides in providing free healthcare for all, including the provision of free long-term treatment for NCD through the primary healthcare system (46). Despite the efforts made in health facilities to increase access to NCD care, poor control of these conditions continues to be a problem, and there is a need for rigorous prevention strategies beyond facilities.



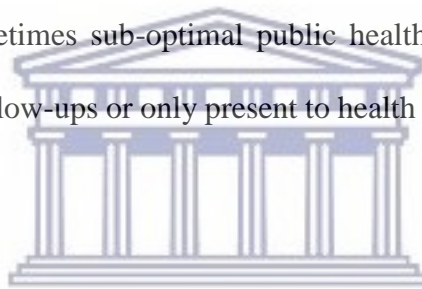
More recently, the South African government introduced ‘Primary Health Care Re-engineering’ as a vehicle for strengthening the delivery of primary health care to communities. Under this initiative (47), a more formalised CHW cadre has been piloted with expanded roles to include maternal child health interventions and integrated approaches to chronic lifelong conditions (involving both communicable and NCD). It has, however, been left to the provinces to either adopt or adapt this strategy. Thus, some provinces have fully embraced this strategy, while others have adopted some components of it, such as has the Western Cape Province.

The Western Cape Province’s Department of Health has developed a people-centred strategy called Healthcare 2030, based on lessons learned from a previous generation of planning, the Comprehensive Service Plan 2010 and Healthcare 2010 (48). Healthcare 2030 prioritises the strengthening and expansion of community-based services. This strategy is in line with the

PHC re-engineering which employs a population-based model. In this strategy, CHWs are a fundamental part of a team responsible for households within a municipal ward, supervised and supported by staff based at the health facility (48). The CHW's roles are mainly to focus on preventive care and health promotion.

1.1 Problem identification

Non-communicable diseases are a significant problem in developing countries, including South Africa, and especially in urban populations. People who reside in settings such as townships and informal settlements are the worst affected (10) and experience high premature death rates caused by NCD. A large percentage of these populations does not have access to private medical aid and rely on sometimes sub-optimal public health sector care. They may have difficulty attending routine follow-ups or only present to health services when the disease is in the advanced stage (49–51).



In health facilities, health professionals have undertaken numerous tasks related to NCD that could be shifted to CHWs. These roles include the screening of patients, adherence support and health and nutrition education relevant to NCD. Since CHWs reside within the communities they serve, they can offer continuous care and personal support and have an understanding of their patient's circumstances. However, generalist CHWs are involved in numerous roles other than NCD. These include home-based care, maternal and child health, directly observed short course (DOTS) support for tuberculosis (TB), human immunodeficiency virus (HIV) care and support and family planning services. There is a need to explore how a chronic disease management role can be integrated into the work of CHWs and to develop an integrated model of NCD care provided by generalist CHWs.

1.2 Rationale and motivation

The primary prevention of NCD by using a more integrated approach is essential for both their prevention and control. The current emphasis globally and in South Africa on the revitalisation of Primary Health Care means that there is a need to revisit the roles of CHWs and to focus on the prevention of ill health and the promotion of good health. CHWs can fulfil prevention and promotion tasks: such actions will be essential in strengthening the health system and decreasing the workloads of health professionals. Furthermore, the use of CHWs will assist in providing continuous care to clients at the community level.

Since the mid-2000s emphasise the development and strengthening of community-based services (CBS) to make them more accessible to the people. This will be achieved through the introduction of ward-based outreach teams (WBOTS). In these teams, CHWs will be tasked with providing prevention and promotion services in communities through the supervision of a nurse (52). However, the rigorous training of CHWs is necessary for more robust community-based services. According to the Comprehensive Service Plan 2010, CHWs are expected to provide disease prevention and health promotion support. Similar sentiments are echoed in Healthcare 2030 (48), thus highlighting the significance of an integrated model of care for NCD in fulfilling the functions highlighted in the Health Care 2030 and PHC Re-engineering.

The current study was part of the work undertaken by the Chronic Disease Initiative for Africa whose purpose, among other things, is to build capacity for NCD care. This includes the evaluation and dissemination of its integrated programme of training CHWs in an innovative service delivery model connecting communities and primary healthcare sectors. Further, the lack of accredited NCD training materials for CHWs in the Cape Metro District, despite the

existing high burden of NCD, was also a cause for concern.

1.3 Study aim

In this PhD, the researcher aims to develop an integrated model of care for CHWs working with patients with NCD by describing and exploring current CHW roles, knowledge and practices in relation to community-based NCD care.

In addressing this aim, the following specific questions are asked:

1.3.1 Research questions

- What are the current roles of CHW in NCD care?
- What competencies do CHWs need to fulfil their roles?
- What kind of NCD training do the CHW receive and what is the ideal?
- What are the gaps in the existing roles and the envisaged roles of CHWs as specified in policy documents (incl. PHC-Re-engineering.)?



1.3.2 Study objectives

In undertaking this study, the researcher had five specific objectives. These were addressed in three phases:

Phase 1: *To explore the NCD roles of generalist CHWs in the context of a limited resource urban setting*

1. To determine the roles of CHWs in the prevention and control of NCD; and
2. To explore the relationships between CHWs, community, peers and health facilities.

Phase 2: To profile NCD-related knowledge of CHW and factors influencing this in a limited resource urban setting

1. To assess CHWs' current roles, training and knowledge relating to diabetes and hypertension; and
2. To determine the relationship between NCD knowledge and CHW socio-demographic characteristics, supervision and training.

Phase 3: To compare actual and envisaged roles in the management and prevention of NCD using the integrated chronic diseases management model (ICDM) as a benchmark, and propose key competencies and systems support for NCD functions of CHW in South Africa

1. To compare actual and envisaged roles as stipulated in policy documents;
2. To describe the referral and other support systems for CHW programmes; and
3. To propose key competencies for CHWs in line with their roles for NCD.

1.4 An outline of the thesis

This thesis is presented in seven chapters. The literature review is presented in the second chapter, and focuses on the literature on NCD and describes the health reforms that have had an impact on the roles of CHWs. The focus in the methodology chapter is on the theoretical framework, study designs and methods used to address the specific objectives and the rationale for the use of these methods as well as a description of the study setting. In chapters four to six, the study phases are addressed with each phase presented as a separate chapter to answer the set objectives. Each of these chapters also provides the background to the research, methodology used, data analyses, findings presented, and a discussion of the findings and conclusion. Thus, chapters four to six are written in a manuscript form which has resulted in some repetition. However, each of these chapters were written this way in order to highlight

the distinct characteristics of each phase. A summary of the findings is given in Chapter 7 and the recommendations proposed.



CHAPTER TWO: LITERATURE REVIEW

Current literature on non-communicable diseases (NCD) is examined in this chapter, as they relate to the burden, behavioural and underlying risk factors of NCD, the management of NCD with particular emphasis on the responsiveness of the health system as well as task shifting as an approach to improve the management of clients and increase coverage. The roles of CHWs in NCD based on what exists in LMIC and South Africa are also described.

2.1 The burden of NCD in LMIC: mortality and risk factors

Non-communicable diseases (NCD) are a public health concern in many parts of the world. This group of diseases includes cancer, diabetes, chronic obstructive pulmonary disease (COPD), cardiovascular disease (CVD) and mental health conditions. The global prevalence of diabetes in 2017 was 425 million (53), 1.13 billion people had hypertension (54), while 251 million cases of COPD in 2016 were reported globally (55). More recently, debates have surfaced about the reframing of NCD so that they receive recognition from both policymakers and funders. In their commentary, Allen and Feigl argue that the term ‘non-communicable’ hampers efforts to deal with these diseases efficiently, propagates confusion and undermines efforts to stimulate a sense of urgency (56). It is sufficient to say that, as a disease group, NCD should receive more attention than they do at present, as they have been identified as the leading cause of death worldwide (57).

2.1.1 Mortality due to NCD

There has been a rise in the prevalence of NCD globally over the past couple of years, and their occurrence has been more pronounced in low- and middle-income countries (LMIC) (58). An estimated 56.4 million people globally died in 2015, and NCD caused about 39.5 million of those deaths, thus accounting for 70%, while 25% of these NCD deaths occurred in LMIC

(2). Data from several analyses and projections of global mortality have also shown that NCD are on the rise and are expected to increase further (3,4,59).

Table 1: Global deaths for all causes and NCD 1990 and 2030 for all ages and both sexes combined (million) (4,59)

Year	All causes	Non-communicable disease
1990	46.5	26.7
2010	52.7	34.5
2030	73.2	52.0

As shown in Table 1 (and based on the projections of Lozano et al. (2012) and Mather et al. (2006)) the total number of deaths globally and the proportion of deaths due to NCD are projected to increase from 1990 to 2030. The projections for 2030 are particularly alarming, as then deaths due to NCD will almost double (48.7%) from 1990, and 71% of global deaths will be attributed to NCD. The World Health Organisation (WHO) projected a 15 % global increase in NCD deaths between 2010 and 2020, with the highest increase of over 20% occurring in Africa, the eastern Mediterranean region and South-East Asia (60). According to the WHO, in South Africa, NCD were estimated to account for 43% of total deaths in 2012 and 51% in 2016 (58).

Among the NCD, four disease groups/conditions, i.e. CVD, cancer (malignant neoplasms), diabetes, and chronic respiratory diseases, are responsible for most of the morbidity and mortality in LMIC (61). These four disease groups have contributed immensely to NCD deaths. For example in 2015 deaths caused by CVD accounted for 45% of all deaths (17.7 million), while cancers, respiratory diseases and diabetes accounted for 8.8 million, 3.9 million and 1.6

million, respectively (62). In South Africa, 19% of NCD deaths were due to CVD in 2016 (54), 1% higher than the statistics obtained for 2012 (58).

Moreover, in 2008, almost half (44%) of all NCD deaths of victims worldwide occur below the age of 70 years in LMIC, about 48% are estimated to have occurred in those under the age of 70, compared with 26% in high-income countries (HIC) (63). The low premature rates in HIC could be due to improved treatments as well as population-wide interventions. In 2012, about 42% of premature deaths (deaths of people younger than 70 years) occurred globally, with just under 30% from LMIC. By 2015, the proportion of premature deaths globally had risen to 48% (58,62). Among NCD, CVDs were responsible for a considerable proportion of these premature deaths (58). There are differences in premature deaths between regions. In the WHO 2014 *Global Status Report on NCD*, regional age-standardised death rates for NCD ranged from 438 to 650 per 100 000 population, and the higher premature mortality rates were reported in the WHO Member States, namely, Africa, South-East Asia and the eastern Mediterranean region (58). The wide range in premature mortality rates across WHO regions can be possibly explained by the fact that many regions are undergoing the epidemiological transition at different stages (64,65). In places like Europe, with its high life expectancy (66), deaths occur among the elderly. In Africa which consists of areas that are still in the early stages of the epidemiological transition, life expectancy is low, and NCD mortality is distributed in the younger population (67).

In the absence of appropriate action, cumulative economic losses due to NCD in LMIC between 2011 and 2025 are estimated to be US\$ 7 trillion (68). Furthermore, the treatment of NCD – especially – tends to be prolonged and costly for many in LMIC. Thus many of the already

scarce family and societal resources are often channelled to medical expenses (69), resulting in lower socio-economic groups having a higher prevalence of risk factors, higher disease incidence rates and higher mortality.

NCD deaths are preventable and can be reduced through interventions that tackle the risk factors for these diseases. The World Health Organisation has proposed numerous government policies to curb these deaths, which include the reduction of tobacco use, harmful use of alcohol, unhealthy diets, and physical inactivity together with the delivery of universal healthcare (58). Many of the risk factors now seen in LMIC are also an illustration of their economic development (70) as well as the disparities within them.

2.1.2 Risk factors for NCD

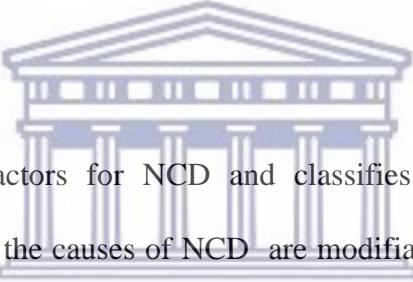


Figure 2 displays the risk factors for NCD and classifies them into three categories. Represented in the diagram on the causes of NCD are modifiable risk factors which include inadequate dietary intake, harmful alcohol use, tobacco use; physical inactivity and metabolic or physiological factors, such as disorders like overweight/obesity, raised blood pressure, raised blood glucose and raised lipids (58,71–73). Underlying drivers that are structural are also presented in the diagram, and they include social determinants of health, as well as urbanisation, globalisation and the ageing population.

Causes of NCDs

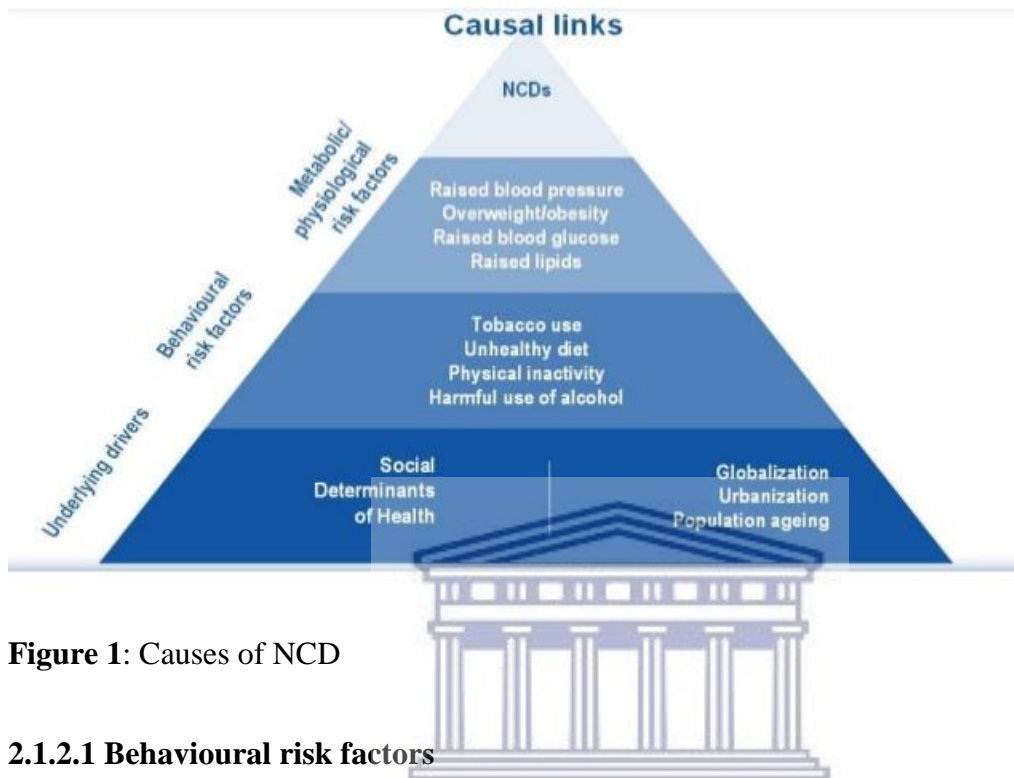


Figure 1: Causes of NCD

2.1.2.1 Behavioural risk factors

This section focuses on four behavioural risk factors, namely, tobacco use, unhealthy diets, physical inactivity and the harmful use of alcohol.

Tobacco use and passive smoking are responsible for more than 6 million deaths (74) and, globally, an estimated 22% of people above the age of 15 years smoke (58). Tobacco smoking has been cited as one of the leading causes of premature death and disability and –more alarming – is the fact that over 80% of the world's smokers live in low- or middle-income countries (75). The overall consumption of tobacco, as well as the prevalence of smoking, is generally higher in men than in women (76).

Earlier studies conducted in Britain established the link between tobacco use and NCD (77,78). More recently, systematic reviews with meta-analysis have identified smoking to have a strong association with lung cancer and other forms of lung diseases (79,80).

Smoking is a well-recognised risk factor for certain cancers, including of the lung and tongue (81). In lifelong smokers compared to non-smokers, the risk of lung cancer development is reported to be 20–40 times higher (82).

Smoking has also been implicated as a causative factor in the development of chronic obstructive pulmonary diseases (COPD) (83). An estimated 5% of all global deaths in 2015 were due to COPD, and 90% of these deaths occurred in LMIC (55). The World Health Organisation predicts that, by 2030, the third leading cause of death globally will be COPD (4).

Smoking is also reported to increase the risk of heart disease and stroke by two to four times (84). Numerous studies have identified cigarette smoking as a cause for CVD, including coronary heart disease (CHD), cerebrovascular disease (stroke), peripheral artery disease (PAD), and abdominal aortic aneurysm (85–87). Smoking cessation, on the other hand, has proven to be beneficial in reducing smokers' risk of myocardial infarction and stroke, and smokers' excess risk of CVD (85). The benefits of quitting smoking were also reported in a study that examined the relation of time since stopping smoking with risk of coronary heart disease in middle-aged women in America. In this study, investigators found that nearly half of the excess CHD risk was eliminated within two years of quitting (88).

Other studies have also shown that the risk for diabetes among smokers was higher than nonsmokers (89–91). Interestingly, in a cohort study by Manson et al. (92) that sought to determine the association between cigarette smoking and the incidence of type 2 diabetes mellitus they found that the risk of diabetes increased for smokers and past smokers after adjusting for body mass index (BMI), physical activity (PA), and other risk factors. Thus, it is shown in this study that cigarette smoking in this study was an independent determinant of type 2 diabetes.

Unhealthy diets (in particular, high salt intake, high saturated and trans-fatty acid intake, and low fruit and vegetable consumption) have been linked to the development of many NCD, including diabetes, CVD and certain cancers (58,93,94). The WHO report on globalisation further emphasised the relationship between unhealthy diets and NCD (95). A diet high in sodium has been associated with elevated blood pressure, a major cause of stroke and ischaemic heart disease (IHD). An estimated 62% of cerebrovascular disease and 49% of IHD globally were attributable to elevated blood pressure (96). Strazzullo et al., in their meta-analysis of data pooled from 1966–2008, demonstrated that an increase in salt intake by 5 g/day was associated with a 17% increase in CVD risk (97). Furthermore, high intake of salt was associated with a higher risk of stroke (relative risk 1.23, P=0.007).

The World Health Organisation (WHO) has cited salt reduction strategies as one of the best buys for NCD (68). The salt reduction strategy has been identified as one of the most effective interventions on blood pressure at the population level in decreasing CVD risk (58,97–99). In order to do this, however, there needs to be an understanding of the major sources of salt in the diet.

In South Africa, Charlton et al. found that the sources of salt were grain products, such as bread, were significant contributors to daily sodium intake (98). The highlighted main dietary sources of sodium include foods that are commonly consumed by the majority of the population such as bread. It is suffice to say that there is a need for population-based strategies to restrict sodium intake. Apart from salt reduction, other strategies for reducing CVD risk have been suggested and include the reduction of fat intake, especially that of saturated fats (50).

Another study undertaken in Australia that examined whether longitudinal dietary changes in polyunsaturated fatty acids (PUFAs) or saturated fatty acids (SFA) were associated with mortality outcomes, Ramsden et al. (101) found that the replacement of saturated fats with polyunsaturated fats was not beneficial, as the intervention group had a higher rate of CVD deaths, CHD and all-causes deaths. Such findings have implications for dietary guidelines, including the dietary advice offered to people with NCD.

Globally, a low intake of fruit and vegetables is estimated to cause 1) 19% of gastrointestinal cancer; 2) 31% of coronary heart disease; and 3) 11% of stroke (102). Approximately 6.6 million deaths globally were attributed to a diet low in fruits and vegetables (FV) alone (103). The protective effects of FV are due to their high content of vitamins and minerals, as well as fibre, and include the lowering of blood pressure (BP), reducing antioxidant stress, improving lipoprotein profile as well as increasing insulin sensitivity (104). These findings have implications for dietary advice, one of the tools used in the management of many NCD.

Unhealthy diets are now responsible for more diseases than physical inactivity, alcohol consumption and smoking combined (105). The change in traditional diets high in fibre and nutrients to a diet high in salt, fat, sugar and ultra-processed foods which is more energy-dense

is known as the nutrition transition (8,106,107), and this is the phenomenon that is driving the development of many diet-related conditions, including NCD (108,109).

Physical inactivity

Physical inactivity has increased globally to the extent that even populations in LMIC have become sedentary. An estimated 31% of adults aged 15 globally were insufficiently active in 2008, with women more inactive than men (men 28% and women 34%). Also, yearly deaths attributable to insufficient physical activity were approximately 3.2 million (110). A closer look at the African region showed a higher inactivity rate among adults (21%) and children of school-going age (85%) than other WHO regions (111).

There is a dose-response relationship between physical activity (PA) and NCD (112–115). A systematic review and meta-analysis investigating the association between specific types of physical activity and the risk of type 2 diabetes reported an association between physical activity and the risk of type 2 diabetes. They reported that total physical activity was protective, and higher reductions in type 2 diabetes were observed at low activity levels than at high physical activity levels (116). While a review summarising existing evidence for the long-term (>5 years) relationship between physical activity and weight gain, obesity, coronary heart disease, type 2 diabetes mellitus, Alzheimer's disease and dementia found that physical activity had a positive long-term influence (117). A review of longitudinal studies was conducted with the aim of condensing existing evidence for the long-term (>5 years) relationship between PA and overweight, obesity, coronary heart disease, type 2 diabetes mellitus, Alzheimer's disease, and dementia. The results showed that PA had a positive long-term influence on all these conditions (117).

Many studies on physical activity and its association are conducted among adults; however physical inactivity is an increasing problem for children.

In studies among children and older persons a relationship between television (TV) viewing and body mass index (BMI) has been reported (118–120). In one study, this relationship was strongest among women of low-economic status as compared to those of high-income status (42). However, no significant relationship was found between changes in BMI and in viewing hours at baseline, with average viewing hours over a three-year follow-up and a change in TV viewing hours evident from baseline to three years (121). On the other hand, the likelihood of being overweight was 93% for those who watched TV for 1 to 2.5 hours compared to those who spend fewer hours watching (118). The NHLBI family study acknowledges this relationship, and one hour per day of TV viewing in obese women and 75 minutes of moderate exercise per week was beneficial in lowering BMI (122).

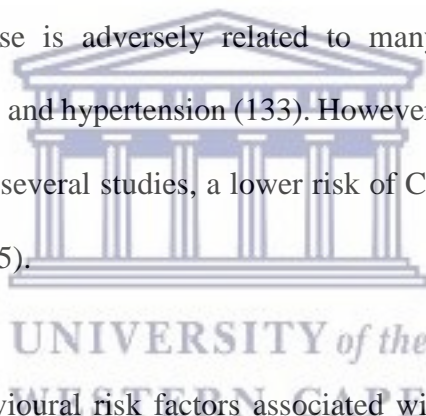
Mechanisation and industrialisation in developing countries have assisted in propelling sedentary living. However, of concern is the growing obesity levels among children that are propelled by sedentary activity levels (123). In the context of South Africa, socio-economic status and race have also been found to be associated with physical inactivity (123,124) suggesting the complexity of dealing with risk factors that may be influenced by contextual factors.

Harmful use of alcohol has been connected to various NCD, i.e. cancer, CVD and liver diseases (125,126). The growing concern regarding its harmful effects has resulted in alcohol use being included in the Global NCD targets by the WHO (58). Globally, in 2012, about 5.9% of all deaths were attributable to alcohol consumption. Furthermore, there were gender

differences in mortality attributable to the harmful use of alcohol, with males (6%) having the highest mortality rate (127). In South Africa, 7.1% deaths in 2000 were attributed to the harmful use of alcohol ranking it fourth among the selected risk factors (128).

The relative risk of having certain cancers was higher among heavy drinkers as compared to those who abstained, and the risk seemed to increase with the volume of alcohol consumed (129). Alarming is the figure for alcohol-attributable cancer deaths worldwide which were reported to be 5.8% in 2012 (129) somewhat higher than that reported in 2002 (3.6%) (130).

Cardiovascular diseases are another category of diseases that are exacerbated by the harmful use of alcohol. Alcohol abuse is adversely related to many CVD outcomes, including haemorrhagic stroke (131,132) and hypertension (133). However, moderate alcohol intake was found to be protective, and in several studies, a lower risk of CVD among moderate drinkers has been reported (131,134,135).



In this section, the four behavioural risk factors associated with NCD, including unhealthy diets, tobacco use, lack of physical activity and the harmful use of alcohol have been discussed. However, it is crucial to understand that the relationship between some of these risk factors and NCD is complex and not necessarily linear.

2.1.2.2 Underlying factors

Underlying factors – also known as upstream factors – include the social determinants of health. Such factors also include social issues and issues of inequity, all of which play a fundamental causal role in poor health outcomes. These upstream factors are critical determinants of the behavioural factors mentioned above. Upstream factors include

globalisation, urbanisation and cultural perceptions among others. These will be described in the following paragraphs.

Globalisation

Globalisation which is characterised by the merging of economies of developing and developed countries has been identified as one of the drivers of inadequate dietary intake and physical inactivity (136). There is, however, more evidence suggesting that globalisation is a complex phenomenon, with multiple layers and systems that interplay (137) and which have an impact on health. In the WHO report (2002) on globalisation, diets and NCD, Chopra mentioned at least three components that are related to globalisation and have an impact on diets (95). These are highlighted in Figure 3.

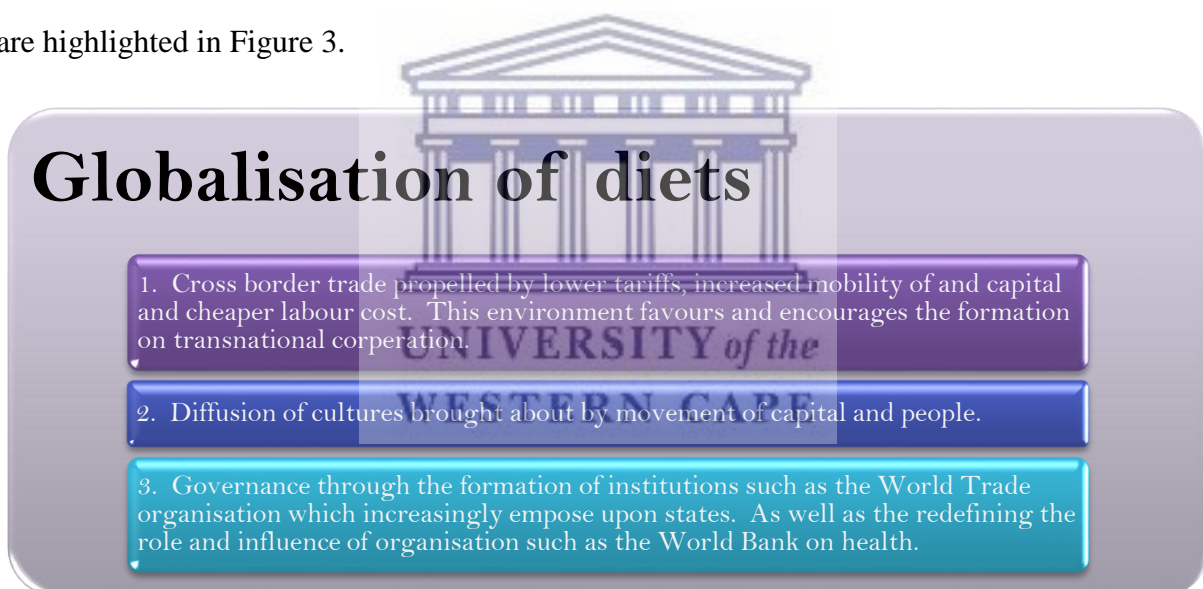


Figure 2: Components of globalisation that influence diets (95)

The presence of ‘big foods’, such as Coca-Cola, in developing countries, has shifted the markets. This is illustrated by the higher consumption per capita of Coca-Cola products in 2011 in South Africa, compared with the consumption worldwide. Interestingly, these figures almost doubled globally between 1991 (136) and 2011 (247), with an increase of 111 in per capita consumption (138,139). The increase may be because of a sprawl of supermarkets in many

disadvantaged communities in South Africa. Nevertheless, their expansion to low-income areas does not equate to increase access to healthy food (140). There is evidence that the sales of snack bars, ready meals and noodles have increased by 40% between 2005 and 2010 (141). The consumption of highly processed diets is typical of countries undergoing the nutrition transition (142,143).

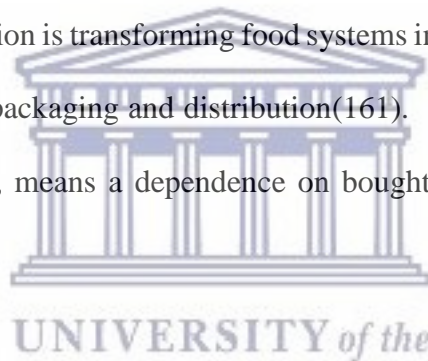
Globalisation influences the diffusion of cultures because of the advance in technology. The diffusion of cultures is evident in the nutrition transition that has introduced 'western diets' followed in many developing countries, including South Africa, which have replaced traditional diets (8,106,144). These diets tend to be nutrient deficient, energy dense and of poor quality and they have been associated with increasing rates of overweight, obesity and diet-related NCD as well as undernutrition (138,143). Trade agreements between countries further propel the movement of unhealthy food. Food trade agreements have been reported to be structural drivers of dietary risk factors (145,146). In recent years, the link between trade and NCD and health has gained prominence.

Urbanisation

Presently, a large proportion of the world's population resides in urban areas. Africa is the most rapidly urbanising continent, and its urban population is expected to rise from 196 million in 1990 to 1,339 billion in 2050. This implies that the proportion of Africans living in urban areas will increase from 31% to 56% (147). Urbanisation has some benefits, for example, access to health services and information, education, safe drinking water, and cash incomes (148,149). Despite the improved access to infrastructure and food in urban areas, urban dwellers' health is compromised by socio-economic conditions that many migrants from rural areas find themselves in. Thus, urban living for many is associated with many challenges,

including high rates of extreme poverty, overcrowding, inadequate water services and waste disposal, and the reliance on cash for food (148,150). The association between urbanisation and health has either positive or negative effects. Negative effects include nutritional factors, such as poor diets and the over-consumption of energy-dense food (144,151), NCD (1,152), psychopathology (148,153), child health problems, including infant mortality, and poor breastfeeding practices (154,155). Furthermore, air and noise pollution characteristic of the urban environment has been linked to respiratory diseases (156,157), sleeping disturbances (158,159) and deafness (160).

The shift from rural to urban living has changed the population's relation to food. In many areas, the increase in urbanisation is transforming food systems in many ways, and this includes food production, processing, packaging and distribution(161). Also, access to food in urban areas, especially for the poor, means a dependence on bought food that tends to be highly processed (162).



Sedentary living has been marked by a shift from more agricultural activities, more prevalent in rural areas, to more service-orientated jobs in cities (163). Katzmarzyk and Mason summed up the process of urbanisation as characterised mainly by a reduction in the intensity of occupational and domestic activity, and the substitution of an activity, such as walking for personal transportation, with mechanised modes. They further suggest that increased personal efficiency is rewarded with more time available for leisure which is usually preoccupied with more sedentary activities (164).

The association between the built environment and physical activity have been well documented (165–167). A systematic review examining the relationship between the built

environment and physical activity based on a study design reported that land use mix, neighbourhood design, connectivity and population density were critical determinants of physical activity (168). Similar findings were observed in another study that sought to determine the association between physical activity or obesity and smart growth planning which reported housing density, compact development patterns and levels of open space as factors that increase the levels of physical activity, mainly walking (169). Apart from the built environment, other factors within an urban setting that have been found to inhibit physical activity include a perceived lack of safety often perpetuated by neighbourhood crime (165).

Rural-urban differences and NCD risk factors

Hernández et al., in their systematic review of studies evaluating rural-to-urban and within-country migration, found lower risk factors (systolic and diastolic blood pressure, body mass index, obesity, total cholesterol and low-density lipoprotein) in migrants compared to urban residents. Also, rural dwellers' risk was lower than migrants (170). However, the review had numerous limitations, some related to sample size within the studies as well as the lack of behavioural risk factors that are vital in the development of NCD.

A recent analysis of a WHO study on global ageing and adult health (SAGE), found similar NCD risk-factor profiles among migrants from rural areas and urban dwellers. However, these risk factors were not consistently worse than found in rural dwellers (171). The findings that were reported in these studies could be a result of the different definitions used between countries to describe rural settings. Furthermore, these findings may be suggestive of changes in rural living, and thus there is a need to redefine rural areas.

The multi-causality of NCD calls for preventive measures at the primary level. Although the underlying causes of NCD are preventable, they require population-based strategies and an enabling health system that will respond to the population's needs (172). Intervention programmes that focus on primary prevention, early diagnosis of those at risk and cost-effective management of NCD are lacking in many resource-poor settings.

2.1.2.3 Metabolic/physiological risk factors

Most of the NCD are a result of four behavioural factors that lead to four critical metabolic/physiological changes: overweight/obesity, raised blood pressure, raised blood glucose and raised lipids.

Overweight and obesity are characterised by a Body Mass Index (BMI) above 25 and 30 kg/m² respectively. According to the WHO in 2016, an estimated 39% of women and 39% of men aged 18 and older globally were overweight. The prevalence of obesity has doubled since 1980 in more than 70 countries. Approximately 4.0 million deaths globally in 2015 were attributed to a high BMI, with nearly 40% of these deaths being of persons who were not obese, and 2.7 million deaths among those with a high BMI were due to CVDs (173). Furthermore, in another study overweight and obesity have been associated with increased all-cause mortality (174). Obesity increases the risk of NCD, such as diabetes, hypertension, coronary heart disease, stroke, certain cancers, obstructive sleep apnoea and osteoarthritis (73). In Africa, the prevalence of obesity in urban populations was higher compared with their rural counterparts (175). In a study that sought to determine the differences between urban and rural populations and other socioeconomic groups in sub-Saharan Africa, the average BMI was 28.4 (SD = 6.6 kg/m²). However, the prevalence of overweight and obesity was 31 % and 34% respectively, with South Africa reporting a significantly higher prevalence of obesity (54%) compared to the

other sites, namely, Tanzania, Uganda and Nigeria (176) , and being a female was a predictor of overweight and obesity. This high prevalence in urban sites can partly be explained by urbanisation (177,178) and globalisation (137) in many African countries.

Raised blood pressure affects 1.13 billion people worldwide, and a slight decrease in mean blood pressure has been observed in women, while from 1975 to 2015 (73) it stayed more or less the same in men. Hypertension which is characterised by a raised blood pressure is one of the most critical risk factors for CVD (179). However, the risk for CVD does not only depend on blood pressure but also on coexisting risk factors, and the presence of possible hypertensive damage to target organs (180). In many countries in Africa, like Tanzania and Uganda, the high prevalence of unrecognised and untreated hypertension represent significant problems (181). A systematic review to assess the burden of hypertension in sub-Saharan Africa by Ataklte et al. reported that between 7% and 56% people were aware of their hypertensive status before the study commenced, with only 18% (95% confidence interval, 14%-22%) receiving treatment across the studies, and 7% (95% confidence interval, 5%-8%) had controlled blood pressure (182). Poor diagnosis of elevated blood pressure occurs in most African countries where efforts are mainly focused on HIV programmes.

Raised blood glucose is defined as a distribution of fasting plasma glucose in a population that is higher than the hypothetical distribution that would reduce risks to health. In 2017, 425 million people globally were said to be living with diabetes, and an estimated 16 million lived in Africa (53). More alarming is the 69.2% of people in Africa with undiagnosed diabetes, while 84.5% of global cases with undiagnosed diabetes live in LMIC countries (53). Fasting blood glucose has been found to have an association with risks of CVD (183).

Abnormal lipid levels are often characterised by raised blood lipids including hyperlipidaemia and are well-documented risk factors for CVD (184) and atherosclerosis (185). The term hyperlipidaemia is the name of a group of disorders characterised by an excess of lipids which includes cholesterol, cholesterol esters, phospholipids, and triglycerides in the blood (185). Dyslipidaemia is defined by the presence of suboptimal serum lipid levels that signify a heightened risk of cardiovascular events(186). A retrospective study in South Africa found a high prevalence of dyslipidaemia, with severe and extreme hypercholesterolemia observed in 5% and 0.5% of patients in the study. Approximately 9% of patients had elevated triglyceride levels (187). Of note is the fact that in a study that assessed the prevalence, awareness, treatment, and control of dyslipidemia many rural residents were unaware of their condition(188), therefore, the majority were left untreated, thereby suggesting a need to look at lipid profiles and other risk factors when examining the problem of CVD.

Also of note is the clustering of the risk factors that pose a problem and a risk for CVD. This clustering of more than one risk factor is known as metabolic syndrome (MetS) and is characterised by obesity, insulin resistance, hypertension, dysglycaemia, and dyslipidaemia (189,190). Different South African studies that have assessed the prevalence of MetS reported a high prevalence among rural women (30.2%) (191). However, in another urban study, the prevalence of the MetS was 60.6%, and this was related to people of coloured descent (192). The multiple risk factors for NCD pose a challenge to the management and prevention of NCD. The multiplicity of these risk factors suggests that intervention should employ a multi-pronged approach to diseases management.

2.2 Health system readiness for the management of NCD in LMIC

Prevention and better management of NCD are crucial to improving health outcomes. However, the co-existence of infections and non-infectious diseases in LMIC has put a strain on the already overstretched healthcare in these countries. The management and control of NCD require responses from both the health system (provider) as well as the patients. Thus, a functional health system is of paramount importance.

For a health system to be functional, it needs to be able to respond efficiently to population needs. Moreover, it needs to contain six building blocks, namely, health workforce, service delivery, health information systems, access to essential medicines, financing, and leadership or governance (193). The strength of the health system and its ability to be responsive lies on its readiness to respond to a health crisis and its building blocks. The health workforce is one of the fundamental input components of the health system, and Samb et al. identified the health workforce as one of the critical components which can constrain the health system (17). A significant burden is exerted on health personnel who have to be constantly evolving to respond to the changing burden of disease (17). The human resource crisis in health has been highlighted in many studies, and several reasons have led to this crisis (35,194).

Multiple factors have been linked to the human resource crisis in health: these include, among others, poorly trained staff, lack of recruitment, attrition, low compensation and maldistribution of trained workers, all of which results in a higher concentration of workers in urban settings (195,196). Moreover, mortality attributable to HIV/AIDS has also been cited as a cause for staff shortages (196). Staff shortages require most countries to think innovatively about the solutions to the human resource crisis. Many have suggested task shifting to curb this problem (34,35,197,198). Despite these challenges, many developing countries have managed to

formulate guidelines as a step to dealing with the burden and resultant management of NCD.

Clinical guidelines have been viewed as an essential part of quality medical practice for decades. They have many purposes, such as assisting health workers in managing diseases to improve effectiveness and quality of care and reduce variations in clinical practice costly and preventable mistakes. However, in many countries where NCD are emerging, such guidelines may not be available (23), and in others there is lack of compliance with guidelines for conditions, such as diabetes and hypertension (22,199). There are additional health system and provider barriers to good quality care. In a systematic review of qualitative studies exploring primary care, physicians' and nurses' perceived influences on care, barriers to care were shown to include a lack of confidence in applying the guidelines, an inability to stay abreast with the changes in guidelines, the evolving roles of nurses and limited knowledge and skills, especially with regard to continually changing recommendations. In addition, there is ambiguity or disagreement over who is responsible for which elements of patient care across both primary and secondary care (200). Similarly, in another systematic review examining, among other things, barriers that may impede optimal hypertension management, it was found that skills barriers included keeping up to date with new clinical information and challenges in educating and counselling patients (199).

This evidence suggests that the approach to the management and control of NCD can no longer just be biomedical. Furthermore, poorly functioning health services call for a more pragmatic approach that combines community and biomedical interventions to improve health outcomes. Community health workers can be role players in facilitating community interventions.

2.3 Task shifting

The current human resource constraints in many LMIC call for creative approaches to dealing

with staff shortages. Researchers as well as the WHO have suggested task shifting as a possible intervention to the existing human resource crisis (35,197,198). Task shifting is referred to as the shifting of tasks to lower cadres (96). This approach is also viewed as the rational distribution of tasks, with the movement of tasks from highly qualified to less qualified health workers who may have lesser training (197). Previously this concept of delegating tasks was called substitution (33). This concept is not only about mere substitution or delegation of tasks; it is also about expanding the human resources pool as depicted in Figure 4. Although more recently task shifting has been advocated for, it is not a new approach (25).

The burden of HIV has encouraged governments from developing countries to look at the shifting of tasks as a means to mitigate the problem of insufficient health workers to deliver universal access to HIV prevention, treatment, care and support (201). For example, in Uganda nurses dispensed antiretroviral drugs, a task previously performed by doctors (201), thereby freeing the doctors' time so that they can provide other services. Similarly, in another cluster-randomised trial, the inclusion of antiretroviral initiation and represcription into the roles of primary care nurses was implemented successfully. Although it has improved health outcomes and quality of care, it did not reduce the time taken to use antiretroviral therapy or mortality(202). There have been many African countries implementing interventions on task shifting in the context of HIV (203–205).

The World Health Organisation has made several recommendations for the implementation of task shifting in the context of HIV services (206). Although these guidelines were meant for HIV, they apply to other conditions.

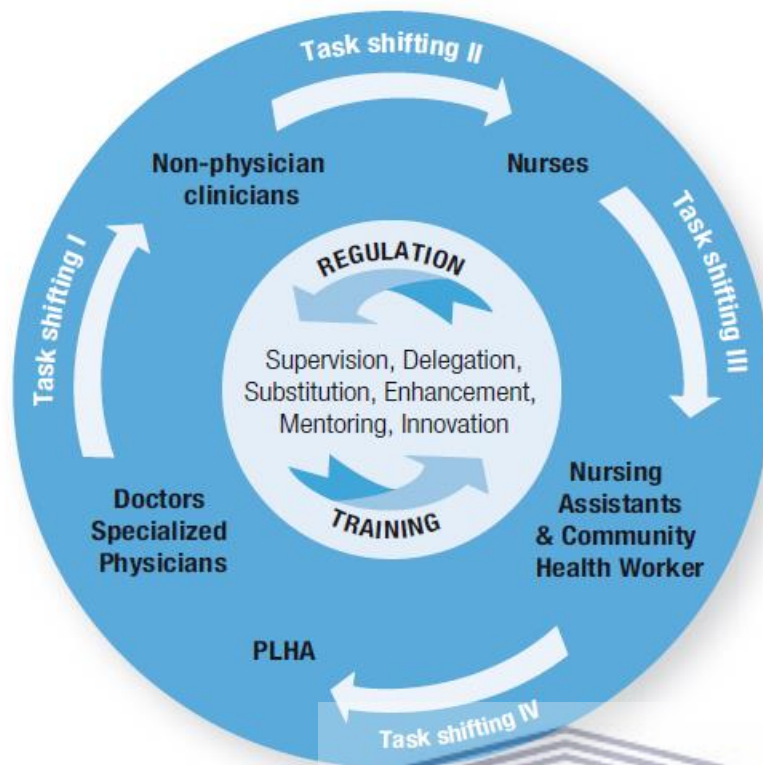


Figure 3: Task shifting expanding the human resource pool (35)

Many scholars have highlighted the challenges with task shifting as an approach. Lehmann et al. (198) suggested several strategies that are crucial for task shifting. These include 1) the need to reconfigure health teams, especially at primary and community level; and 2) the re-examination of scopes of practice and regulatory frameworks as well as new roles. Others have highlighted the importance of supervision and training in ensuring a smooth transition to new roles (34,35).


2.4 Overview of community health workers (definition, selection and training)

For decades CHWs have been defined as lay persons who serve as liaisons between members of their communities and healthcare providers (25) and have been used in health services to those that are disenfranchised and underserved. Several names have been used in many parts of the world to distinguish this cadre of workers from professional health workers (25).

Although community traditional birth attendants and health educators (207) have existed for decades, CHWs have played a formal role in healthcare for many years (26). A range or mixture of names is used to describe this cadre of workers and to depict their different types of role (207).

2.4.1 Selection

Some critical elements or components define or characterise a CHW. These include being part of the community served (25,207), thus sharing the same culture as the beneficiaries of their services (207,208). Gampa (209) has shown that trust was central to the client-CHW relationship, and culture and tradition defined the nature of this trust. For these reasons, the process of CHW selection is crucial.



According to the WHO's definition of CHW, they should be selected by the community and be accountable to them (96). Different countries have, however, adopted diverse strategies for selecting CHWs, and the selection tends to be based on residency, gender and education attainment (Table 1) (210). Such variations in the method of selection make it challenging to compare CHW programmes from different countries. Moreover, selection impacts the type of roles that CHWs can fulfil as well as performance. The selection process also affects training, as training needs to cater to the diversity in education levels. In Table 1 criteria used by different countries in the selection of CHWs are shown. This highlights variations in the selection that influences how CHW are used as well as difficulties in comparing this cadre of workers in different contexts.

Table 2: Selection criteria for community health workers in selected countries (210)

India: Accredited Social Health Activists (ASHA)	Brazil: Community Health Agents (CHAS)	Pakistan: Lady Health Workers (LHWS)	Ethiopia: Health Extension Workers (HEWS)
<ul style="list-style-type: none"> • Female. • ≥ 8th-grade education. • 25–45 years of age. • Married (or widowed or divorced). 	<ul style="list-style-type: none"> • Adult • Work in a community where they are from/permanently reside • Be literate. 	<ul style="list-style-type: none"> • Female. • ≥8th-grade education • 18–50 years of age. • Reside in community/recommended by their community. • Married with children. • Experience in community development preferred. 	<ul style="list-style-type: none"> • Female. • ≥ 10th-grade education. • ≥18 years of age. • Reside in the community.

2.4.2 Training

For many years the training of CHW has been debated as has its ability to strengthen their performance (211). Many studies have reported on the training of CHWs but have failed to provide sufficient information on the length, depth and trainer qualities. Furthermore, training approaches vary tremendously among programmes (25).

In their review of American studies focusing on CHW selection and training, O’Brien et al. (212) reported variability in the length of training which was primarily influenced by the nature of their regular tasks. Moreover, role-playing, didactic sessions and mentored individualised learning were the most utilised methodologies for training (212). Interestingly, in areas like Nepal where CHWs had low literacy levels, pictorial diagrams were adapted to suit their needs (210).

However, most programmes providing training lack follow-up assessments and refresher courses (212). These are often an afterthought, with no formal structure and may be included within the supervision process (211), despite being as important in improving performance. Lopes et al. (45) reported a decline in the CHWs' ability to perform tasks three months post-training, regardless of initial improvements noticed immediately after training, thus illustrating the importance of refresher training. Similar findings were reported by Abrahams et al. (213), who found that constant training and retraining was needed for CHWs, whose training was often fragmented. In places with efficient and structured in-service training, such as Iran, continuous education is provided regularly and presented in the form of workshops, monthly meetings and refresher courses (214).

All these factors related to training make it challenging to evaluate CHW programmes as many are complex and diverse. Also, the different models used in countries worldwide make it almost impossible to compare and evaluate CHW programmes (211).



2.5 Community health workers in the South African context: then and now

2.5.1 Pre-democracy

CHWs have been playing an essential role in the provision of health care in South Africa for generations. The existence of CHW programmes in South Africa dates back to the 1910s with the introduction of malaria assistants in KwaZulu-Natal (27). The Pholela Project was formed in rural Kwa-Zulu Natal in the 1940s. This gave birth to what is now known as community-oriented primary health care (215). Nowadays, this approach to community health is used in certain South African cities (216). In the 1970s, during the political upheaval in the country, non-governmental organisations (NGO) were the driving force of CHW programmes and rural initiatives (27). Many of the programmes were formed in response to the unmet health needs

of communities, as the apartheid government of the time did not provide comprehensive healthcare to most of the population. Many of the CHW programmes remained and, interestingly, in the mid-1980s, community projects, such as the Mamre project and the South African Christian Leadership Association (27,217,218), were focusing on chronic illnesses including NCD.

2.5.2 Post-democracy


Post-democracy (1994), the new dispensation introduced the District Health System (DHS) which became the foundation of the National Health Plan. According to the White Paper, the role of the DHS within the National Health Plan is as follows:

This level of the healthcare system should be responsible for the overall management and control of its health budget, and the provision and/or purchase of a full range of comprehensive primary healthcare services within its area of jurisdiction. Effective referral networks and systems will be ensured through co-operation with the other health districts. All services will be rendered in collaboration with other governmental, non- governmental and private structures (219).

This planning system, however, excluded CHWs (27), and after the introduction of the DHS, several CHW projects collapsed because donor funding ceased. In the mid-1990s, with the rise in the HIV prevalence and deaths caused by AIDS, CHW programmes re-emerged to provide care to those living with the disease (220). The re-emergence of CHW occurred within a fragmented and poorly coordinated CHW programme (221).

Since 2004, four frameworks that relate to CHWs work have been published. The first was the Community Health Worker Policy Framework (CHWPF), launched in 2004 to bring about significant changes to the use of CHW in the health system (222). The policy was also a strategy to develop a national CHW programme (220). Community health workers in the context of South Africa are employed by NGOs that are government funded (27,223) or funded by international donors (27).

Table 3: Health services for home, facility and community-based care relating to NCD

Home	Facility	Community
<ul style="list-style-type: none"> Promote adherence to chronic medication. 		<ul style="list-style-type: none"> Promote the formation of social groups for older persons.
<ul style="list-style-type: none"> Provide necessary information on healthier nutritional choices. 		<ul style="list-style-type: none"> Provide information on healthy choices to prevent hypertension and diabetes.
<ul style="list-style-type: none"> Test blood pressure and blood glucose. Identify indicators of hypertension and diabetes. Support families or carers of older persons. Support of activities of daily living for older persons and people with disabilities without carers. Support the psychosocial aspects of palliative care. Provide basic information on healthier nutritional choices. 	 <p data-bbox="598 1220 1018 1323">UNIVERSITY of the WESTERN CAPE</p>	

Source: Adapted from DoH and DSD (224)

In the CHWPF, the service package for CHWs has various focus areas, i.e. maternal child and women health, mental health, HIV/AIDS/sexually transmitted infections (STIs), NCD, communicable diseases, nutrition and tuberculosis (224). The NCD services offered by CHWs as part of the package are at home and at a community or health facility, and they tend to overlap between the different focus areas as seen in Table 2.

Despite the usefulness of the policy framework, it has been criticised roundly. Although the policy framework proposes some services, it lacks guidelines regarding the roles and

competencies that CHW require for fulfilling daily tasks successfully. Others have criticised this framework, suggesting that it was rigid with a weak focus on rural areas (220). Others viewed it as vague and ambiguous about remuneration and CHWs' responsibilities (221).

The Expanded Public Works Programme (EPWP) was another pertinent framework in South Africa related to the CHW programme. The EPWP has been utilised as a formal system for qualifications and training (225) within the CHW programme. White (222) summarised these frameworks when looking at certain policy areas. As shown in Table 3, it is evident that there has been a move over the years to formalise and improve the CHW programme in South Africa. However, issues regarding remuneration, career path and educational attainment have clouded the efforts that have been made.

Demands, such as a pre-requisite for CHW training which includes a matric qualification, are in conflict with the current pool of CHWs who have a lower school-level qualification (226). The required education levels are especially disturbing since CHWs nationally have lower education levels (227). Remuneration has been viewed by CHWs as meagre, considering the hours and the work performed by them (222). All these are possible factors that may be influencing the high attrition rate confronting community-based care programmes (228,229).

Table 4: Pertinent frameworks about the community health worker programme (222)

Policy area	NQF	EPWP	NCHWPF	BCEA
	2008	2004	2004	2002
Stipend	Not applicable.	Paid a stipend, which varies by NQF level qualification and province.	Reported hours of employment indicate that they should be salaried.	Remuneration should be aligned with a national standard.
Formal growth pathway	Achieved by completing NQF levels.	The programme is intended to up-skill that non-matric to NQF Level 3 and those with Matric up to NQF level 4.	Volunteers were absorbed into as generalist CHW. No growth pathway exists for CHW to qualify with a higher rank.	Not applicable.
Conditions of employment	Not applicable.	Conditions stipulated in job offer and work contract. Work 40 hrs in a five-day week, but only earn a stipend that is province-dependent and not a national standard.	Conditions stipulated in job offer and work contract. Work 40 hrs in a five-day week, but only earn a stipend that is province-dependent and not on a national standard.	The national standard is established, to which all employers must adhere.
Formal job title and Status	NQF L1: Ancillary CHW NQF L2&L3: Community Care Worker NQF L4: CHW.	CHW (title) and individuals are considered as employees. Volunteers are unpaid for the programme.	CHW (title) also called 'Community Care Giver', 'Home-Based Carer' and 'uNompilo' being used. Volunteers are accepted but unpaid. CHW are considered employees.	Not applicable.

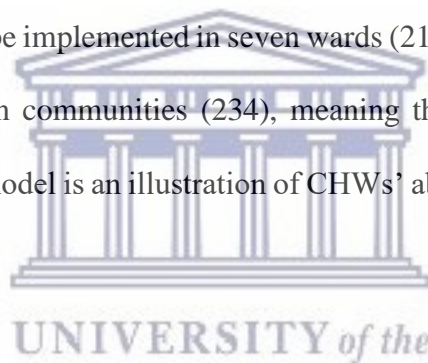
Supervision	Not applicable.	CHW supervisors are allocated a team of CHWs.	An 'Outreach Nurse' working as a nurse and CHW supervisor at the clinic. A ward-councillor also supervises CHW.	Not applicable.
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Primary Health Care (PHC) re-engineering of primary health care was initiated by the South African government in 2009 and is the cornerstone of health reform. This health sector reform focuses on strengthening the district and sub-district level, including the formalisation and integration of community-based services (52). At its initiation, it was envisaged that the ward-based outreach teams (WBOT), operating from formal PHC facilities in each electoral ward, would be nurse-led and focused on maternal and child health, HIV and TB, and NCD. Within the above programmes, CHWs were going to concentrate on preventative and promotive care; adherence and psychosocial support at the local level (52). As shown in Figure 4, CHWs were seen as a critical workforce in the implementation of this policy (226). To date, the implementation of the WBOT teams has been challenging (227,230). Issues relating to supervision, ownership, accountability and defining realistic workloads for CHWs have been problematic. In addition, since re-engineering of PHC is nurse-led and many of these nurses are linked to facilities, this stimulated many conflicts as nurses were caught up between WBOT that they were expected to lead as well as clinic/facility-related goals. It was reported that WBOT duties were often neglected because of competing priorities (230).

Initially, implementing a nurse-led intervention attached to a facility may have been a good idea as it would solve the challenges with the referral system (231,232). Moreover, it removes the problem of disrespect often shown to CHWs by health professionals (52). Thus, teams (WBOT) were meant to cushion and provide the needed expertise. Despite positive aspects to

team involvement, Naledi et al. (47) have cautioned that such a team requires a different level of teamwork between lay and professional workers, including the need to recognise the uniqueness of contributions by all team members. Also, they suggest that competencies of all team members should be identified, this will assist in putting processes in place for task shifting, a system that has been utilised to curb the human resource crisis (197,233).

Some of the challenges of WBOTs can be addressed with a more community-based model that is independently resourced and comprises fully constituted teams that are well supported (230). Such a community-based model is the community-oriented primary care (COPC) that was implemented in Tshwane, South Africa by the government together with other stakeholders (216). The COPC that was to be implemented in seven wards (216) was designed around health posts physically placed within communities (234), meaning that the COPC was embedded within communities. Such a model is an illustration of CHWs' ability to deliver health services in communities successfully.



2.6 Role of community health workers in non-communicable diseases in LMIC)

Community health workers have been used in programmes that target many conditions. The roles of CHWs in many programmes, especially in maternal and child health, have been shown to be effective as compared to usual care (36). Evidence, however, is lacking in respect of the effectiveness of CHWs, in the management and prevention of NCD, especially systematic reviews. Despite insufficient evidence on their effectiveness, they have been shown that they have a potential role in the management and prevention of NCD, especially in limited-resource settings (41,42,235).

Most of these interventions focus on one particular condition such as diabetes, hypertension or

breast cancer instead of integrating several conditions. There is much to be learned from developed countries about the generic roles as well as the NCD-related roles of CHWs, as they have decades of experience in utilising CHWs for community programme.

Studies from developed countries highlight the varied roles and duties of CHWs. These roles vary within the different interventions and include patient education (236,237), patient care and support (236,238,239) the provision of social support, and also acted as a liaison with the healthcare system (240). Despite their generic roles, CHWs have a role to play in interventions for specific diseases.

The possible roles that CHW can play in NCD, such as hypertension, diabetes and cancers have been described in several studies (237,241,242). However, their role in the prevention of NCD is understudied, despite its importance. In a systematic review of studies that synthesised the effectiveness of CHW in delivering NCD primary prevention interventions, Jeet et al. (243) reported the effectiveness of CHWs in decreasing blood sugar levels and systolic and diastolic blood pressure in LMIC, thus, indicating the positive effect that the CHWs' presence has in developing countries. There were, however, numerous methodological flaws in the studies reviewed, such as heterogeneity in the collection of specific parameters in areas like diet, PA and tobacco smoking. This suggests the need for uniformity of evaluation tools in interventions that utilise CHWs to allow for comparisons.

African studies – especially trials that assess the use and effectiveness of CHW in NCD prevention and management – are limited. There have, however, been studies that have compared the feasibility of using CHWs as against usual caregivers (42,43). Results from such studies show that CHWs could screen for CVDs as effectively as nurses, using a non-invasive

non-laboratory-based screening tool. The mean level of agreement between the risk-score calculations of CHWs and nurses was 96.8% (42). Several intervention studies have been conducted in South Africa in the area of NCD (41–43,57,241). All studies were conducted among the people residing in resource-constraint settings, mainly on the peripheries of cities. Table 3 presents studies that have used CHW for NCD management and prevention. These South Africa studies focused on either one or two NCD.

These studies, furthermore, present essential areas that are paramount to role development. Components such as training varied tremendously in these studies; and refresher training – also known as retraining – was omitted in their results, thus illustrating potential flaws within CHW programmes. The diversity of roles suggests the potential of CHWs, regardless of their educational attainment. One of the studies highlighted an advocacy role for CHWs (41). Although not well established in South Africa, in many parts of the world CHWs have functioned as change agents or advocates for health (244,245). Wakefield & Poland (246) suggest that to achieve change on a large scale, CHWs must mobilise the members of their community to become activists for social justice. All these have implications for practice as well as policy.

Table 5: Community health worker-led NCD-related intervention 2006–2015 (roles, training and outcome)(247)

Author and year; Setting	Aim	Roles of CHW	Training focus, duration, & retraining	Impact/ Outcome
Puoane et al. (2006) (248). Urban community.	To describe the development of an intervention programme for primary prevention of NCD in general and CVD.	Mapping of the environment as it related to NCD as part of the situational assessment.	The training focused on primary prevention NCD. Three-hour session held weekly for one year. <i>No information on retraining.</i>	Awareness raising among community members on the importance of primary prevention for diabetes. CHW change behaviour.
Bradley et al. (2007) (41) Urban Community	Identification of factors contributing to hypertension and diabetes. Also designing and implementing appropriate local interventions to prevent NCD and promote healthy lifestyles.	Community liaison; conduct anthropometric measurements; Facilitate community participation in advocacy. Facilitate exercise sessions; provide nutrition education and cooking demonstrations; refer clients to the facility .	The focus was on hypertension and diabetes; promotion of healthy lifestyles (nutrition and physical activity), and developing their skills in communication and advocacy. Weekly sessions for 3 hours over five months. <i>No information on retraining.</i>	No outcomes highlighted.
Puoane et al. (2012) (249). Urban community.	Description of experiences in developing and implementing health clubs to reduce hypertension risk.	Group facilitation; measure anthropometry; measure blood pressure; nutrition education.	The training focused on primary prevention of CVD, including risk factors as well as facilitation skills. Training duration was over a period	A decrease in obesity while the proportion of people who were of normal or overweight decreased over a two-year period. Diastolic pressure

			of six months.	remained the same while systolic pressure increased.
Ndou et al. (2013) (43). Urban community	Examination of the outcomes of a pilot CHW programme to improve the management of hypertension and diabetes.	Social support and counselling; provide health information; distribute medication.	The course focused on home-based care. Training duration was 14 weeks. <i>No information on retraining.</i>	CHW home visits improved hypertension control compared to usual care. However, the inverse was found for diabetes control. When both conditions were considered, hypertension control was higher in the intervention group compared to usual care.
TUM et al. (2013)(241). Urban community.	Development and piloting of intervention to address low cervical screening uptake as well as a potentially low breast screening uptake.	Five community members were trained to become CHW –one of them was specially trained to work in cancer prevention - assessed outcomes: 1. screening uptake 2. awareness 3. value of the CHW - post-intervention design.	CHW were trained and tasked to raise awareness of cervical and breast cancer and motivate women to take up screening. Training of the CHW: –three months.	Intervention showed that CHW were valued, but they could not low uptake and awareness remained low.

Adapted from a table by Puoane et al., 2017 (247)

2.7 Key methodological and knowledge gaps in CHW programmes (about NCD)

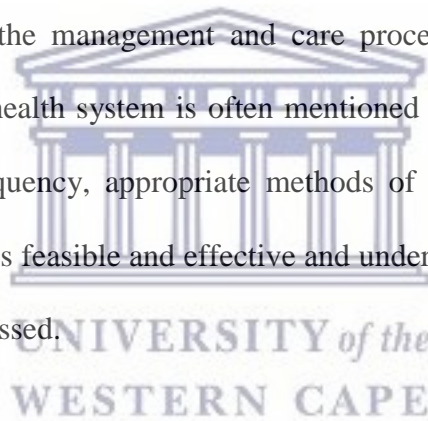
Over the years, studies have focused on investigating the effectiveness of CHWs to deliver certain services to communities. In a systematic review that examined the effectiveness of lay health workers (LHW) to improve maternal and child health, Lewin et al. found that LHWs were effective in promoting immunisation, exclusive breastfeeding and the initiation of breastfeeding, among other roles (36). In an earlier review, the LHWs were reported to improve health outcomes for some infectious diseases; however, their effect in breast cancer screening compared to usual care was minute (240). Despite being effective, there is still a lack of good quality studies that focus on the factors influencing the effectiveness of CHWs. This section, thus, examines some of the key methodological and knowledge gaps in CHW programmes.

2.7.1 Training and continuing education of community health workers

Training and continuous education of CHWs is primarily a contested debate. In their review, Lewin et al. (36) suggest that there was insufficient evidence to determine the type of CHW training or intervention strategies that are likely to be most effective. Training is often fragmented with different training methodologies being used, thus producing programmes with varying intensity and quality (212). Furthermore, studies that explain the training process are lacking, especially in developing countries. However, countries with more established and well-resourced CHW programmes have only recently described the training process (250). In most of the literature, specific training of CHWs is described, but the link to competencies or to improved CHW performance is lacking (251,252).

2.7.2 Supervision of community health workers

Supervision of CHWs and the importance thereof have been mentioned in several studies (213,223,253). Supervision has been described as an internal process; however, it also presents an opportunity for community involvement. There is a shortage of studies that look at the role of community participation in the supervision of CHWs. It has been suggested that community supervision could occur through community structures, such as women's groups or health committees. Their potential role in supervision could be setting and clarifying expectations of the types of services the CHWs will provide, and agree on the ways CHWs will respond to community issues. Also, these community structures could be involved in deciding on approaches that can be employed by the community to support and help CHWs and much could be done by participating in the management and care process (254). The frequency of supervision from the formal health system is often mentioned but not adequately described. Furthermore, supervision frequency, appropriate methods of supervision, the approximate supervisor to CHW ratio that is feasible and effective and under which circumstances, are not clear and thus should be addressed.



2.7.3 Roles and health outcomes (in regard to NCD)

Community health workers in many parts of the world fulfil various roles (25,255). Their work spans from maternal and child health to NCD. However, there has been no consensus on the maximum number or mix of CHW job tasks that will ensure the highest level of CHW productivity (256). Furthermore, evidence that suggests the skills mix is lacking. Generalist CHWs are said to carry the brunt, as their duties encompass a wide range of service delivery tasks which are translated to some tasks they are asked to perform (256). In his book, Abbat (257) warns that CHWs cannot do everything and their limited educational background and training means that their tasks should be limited to those that complement the work of health

professionals.

Furthermore, their effectiveness to influence health outcomes has been well documented in maternal and child health (36) and other communicable diseases. However, the same cannot be said for NCD. As NCD are emerging in LMIC, there is a need to look at the comprehensive roles that are evidence-based and context specific.

2.8 Summary

It is evident from the literature reviewed that there is a growing burden of NCD in LMIC countries that is driven by a plethora of risk factors as well as an ageing population. Health outcomes in LMIC are currently poor and therefore require multi-layered approach/interventions at both prevention and management level. The prevention of NCD requires a whole society approach that also involves communities, while the management of NCD requires improvements in healthcare delivery as well as self-management. Task shifting characterised by a shift in the task from one cadre of workers to lower-level workers is an essential component of healthcare delivery. Task shifting is therefore crucial, especially in areas where there is a human resource crisis. CHWs have for years been the interface between facilities community, and with the high prevalence of chronic diseases, they are thus possible role players in curbing NCD. However, current evidence of the effectiveness of CHWs in NCD is relatively limited or similar, but their potential is enormous. There is no reason why their use in NCD should be different, as it has been shown that they can improve the health outcomes of chronically ill patients with HIV and AIDS.

CHAPTER THREE: METHODOLOGY

In this chapter, the methods used for this study are described. The theoretical framework informing the development of the study is included along with an outline of the research findings.

3.1 Study aim

As stipulated in Chapter 1, the aim of this study was to develop an integrated model of care for CHWs working with patients with chronic NCD in Khayelitsha, Cape Town.

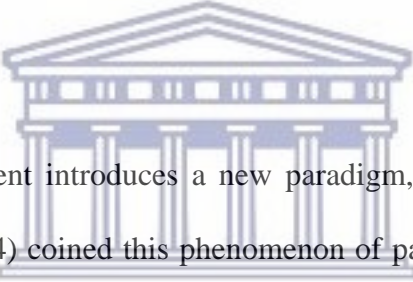
3.2 Theoretical framework

The conceptual framework that was used in the study was the Integrated Chronic Care Model (ICCM) and the Chronic Care Model (CCM). Interestingly the ICCM is an adaptation of the Chronic Care Model (CCM) (258), and both frameworks are critical in conceptualising chronic care. Before the diffusion of innovation theory is discussed, it is crucial to explain the CCM and how it gave rise to the integrated chronic disease management model (ICDM).

The CCM is derived from successful interventions responding to chronic conditions that have been implemented over the years (259). From the synthesis of these existing interventions, Wagner et al. developed an experiential model to improve health outcomes through identifying and organising changes required in the health system, the practice and the patient (259,260). The CCM is patient-centred and is based on the premise that effective chronic disease management is delivered through partnerships between the community and the health system (260). For the system to be efficient, it needs to develop the four main areas at the level of practice, the first being self-management support which relates to how patients can be assisted in living with their conditions. The second area is the delivery system design which refers to

the make-up of the healthcare team and in the ways it interacts with patients. Decision support is the third component and represents the best care and ways of making it happen whenever the client visits or contacts the health facility. Finally, clinical information indicating the capturing and use of critical information for clinical care is needed (261).

The main areas listed above, are considered to be beneficial in improving the health outcomes of patients (262). These levels reside within the healthcare system, and some aspects influence clinical care. However, the health system cannot be seen in isolation as it is embedded in the broader community. Self-management is a critical aspect of health care that occurs in the community but also crosscuts it as it occurs in both the healthcare facility and the community (263).



The concept of self-management introduces a new paradigm, especially in the developing world. Bodenheimer et al. (264) coined this phenomenon of patient-professional partnership which involves joint care and self-management education. Furthermore, self-management support transcends traditional knowledge-based patient education to include practices that develop patient's problem solving skills, self-efficacy and knowledge application to real-life situations (265). At the community level, resources and policies may impact the kind of care that is delivered. All these strategies should lead to informed and active patients.

Community health workers have an essential role to play in the CCM (237). For example, they can serve as a link between the different components of the CCM and also facilitate the development of sustainable culturally appropriate interventions as reported in diabetes interventions (266,267). Pragmatic ways of including CHW in the CCM are shown in Figure 1. They can assist in self-management and by being part of teams and of a delivery system

design. Their role in decision support, especially at the clinical level, is minimal but they can assist in the continuity of care and less in making decisions related to clinical care.

Community health workers currently collect data that could improve the clinical management of patients. In many instances, however, this data does not correspond with the health information system and does not even feed into existing information systems in health facilities. For example, the routine data collected by CHWs on patients such as weight, blood pressure and blood glucose measurements are not as yet included in the health facility information system. Apart from that, the integration of the community component is often challenging (237), despite its application in diabetes management interventions (262). Although there are studies that have discussed the CCM, few have described its full implementation (268,269). Systematic reviews assessing the comparative effectiveness of CCMs for mental health conditions across disorders and treatment settings (270) and examining the degree to which interventions containing the CCM components improve diabetes care and determining the relative effectiveness of different CCM components (271) have found successes in health outcome in interventions using the CCM. These include minute to moderate improvements in health outcomes associated with diabetes (271), changes in mental and physical health outcomes for patients with mental disorders (270) and a rise in adherence to inhalants among patients with asthma (272).

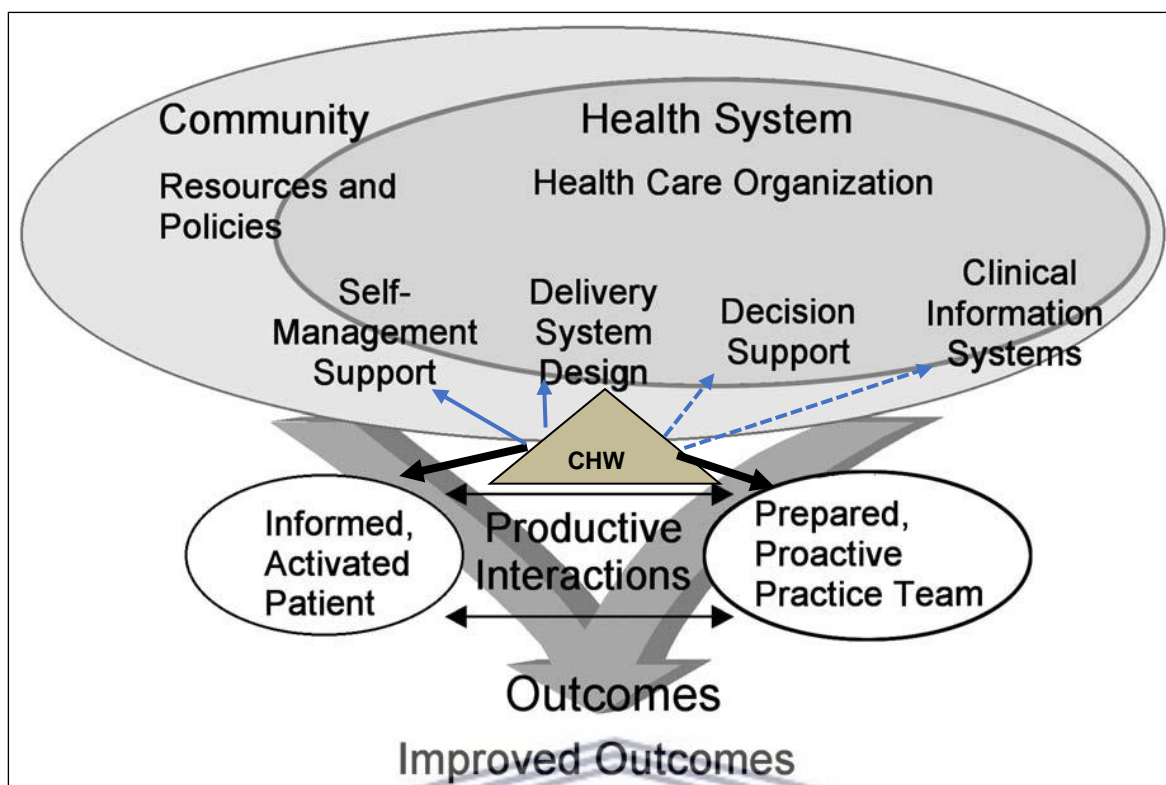


Figure 4: Integration of the community health workers model into the chronic care model (237). Adapted from Wagner et al. 2005

The CCM was ideally suited to improve the facility component and patient experience; however, the deficiencies in other aspects of the health system building blocks necessitated a hybrid model (258). Thus, the South African government proposed the integrated chronic disease management model (ICDM) as a feasible chronic care model at the primary healthcare level.

According to Figure 2, ICDM consists of four inter-related phases, for example, 1) facility re-organisation; 2) supportive clinical management; 3) assisted self-support and strengthening of support, and 4) systems and structures outside the facility (258,273). Furthermore, Mahomed and Asmall (258) suggest that the Ward-Based Outreach Team (WBOT) will be responsible for rendering the services for strengthening the community and population level aspects of the ICDM. Most importantly, their work will be a complement to existing healthcare services

offered at facility level (273). For the implementation of this model to be successful capacity building of CHWs as well as support systems that include other support structures, however, are necessary to provide support and care to chronic to patients, thereby strengthening all four components of the model and allowing CHWs to work efficiently. Therefore, ICDM is used to guide the analysis and explanation of the roles and support systems for CHWs in chronic care and management.

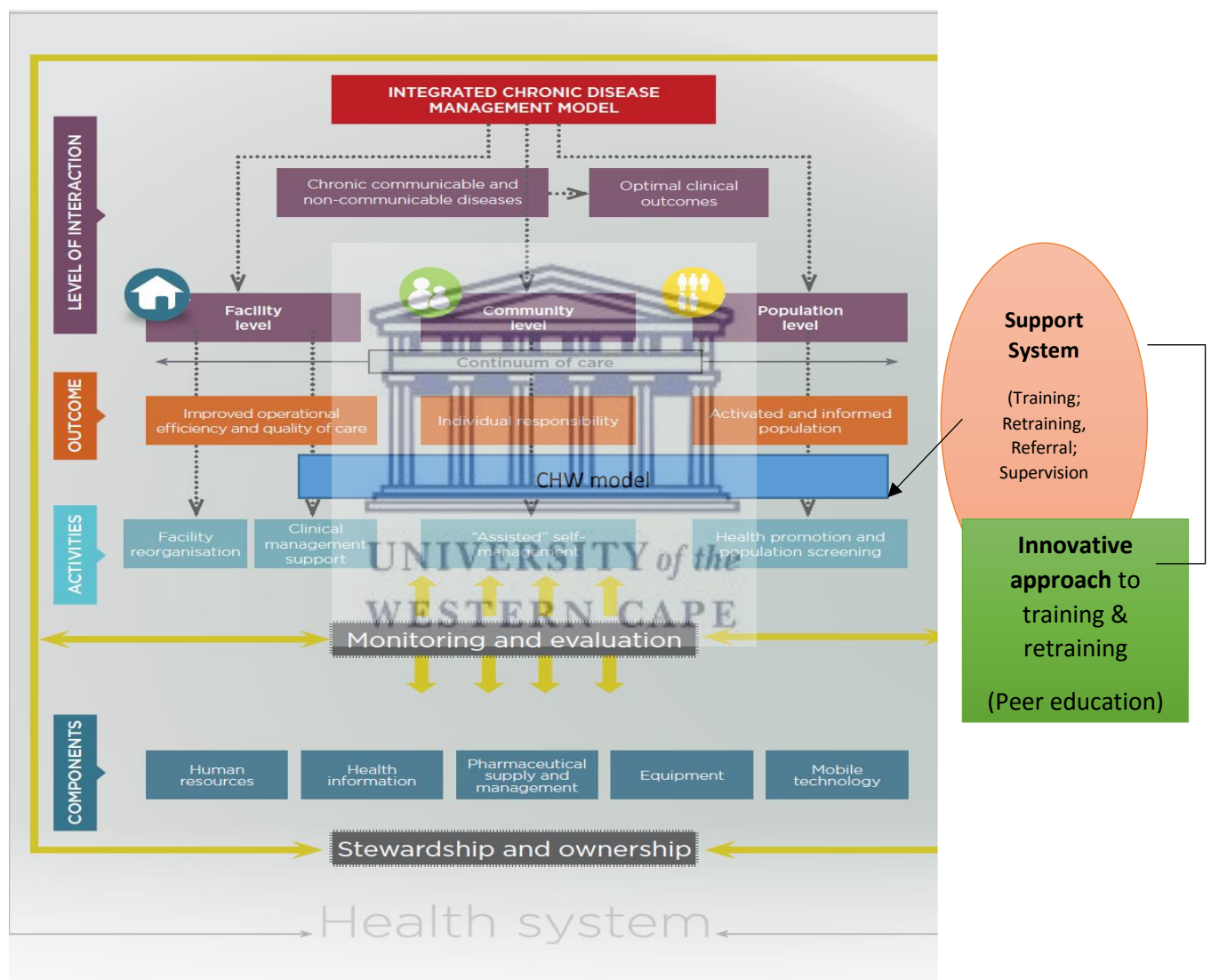


Figure 5: The integrated chronic disease management model adopted by the South African government. Adapted from Mahomed and Asmall (2015) (258).

In this study, it is assumed that CHWs have the potential to influence the management and control of NCD. Appropriate and relevant support systems, however, need to be in place so

that CHWs can be more efficient and they should be assisted in roles that reflect and are appropriate for their context.

3.3 Study setting and population

In South Africa, health care is provided by the public and private sector with most (83%) of the population serviced by the public sector (274). Healthcare in the public sector is free for many underserved citizens. The post-democratic South African government initiated several health reforms to improve people's health outcomes. These reforms were introduced to address the burden of disease and to improve clinical outcomes and strengthen the health system. One of the reforms has been the District Health System (DHS) which uses PHC as the vehicle for health service delivery (219). As part of reviving PHC, the government has approved the Re-engineering of Primary Health Care (PHC) strategy. The role of the PHC re-engineering strategy is to assist in improving community health, using CHWs as members of ward-based outreach teams (WBOT). It is envisaged that the CHWs would be supervised by a professional nurse (52). Currently, several provinces have implemented WBOT.

Non-governmental organisations (NGOs) have played a vital role in South Africa in lessening the health impacts posed by the inequities of the apartheid health system as well as in supplementing and helping to reform the health system post-democracy (27). These NGOs have for many years been at the forefront of healthcare delivery, especially in limited-resource communities in many provinces in South Africa, including the Western Cape Province.

The Western Cape Province is one of the most inequitable provinces in South Africa and is divided into districts. Khayelitsha is a sub-district within Metro East, a district in the City of Cape Town Metropolitan Municipality. Khayelitsha – where the study took place – is a peri-

urban township with a population size estimated at 391 749 and with 71% of the population having access to flush toilets (275). Only 4.9% have a higher education qualification, and the majority are unemployed. This sub-district is said to be one of the poorest sub-districts in Cape Town, with a high burden of disease.

Groenewald et al. found that Khayelitsha had the highest levels of premature mortality in all main cause groups, namely, (i) pre-transitional causes (for example, communicable diseases, maternal causes, perinatal conditions and nutritional deficiencies), (ii) non-communicable diseases and (iii) injuries (276). It had the highest mortality rate due to NCD and had high mortality rates for stroke, hypertension and diabetes compared to other sub-districts.

In Khayelitsha, health services are provided at three community health centres (including two maternity services), eight clinics, and a district hospital, while the administration of these services is run by local and provincial government authorities (277). In the study site, CHWs were employed by NGOs who are funded by the Department of Health to perform generalist tasks. In 2010, Khayelitsha had about 1 124 CHWs, who were employed by NGOs, meaning that then there were almost one CHW per 444 people (278). Compared to other sub-districts, this has the highest number of people with HIV/AIDS, chronic NCD and injuries (276).

3.4 Study design and methods

The mixed-method approach was used in this study; that means in each phase of the study different methods were employed. These were, 1) a qualitative exploration of the work done by CHW through observations, 2) a cross-sectional survey, and 3) a comparison of envisaged and actual NCD roles through a desktop review of the current policy and data from cross-

sectional and qualitative observations. The study design and the contributions of the researcher are presented in Figure 6.

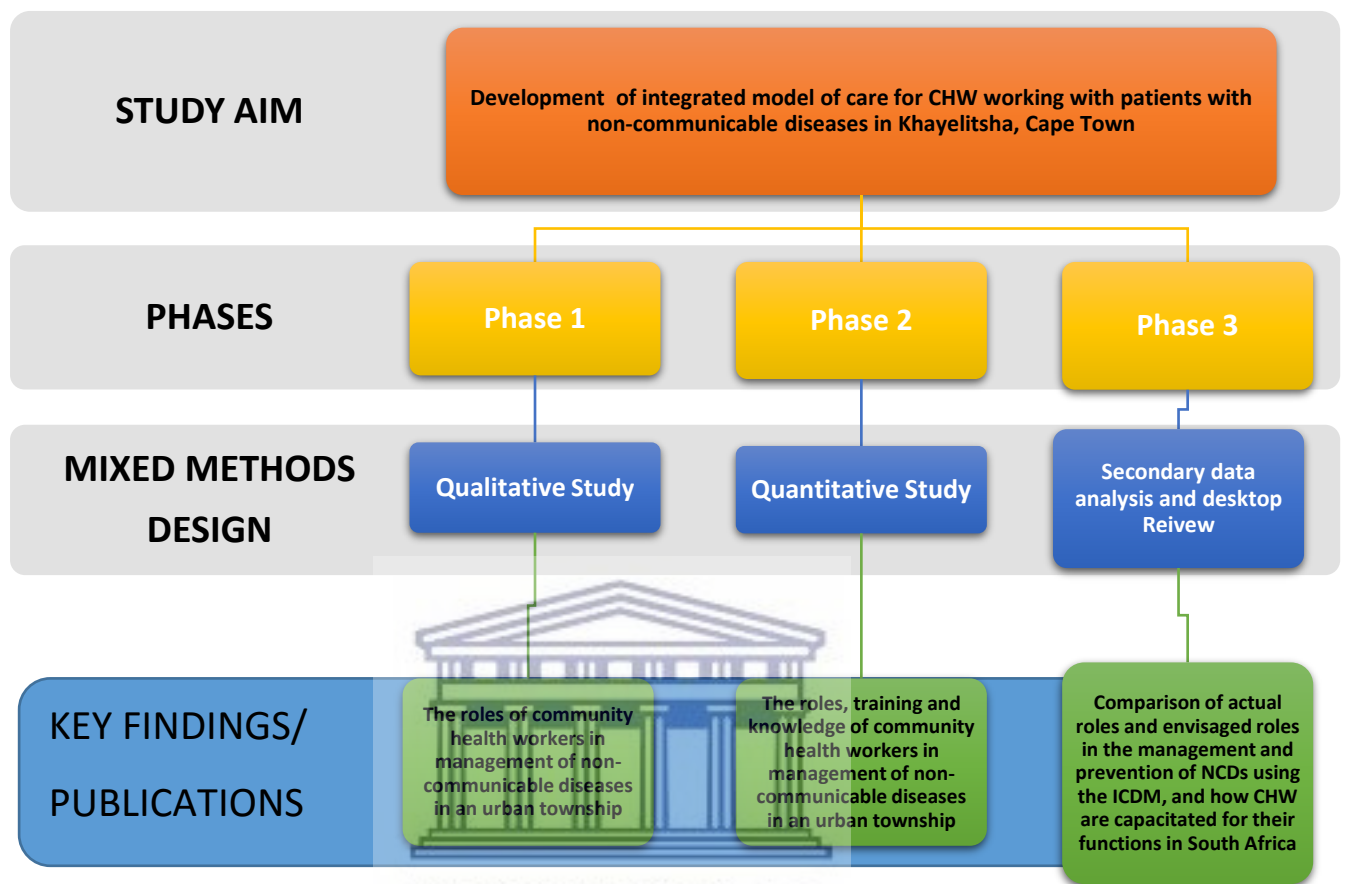


Figure 6: Schematic diagram of the study design and contributions of the NCD and community health workers' work

Data were collected in three phases. In the first phase, a qualitative approach to data collection was used to explore the roles of CHWs in the context of NCD in a limited resource setting (objective 1). In this phase, CHWs were observed conducting their daily activities. This phase also informed the development of the questionnaire for Phase Two.

In Phase Two, a cross-sectional survey was undertaken (as in Phase Three) to assess CHWs' current roles, training and knowledge relating to diabetes and hypertension. The relationship

between NCD knowledge and the socio-demographic characteristics of CHWs as well as their supervision and training were also examined in this phase.

Phase Three consisted of a comparison of actual and envisaged roles of CHW in the management and prevention of NCD. The ICDM was used to outline the findings related to roles. Also, competencies related to NCD roles were developed to better respond to how CHWs are capacitated for their functions in South Africa. Phase Three responded to three of the objectives.

3.5 Rationale for mixed methods

In this study, the researcher sought to explore the issue of NCD roles and thus needed a method that will be the best fit for researching such an issue. Thus, a qualitative approach was better suited to answer the objective in Phase One. To determine roles more objectively and to study the relationships between individual variables and NCD knowledge, a more objective approach was also needed. Thus, a quantitative methodology was the most appropriate method to respond to the questions in Phase Two.

Mixed-methods research, as the third research paradigm, is seen as a method that can assist in bridging the rift between quantitative and qualitative research. Thus, in this study its use was appropriate, as the method offers great promise for researchers who would like to see methodologists describe and develop techniques that are closer to what researchers use in practice (279). The mixed-method research is also used to integrate findings from qualitative and quantitative inquiries and draws inferences using both methods of enquiry in a single study (280). Not only were both methods of enquiry used in this study, but also the findings from these methods were integrated. Evidence revealed that mixed methods had been used to

describe the roles of the CHWs and to explore the barriers and enablers influencing their service delivery (222).

3.6 Phase One: Exploration of CHWs' role in the context of NCD

3.6.1 Study design

A qualitative, naturalistic research design utilising observations and in-depth unstructured interviews to investigate the daily activities of CHWs working with NCD patients was adopted. A naturalistic observation assumes that the roles of CHWs are socially organised and involve examining the subjects in their natural environment while carrying out their everyday tasks as they would usually do (281). The use of naturalistic observations facilitated an understanding of the complex realities of CHW working in resource-limited settings with clients with NCD as well as various influences affecting their work.

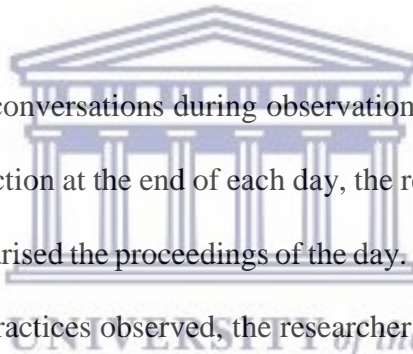
3.6.2 Sampling procedure

Community health workers employed by the NGO were included in the study. Purposive sampling was used to select an NGO. The NGOs that were selected were those that provided services to clients who had diabetes, hypertension or any NCD. In addition, the study focused on NGOs that were in Khayelitsha. This NGO had 126 employees at the time of the study and was one of the NGOs with the most significant number of CHWs.

3.6.3 Data collection

Ten CHW pairs were purposively sampled based on their experience of working as CHWs, namely, working for two years or more. The CHW pairs were observed conducting their daily activities. Data were collected during August 2011 over a period of four weeks through participant observations and unstructured interviews. Participant observations were conducted

with a pair of CHWs. Rapport was built over time with CHW, this meant that the researcher visited the NGO on a daily basis and spent time with CHWs before embarking on data collection. Observations were focused, meaning that they were supported by interviews, which assisted the researcher's decision about the observation. During observations conducted on a working day (4.5 hours), the researcher collected data through note-taking. The notes taken captured the observed activities and informal conversations and daily journal notes. Unstructured interviews with CHWs were conducted to stimulate discussions related to roles, issues about training and an understanding of the relations and links with the health facility. These were introduced at the end of each observation when there were questions that the researcher needed to be answered which stemmed from the observations.



Data collected from informal conversations during observations were recorded in the form of notes. As part of the data collection at the end of each day, the researcher reflected on the day's occurrences and further summarised the proceedings of the day. To crystallise an understanding of some of the activities and practices observed, the researcher conducted in-depth interviews with two coordinators who supervise the daily activities of CHW.

In preparation for data collection, the researcher spent a week with the CHWs, accompanying them to the field while they were carrying out their activities. Spending time with CHWs served three purposes, i.e. to familiarise the researcher with the day-to-day activities of the NGO, to gain trust and to establish rapport with the CHW. The researcher also participated in some of the activities undertaken by the CHW, such as morning prayers and debriefing sessions. Building trust was a vital element in the data collection process and assisted in gaining insider status.

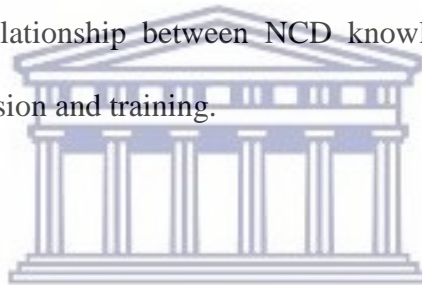
3.6.4 Data analysis

Data from field notes obtained from observations and in-depth interviews were analysed through thematic content analysis. The data analysis process started with the identification of units of meaning which were then categorised. Central themes were identified after categorising the data.

3.7 Phase Two: Assessment the roles, training and knowledge of CHWs

3.7.1 Study design

A cross-sectional study design was used to quantitatively assess CHWs' current roles, training and knowledge relating to diabetes and hypertension. The study design also allowed the researcher to examine the relationship between NCD knowledge and socio-demographic information as well as supervision and training.



3.7.2 Sampling procedure

At the time of the study (2013), community-based services were provided by a network of 5 000 CHWs employed by 45 NGOs which were predominantly funded by government departments such as health and social development (277). Only three of the NGOs supported and funded by the Department of Health were providing NCD care among other services in the community. All three NGOs were purposively selected and approached to participate in the study. Only two, however, consented to participate in the study. Because of the small numbers of CHWs within the organisation, all 160 CHWs employed in the two NGOs were then approached for an interview.

3.7.3 Data collection

A structured interviewer administered survey was conducted in isiXhosa (Khayelitsha's vernacular language) by trained field researchers using mobile phones. The training of the field researchers took place over one week. Data were collected in 2013 for two months. The development of the data collection tool used during the interviews involved an initial phase, where CHWs were observed conducting their daily activities. This formative, exploratory phase, reported elsewhere (282), provided the basis for designing a structured questionnaire for this study. The observations of practice provided an insight into how the CHWs' work was organised, resulting in a focus on four critical areas (constructs) within the CHWs' sphere of activity related to diabetes and hypertension. These included their roles, training and induction, supervision and support and knowledge. In an iterative process, the researchers developed a structured questionnaire to assess these activities quantitatively.

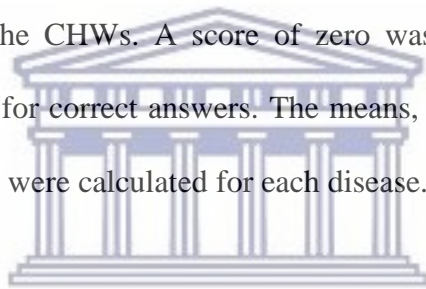
Regarding their roles, CHWs were asked the following question (without further probing): 'What are the services that you provide to clients with hypertension and diabetes?' Their responses were entered into a pre-coded list. Knowledge was assessed through a series of closed-ended questions covering risk factors, complications, and prevention of hypertension and diabetes. Fieldworkers entered the responses into a pre-coded list using a mobile phone.

The study questionnaire was piloted to ensure the appropriateness and understanding of questions and to test its content validity. The pilot was conducted in another township with 17 CHWs who also provided NCD care to community members.

3.7.4 Data analysis

Data analysis was performed using Statistical Package for the Social Sciences (SPSS) software, version 24 for Windows (Microsoft, USA). A univariate analysis was conducted on socio-economic characteristics, NCD-related training, knowledge about NCD (including risk factors, complications, preventative measures) and roles of participants. A multivariate analysis was conducted to establish the relationship between the independent variables (various socio-economic factors, training) and the dependent variables (knowledge scores for diabetes and hypertension). In all the analyses, the statistical significance was set at $p < 0.05$.

Responses were scored for each domain of knowledge. There were 26 and 27 possible knowledge responses about diabetes and hypertension, respectively. These were basic and appropriate to the scope of the CHWs. A score of zero was given to wrong or missing responses, and a score of one for correct answers. The means, medians and 95% confidence intervals for knowledge scores were calculated for each disease.



3.8 Phase Three: Compare actual and envisaged roles

3.8.1 Study design

In this phase, mixed methods were utilised to describe the current and envisaged roles of CHWs in NCD prevention and management at community and population level. These included qualitative and quantitative data as well as a desktop review of policy documents about the use of CHWs in the prevention and management of NCD.

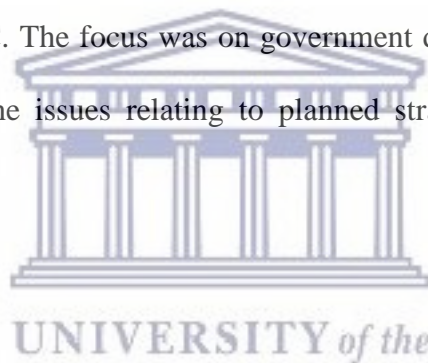
3.8.2 Sampling procedure

The sampling procedure for qualitative and quantitative data has been described in the previous phases, i.e. Phases One and Two. For the desktop review, published and grey material were sampled, especially documents relating to policy and CHW programmes in South Africa from

2009. A literature search on South African material that has been published since 2009 was conducted. Government policy documents describing the CHW programme and proposing work organisation were selected. The key search words included community health worker programmes, South Africa, non-communicable disease, training and supervision.

3.8.3 Data collection

Data collection of techniques used to collect qualitative and quantitative data is described in the previous sections on Phases One and Two. A desktop review of a search on policy documents relating to the training, roles of CHW, supervision and support was conducted. The search was limited to any written documents published since 2009, the period, post-inception of the Re-engineering of PHC. The focus was on government documents that influenced the current practice of CHW. The issues relating to planned strategies for CHWs were also highlighted.



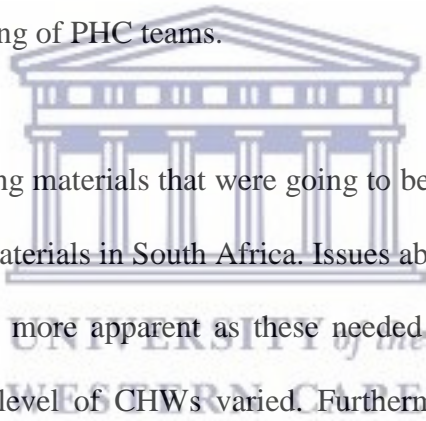
3.8.4 Data analysis

The five types of care embraced by the PHC approach guided the analysis of data relating to NCD roles from policy documents as well as data obtained through qualitative and quantitative methods. These types of care include promotive; preventive; curative; rehabilitative and supportive/palliative care. A better understanding of the roles of CHW in NCD management, along with their training, knowledge and roles or functions relating to NCD care, was provided via the qualitative and quantitative phases.

The holistic model of competence was used to represent the multiplicity and complexities of competencies (283). This model seeks to combine the elements of the dimensions of competence as it encompasses cognitive, functional, social and meta-competence.

3.9 Modification to the protocol and the reasons for the modification

Since the submission of the protocol, CHW-related programmes and policies have changed. New policies that influence how CHW's work is organised were piloted (227). These changes in the policy arena influenced and shaped the direction of this work too. Thus, the ability of policies to alter the context within which CHW work needed to be considered. There was pressure to develop training materials for CHW as well as to commence with training during the piloting of the re-engineering of PHC teams.



The introduction of new training materials that were going to be implemented made it a futile exercise to examine training materials in South Africa. Issues about training and re-training of this cadre of workers became more apparent as these needed examining, especially in the context where the education level of CHWs varied. Furthermore, examining how current policies differ from current practice became more relevant as the implementation of the policy differed from one province to the next. There is also an understanding that current CHW programmes have created an expectation from the communities they serve. It was, thus, necessary to describe how the old and the new were compared, as well as the competencies required for fulfilling roles.

CHAPTER FOUR: EXPLORATION OF ROLES OF CHWs IN MANAGEMENT OF NCD

This chapter presents the findings of Phase One which sought to explore the roles of CHWs in the management of NCD in the resource constraint setting.

Introduction

Community health workers (CHWs) are increasingly being recognised as a crucial part of the health workforce (25). In South Africa and worldwide, CHWs have provided healthcare to communities for many decades and have assumed a variety of roles, including community empowerment, the provision of services and the linking of communities with health facilities. Their roles are better understood in the areas of maternal and child health (36). For the purposes of this thesis, CHWs are defined as health workers with informal job-related training (but no professional or paraprofessional tertiary training) and limited in-service training to contribute to patient management at the community level. They may receive a stipend or work voluntarily (240), and work in communities in which they reside.

CHWs' tasks over the years have evolved from their focus— to a large degree — on prevention and promotion to more supportive roles that are associated with the increased burden of chronic lifelong conditions. South Africa, like many countries in transition, has experienced an increase in the burden of chronic lifelong conditions associated with the HIV- infection epidemic and the parallel emergence of non-communicable diseases (NCD). This burden of disease has led to increased workloads, overcrowding at health facilities and the poor quality of care (6), and has exerted a tremendous strain on human resources in the healthcare system, especially on those working at the primary healthcare (PHC) level (284). The use of CHWs as part of a solution to the human resources crisis in health settings has been suggested (26,285).

The South African government has made significant strides in providing free PHC for all, meaning that people with chronic diseases, such as NCD, are provided with long-term treatment at no cost and with any further ongoing support needed to assist them in adhering to treatment. As part of disease management, people diagnosed with NCD and placed on treatment are typically advised to attend support groups run or facilitated by professional nurses at the health facilities (26). Despite the efforts made at health facilities in managing NCD, these conditions continue to be managed poorly (286), and a need for extended and continued care at community level therefore exists.

Given the fact that not everyone utilises health facilities for routine check-ups and that NCD symptoms are not recognised until the late stages when complications are apparent, employing CHWs to increase awareness about prevention and control of diseases in communities is crucial. CHWs could strengthen the link between health services and the community, increasing access to services, especially in underserved communities (256).

In South Africa, CHWs have been primarily utilised in programmes that target infectious conditions, such as HIV/ AIDS and tuberculosis (TB), as well as maternal and child health. Their roles in such programmes are clearly defined and have an established base of evidence illustrating the benefits (36). The focus of programmes has been propelled by the need to achieve the Millennium Development Goals, resulting in less attention being given to other conditions such as NCD (287).

Numerous interventions for NCD that utilise the CHW model in disadvantaged communities have been described (235,288). Studies from developed countries highlight varied roles and

the relevance or importance of CHWs in the management of NCD. These roles include patient education (236,237), care and support (236,238,239), provision of social support and acting as a liaison with the healthcare system (6). For example, in a diabetes intervention, CHWs assisted in monitoring blood glucose, blood pressure and potential complications, and provided social support to their clients and their families (238). Despite the general support of the CHW model in the management of diseases, there is a need to understand further the roles of CHWs in the prevention and management of NCD, especially in resource-poor settings.

Recent policy reforms in South Africa prioritise the revitalisation of PHC and stronger community-based services (47). On the eve of the re-engineering of PHC and the implementation of PHC outreach teams in South Africa, it becomes imperative to understand the roles of CHWs, particularly in caring for clients with conditions previously not included in their work. According to the policy statements on the re-engineering of PHC, the work of CHWs has been conceptualised to be comprehensive and to cover household and community level (281). With respect to NCD, at household-level CHWs roles will include health promotion, that is, education on diet, exercise and lifestyle, and screening for those at a high overall cardiovascular disease risk and, in particular, for diabetes and hypertension, foot care, and an integrated approach to adherence support. At the community level, the focus will be on campaigns, support groups and promoting action on risk factors related to diet and exercise.

Research methods and design

Study design

A qualitative, naturalistic research design utilising observations and in-depth and unstructured interviews to investigate the actual daily activities of CHWs working with NCD clients was adopted. A naturalistic observation assumes that the roles of CHWs are socially organised and involve examining (281) the CHWs in their natural environment whilst carrying out their everyday tasks as they would usually do (52). The use of naturalistic observations facilitated an understanding of the complex realities of CHWs working in resource-limited settings with clients with NCD, as well as various influences affecting their work.

Setting

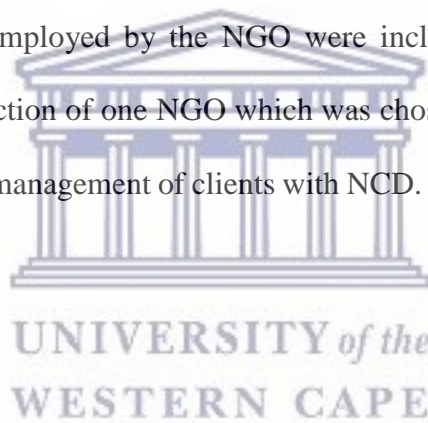
The non-governmental organisation (NGO) studied was located in Khayelitsha, an urban township in Cape Town, South Africa. Khayelitsha has predominantly informal dwellings, and its community is economically disadvantaged. According to census data of 2006, the Khayelitsha has an estimated population of 406 779 (289); however, this number is expected to have increased to over half a million because of an increased influx of people from rural to urban areas over the past few years (290). More than half of the population (67%) is unemployed (291).

The CHWs who work in this area are employed by an NGO operating in Khayelitsha and receive funding from the government. Some of the CHWs within the NGO are also involved in TB programmes, where they act as directly observed TB therapy (short course) supporters. In addition, CHWs also work as home-based carers. At the time of the study, there were no ward-based teams operating in the area, as is the case in other parts of South Africa.

CHWs within this NGO are supervised by professional nurses and coordinators who oversee their daily activities, including administration. The ratio of CHWs to supervisors, however, varies amongst organisations. The daily clinic nurse workload in the sub district is above the national average, as each nurse provides community-based care for about 33 people per day (292). Such findings highlight the importance of community-based services as well as the need for CHWs. Compared to other sub-districts in the Western Cape, Khayelitsha has the highest burden of HIV/AIDS, chronic NCD and injuries (276). This makes it an appropriate setting for encouraging preventive and promotive community health services.

Study population and sampling strategy

Community health workers employed by the NGO were included in the study. Purposive sampling was used in the selection of one NGO which was chosen on the basis of location as well as its involvement in the management of clients with NCD. This NGO had 126 employees at the time of the study.



Data collection

A total of 10 CHWs were observed. Data were collected during August 2011 over a period of four weeks through observations and unstructured interviews. During observations which occurred during a working day (4.5 hours), the researcher collected data through note-taking. Unstructured interviews with CHWs were conducted to stimulate discussions related to roles, issues pertaining to training and understanding of the relations, and links with the health facility. These were introduced at the end of each observation when there were questions that stemmed from the observations. Data collected from informal conversations during observation were recorded in the form of notes. This was complemented by the researcher further reflecting on and summarising the proceedings of the day. In order for the researcher to

have a clearer understanding of some of the CHW activities and practices observed in the field, in-depth interviews were conducted with two coordinators who supervise CHWs' daily activities.

In preparation for data collection, the researcher spent a week with the CHWs, accompanying them on whatever activities they were carrying out. This served three purposes, namely, to familiarise the researcher with the day-to-day activities of the NGO, to gain trust and to establish rapport with the CHWs. In addition, the researcher participated in some of the activities undertaken by the CHWs, such as morning prayers and debriefing sessions. Building trust was an important element in the data collection process and assisted in gaining insider status.

Data analysis

Data from field notes obtained from observations and in-depth interviews were analysed through thematic content analysis. The data analysis process started with the identification of units of meaning, which were then categorised. Central themes were identified after the data were categorised.

Results

Analysis of the field notes revealed several primary themes. Principally, the CHWs had multiple roles, and these could be summarised into six broad themes: advisor; provision of direct services; monitoring of clients; linking clients with the health system; capacity building; and administration.

Table 6: Presents a themes that emerged about the roles of CHWs

Roles of CHWs		
<p>Theme: Advisor</p> <p>Advice people about eating</p> <p>Provide answers about social development questions</p>	<p>Theme: Provision of direct services</p> <p><i>Sub Theme: Facilitation of support groups</i></p> <p>Visited a support group Ran the group session Instructed the group member on what to do</p> <p><i>Sub Theme: Health Education</i></p> <p>Teach support group member about diet Educate about importance of medication</p> <p><i>Sub Theme: Distribution of Medicine</i></p> <p>Drop off medication at the club Delivered medication at a client's home</p> <p><i>Sub-theme: Rehabilitation services</i></p> <p>Assisted a stroke patient with exercises</p>	<p>Theme: Monitoring client's health status</p> <p>Test blood glucose levels</p> <p>Take their weight</p> <p>Measure blood pressure</p>
<p>Theme: Linking clients to services</p> <p>Identify people with problems and sent them to the clinic Receive referrals from the clinic and follow up people</p>	<p>Theme: Capacity building</p> <p><i>Subtheme: Peer education</i></p> <p>Train other CHWs Shadowing CHWs from a different NGO Showing other CHWs what needs to be done</p>	<p>Theme: Administration</p> <p>Collected information about client</p> <p>Documented client medication Submit the number of clients visit</p>

The scenario shown in Box 1 indicates some of the roles and realities of CHWs working in the area of NCD.

BOX 1: Observation of community health workers' conducting their daily work

Scenario

The day started at the NGO base, and I was assigned to accompany a pair of CHWs.

We walked for about 20 minutes before reaching a newly formed support group in a more formal settlement. The group was organised and had a chairperson and a secretary who took minutes. The support group opened with a prayer and CHWs commenced with the support group activities. I was introduced to the members as a colleague visiting the club to see the work that CHWs do.

One of the CHWs started taking out the instruments that were going to be used to measure blood pressure, weight and blood glucose. There were about 15 health club members (who are CHW clients) on this day, and I watched them getting ready to be measured. The majority of the members were women, and many of them were overweight. A bathroom scale was used to measure weights, and an automated blood pressure monitoring machine was used to measure blood pressure.

One CHW conducted weight and blood pressure measurement, whilst the other was responsible for measuring blood glucose. The same cuff size was used on all members. The cuff could not fit one of the women's arm, it was put around the wrist, and a measurement was recorded. All the measurements were recorded in a book. Members whose weights were above the scale's threshold could not be measured. One of the members had an elevated blood pressure reading, and another one had an above-normal glucose reading. The client with an elevated blood pressure reading was instructed to relax whilst the one with a high

blood glucose reading was given water; both clients were instructed to sit for about 30 minutes before CHWs took a second reading was taken. The CHW then wrote a note in her booklet and told both clients that the supervisor, a nurse, would come to observe them the next day.

After measurements were completed, an education session was delivered by one CHW, who spoke about diabetes and hypertension. The lecture focused on explaining what the conditions are and how they can be prevented and finished with a lecture on diet. This lecture took about 20 minutes.

Lastly, an exercise session was conducted for about 15 minutes. All members of the group participated, including the male client with elevated blood pressure. After the exercise session, CHWs recorded dates for collecting medication from the clinic cards. Thereafter we left the support group.

We walked to another area and found that the support group we were visiting did not convene on that day, as there was a death in the area and all the members went to support the bereaved family. We then proceeded to several households where we delivered medication packets to clients. Once we were at the household, the person who received the medication had to sign in the CHWs' booklet. Once the CHWs tasks were done, we then proceeded to the office to deliver the equipment that was used. This is how the day ended.

Advisor

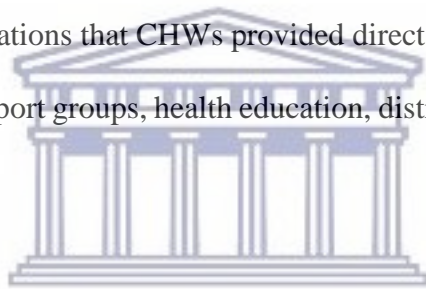
CHWs offered advice to clients, which ranged from health advice to social issues that concerned participants. The following field notes recorded during a support group session demonstrate CHWs' advisory role which extends beyond the health domain.

After the health education session at the support group, the CHW opened the session for questions. One of the elderly participants enquired about the registration process for the Child Support Grant. The CHW could not offer concrete advice but promised to ask relevant people that may have appropriate answers. (Field notes, support group, day 2)

The advisory role was also confirmed by the coordinators during an in-depth interview, and one commented as follows: ‘Community health workers are there to advise clients on a number of issues such as what they should eat and where to go in order to get help’ (Co-ordinator, day 8).

Provision of direct services

It was evident from the observations that CHWs provided direct services to their clients which included the facilitation of support groups, health education, distribution of medication, as well as rehabilitation exercises.



Facilitation of support groups UNIVERSITY of the

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Facilitation of support groups consisting of clients with diabetes and/or hypertension was one of the roles identified. As facilitators, CHWs assumed a leadership position:

On arrival at the support group, the participants were already sitting and waiting for the CHW. She introduced herself and then explained how the session would be structured. Thereafter she started with the day's activities. (Field notes, support group, day 1)

This was also observed in three other support groups that were facilitated by CHWs, where CHWs led support group sessions.

Health education

CHWs work as educators at the support groups and within households. Education sessions offered by CHWs varied and included matters pertaining to nutrition in the management of NCD, as well as explaining about risk factors, symptoms and prevention measures for diabetes and hypertension. In certain instances, CHWs explained healthy eating as consuming plenty of fruit and vegetables. The observation highlights gaps in knowledge on diet and nutrition:

I attended an education session delivered by a CHW at a support group. She started the session by describing hypertension; she further explained the risk factors for hypertension and how conditions such as hypertension can be prevented. She completed the session with a lecture on nutrition and how nutrition can prevent diabetes and hypertension. The CHW emphasised the importance of a 'healthy diet' and explained that this diet should consist of vegetables and fruit. The information provided to the participants was in the form of a didactic lecture with no illustrations or educational materials to assist the participants in their learning and the CHW in her teaching.

(Field notes, support group, day 3)

In addition, health education also occurred during home visits; however, the health education at homes was not of the detailed as within support groups. Health education provided during home visits was in response to questions posed by a particular client rather than routine practice, as done in support groups.

Distribution of medication

Chronic medication for selected clients assigned to CHWs was distributed in households and at the designated support groups. The delivery of medication to clients by CHWs is a way of improving access to treatment and serves a dual purpose for both the clients and the health facility. It not only ensured that clients receive medication timeously but also enabled them to

bypass the long queues and long waiting times usually encountered at health facilities and the transport costs involved:

After recording the medication in the record book, we went to deliver the medication to clients. We first visited a client that was bedridden to deliver her medication; we then visited a support group where we delivered the bulk of the medication. All the clients collected their medication and were then reminded about their next doctor's appointment. (Field notes, support group, day 6).

In certain instances, CHWs did emphasise the importance of taking medication as prescribed; however, this was not a common practice and was mostly communicated during household visits.

Although education about medication was not included in the sessions with clients, CHWs still assisted with medication-related issues and communicated these to the health facility or nurse supervisor. This is highlighted in the scenario and conversation about what CHWs do when confronted with issues relating to medication:

When CHWs delivered the medication at a client's house, the client could not recognise some of the medication that was included in the package and relayed his concern to the CHW. (Field notes, home visit, day 8)

The CHW resolved this issue through a verification process:

I look at the boxes; write down the substances, the milligrams [dosage] and the drug name that is written in the box. I then go to the book where we record the medication to see if what is given corresponds with what is in the book. If I'm not sure, I ask the nurse supervisor or pharmacist at the clinic. After getting a

response, I then tell the client what I have been told. (Conversation with a CHW, support group, day 6)

Rehabilitation services

A single CHW was observed providing exercises to a client with hemiplegia caused by a stroke. The CHW was assisted by another CHW to assist the client. Whilst conducting the exercises, the CHW kept communicating with the client, who seemed pleased with the service provided. The CHW then encouraged the client to visit the local health facility in order to access further rehabilitation services. Interestingly, no clients from the other support groups were observed receiving rehabilitation exercises. The lack of CHWs assisting clients with rehabilitation exercises in other support groups was explained by the co-ordinator:

A few years ago we received funding to train CHWs to work with community members that could not readily access physiotherapy services. Our CHWs were then trained in rehabilitation exercise; however, when the funding ended, we could not continue with the work we were doing. Currently, we only have two CHWs who were part of that training and others have retired. (Co-ordinator, day 7)

Monitoring of clients' health status

CHWs assisted support group members with information that would enable them to manage their conditions better. Whilst conducting support groups, the CHWs collected anthropometric measurements, namely, blood pressure, blood glucose and weights of all the participants. Blood pressure was measured using only one cuff size, despite varying mid-upper arm circumferences. Notably, in cases where the cuff was too small to fit the size of the upper arm, CHWs placed the cuff on a client's wrist. Finger-prick blood glucose was measured using a

new lancet for each person, and clients' readings were recorded. Weights were measured using a dial bathroom scale and put on surfaces that were sometimes uneven. At no point was the scale calibrated during weight measurements. Calculations of the body mass index were not performed. In all the observations, individuals with abnormal blood pressure and/or blood glucose readings were informed of their results and referred to the health facility. The appreciation on the faces of the support group members was clearly evident during the taking of measurements. During home visits, no CHWs were observed taking any client's measurements.

Linking clients with the health system

At the support groups, CHWs referred people who were identified with elevated blood glucose levels as well as raised blood pressure to the nurse supervisor, who then referred the clients to the nearest health facilities. Referred clients were given a referral letter by the nurse to present to the health facility. Although clients reported being attended to at the health facility, no letters were sent back to the nurse supervisor or CHW. When clients were followed up by CHWs through home visits, CHWs could rely only on the clients' recollection of their clinic attendance and by inspecting the clinic card to ensure that the client did indeed visit the health facility as instructed.

Capacity building

Peer educator

CHWs assisted other CHWs with 'on-the-job' experience. It was evident from one of the field observations that CHWs also acted as peer educators by assisting peers with the skills required to fulfil daily tasks:

On one of the visits, I noticed that CHWs were working as a trio and one CHW would constantly be observing what was happening. When I enquired about this, I was told that the third CHW was newly recruited and therefore did not have experience in doing the work. Thus they had to teach her what is usually done. (Field notes, support group, day 9)

According to the coordinators, this was a way of infusing knowledge about fieldwork and assist CHWs in gaining on-the-job experience to newly recruited CHWs. One of the coordinators commented as follows:

We have team leaders that we use in the field; they are the ones that we use to partner with a newly recruited CHW. [...] the team leaders are CHWs who have been working for the organisation for a long time, and they really know the work. (Co-ordinator, day 7).



Administration

On a daily basis, CHWs completed forms with information relating to the clients. The information recorded includes clients' medication, and particulars of the clients to be visited on that day. In addition, CHWs completed daily statistic sheets for clients (clients who were seen the day before or who were planned to be seen). The completion of forms was a daily activity done at the beginning of the day, whilst some of the forms that involved updating patient information were completed after home visits and submitted to the coordinators on the next day. CHWs were also responsible for recording clients' signatures when they receive medication, so as to keep a record of the clients who have collected their medication.

Discussion

The findings of this study show that CHWs fulfil a variety of roles in the management of NCD. As such, they have a crucial role in community level NCD public health-care in South Africa. It is evident that the varied roles fulfilled by CHWs seem to be in response to clients' needs. Consequently, a degree of flexibility in the way they approach their work may be necessary, so as to allow them to react to the community's needs.

In a society where community needs vary, acting as an advisor may be one of the crucial roles played by CHWs. However, as demonstrated in this study, their knowledge and available support material may need to extend beyond health-related issues, especially in communities with social problems. Other studies have shown that CHWs trained in health-related issues – such as diabetes management – were often confronted with issues unrelated to diabetes, and therefore suggested the need to prepare them for unanticipated non-diabetes issues (288). Such expectations pose a challenge to CHWs' scope of practice and what can be realistically expected of them. In addition, this illustrates the need to form meaningful networks with other community structures such as social development. These findings further support the broader debate that CHWs need to be integrated into government programmes and be incorporated into professional teams (25) that can offer support. Furthermore, communication with other team members whilst in the field can provide more streamlined services for the clients.

Playing the role of a health educator meant that CHWs are expected to act as sources of information, creating an expectation that CHWs possess current and relevant information related to NCD. Also highlighted in the study were the shortfalls in CHWs' knowledge, in that information provided was not always accurate. Their inability to clarify certain nutrition concepts emphasises the need for training and continuous education that is tailored to the

context that addresses the everyday realities of CHWs, as well as the need for teaching aids to enforce further and standardise the health information given to clients. Indeed, it has been suggested that the community's perception of the CHW's knowledge, skills and ability to assist communities with their health needs is crucial in inspiring respect and the acceptance of CHW services (256).

As lay workers based in communities, CHWs play a fundamental role in community-based support groups, and as demonstrated in this study, within such groups their roles could vary. As facilitators, CHWs require a diverse range of skills that include communication skills, as part of facilitation includes communicating with the audience. CHWs set the subject or topics for discussion and have the potential to influence the focus of the group, and as such require leadership skills. This leadership role presents its own challenges and expectations, as it would imply that CHWs are expected to know how to guide and support group members. In addition, increased demands to support and provide information may rise to a point where expectations on the leader may exceed their capabilities (293). Thus it is necessary to structure facilitation of support groups in such a way that forges partnerships and co-ownership between participants and facilitators.

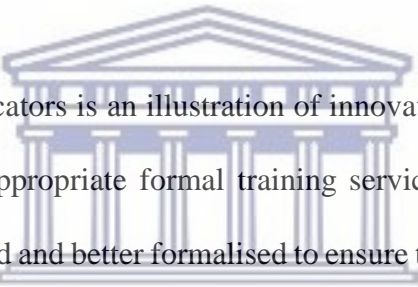
The distribution of medication to clients on chronic medication serves several purposes that benefit the clients as well as the health facility. Distribution of medication in the community may assist in improving access to treatment, ensure that medication is received timeously and reduce long waiting times in pharmacies at the health facilities. Clearly, delivering medication in such settings is helpful, as it minimises the number of trips to the health facility and reduces overcrowding at health facilities. This benefit could be enhanced considerably if CHWs were to advise on improving adherence and provide education relating to medication for the

management of conditions. The findings highlight the lack of adherence support given to clients with NCD, in stark contrast to the extensive support provided by CHWs to clients on HIV infection and TB treatment.

As the CHWs in this study worked mainly with individuals already known to have a chronic disease, it is crucial that they possess skills in physical rehabilitation of clients. This is particularly pertinent because of the increase in risk factors for cardiovascular disease, while an increase in the aging population suggests a similar increase in the burden of cardiovascular disease in sub-Saharan Africa and elsewhere in the developing world. In the absence of appropriate interventions, stroke and heart disease-related deaths are expected to increase from 3 million in 1998 to 5 million in 2020 in developing regions, as outlined by the World Health Organisation (294,295). The suggestion drawn from these statistics suggest that there will be a need for community-based services such as CHWs with specialised skills to deal with the burden of increased numbers of people with physical disabilities caused by strokes and those who suffer from ischaemic heart disease. This will then extend services to clients in areas where there is a scarcity of rehabilitation workers or where people may have limited access to these services.

The role of CHWs in measuring vital parameters in children has been shown to be feasible (reliable) in numerous studies on children (296). This role could be extended to NCD for the detection of abnormal readings and thus the facilitation of referral. In instances when such measurements are incorrectly conducted, this may lead to CHWs' work being devalued. Furthermore, in practice such inadequacies highlight insufficiencies in training and supervision. Thus adequate training, supervision, and the regular evaluation of tasks are essential in ensuring good practice.

One of the major roles for CHWs has been to connect or link community members to the health facility (26). In this study, this role was fulfilled in numerous ways, such as in the delivery of medication and referral of clients identified in the community to a health facility. In communities, where health-seeking behaviour is poor, and people visit health facilities only when they have serious symptoms, CHWs can play a crucial role in identifying problem cases early enough for health professionals to intervene timeously. However, it is evident that the relationship or communication between health facilities and CHWs has its challenges. Improved communication between health facilities and CHWs could assist in increasing CHWs' legitimacy in the eyes of the community.



The role of CHWs as peer educators is an illustration of innovative thinking by their NGO in order to deal with a lack of appropriate formal training services, although innovative peer education needs to be supervised and better formalised to ensure that the knowledge transferred is appropriate and accurate. Peer education in this context shows how an organisation tailors practices to meet the needs of those they serve.

This chapter shows some of the limitations and challenges to the roles and responsibilities of CHWs in an NCD programme. For example, home visits were not utilised adequately by CHWs, despite being potential spaces for delivering health education. In addition, the work of CHWs concentrated on people with NCD, thus excluding the population at risk which could benefit from their services. In a place where there is an increase in NCD, there is a need for primary prevention, and CHWs can be used in communities to identify those at risk.

Conclusion

This phase of the study shows the complexities of the work done by CHWs working with NCD-related conditions. Thus, understanding the actual roles of CHWs provides insights not only into the competencies required to enable them to fulfil their daily functions but also into the type of training required to fill the present gaps.



CHAPTER FIVE: DETERMINING THE ROLES, TRAINING AND KNOWLEDGE OF CHWs

Chapter 5 focuses on the general and specific roles and aspects of training of CHWs. In addition this chapter assesses CHWs' knowledge on the most prevalent NCD namely diabetes and hypertension.

Introduction

Non-communicable diseases (NCD) such as diabetes and hypertension are public health problems that place a heavy burden on health facilities. To address this burden and to provide continuity of care for NCD, it is increasingly recommended that services be offered outside of health facilities in communities (43). In South Africa, community health workers (CHWs) provide community-based care, but for years their efforts have been focused on home-based care for people with HIV and TB, with little done in the area of NCD. There is little information describing the processes required to integrate NCD care into the work of generalist CHWs, including the training, supervision and orientation into roles. Where it has been assessed, studies have suggested that CHWs lack essential knowledge of chronic diseases (41,297).

It is hoped that the will be filled by this study and light will be shed on the roles of CHWs in diabetes and hypertension management in an urban area of the Western Cape (the Cape Town Metropolitan Municipality). The study has been based on current practices, and possible avenues have been suggested for the capacity building of CHWs for NCD care in South Africa, especially in resource-constrained settings.

In this study, the roles, training, in-service support and knowledge related to NCD (i.e. diabetes and hypertension) have been assessed, In addition, the factors associated with knowledge held by CHWs providing NCD care in an urban township have also been examined; with the aim of informing the development of appropriate and context-sensitive CHW training programmes. The following questions were posed:

- 1) the socio-demographic profile and presence of NCD among CHWs ;
- 2) roles of CHWs in NCD management and prevention;
- 3) types of training received by CHWs on NCD and frequency of supervision; and
- 4) community health workers' knowledge of risk factors and of the complications and prevention of diabetes and hypertension.

Definition of key concepts

Community health workers are lay workers who have no professional training but have some training in the context of community intervention and are responsible for delivering services related to healthcare (240).



Background and literature review

Non-communicable diseases (NCD) such as diabetes and hypertension have contributed significantly to the burden of disease globally, including in South Africa (6). According to the International Diabetes Federation (IDF), 2.28 million South Africans had diabetes in 2015 (298), while the prevalence of hypertension is on the increase (71,299,300). According to the World Health Organisation (WHO) (9) in 2015, three quarters of all NCD-related deaths now occur in low- and middle-income countries (LMIC) (62), where diabetes prevalence quadrupled between 1980 and 2014 (301). This rise in NCD has implications for health systems and populations, affecting the most economically active age groups (24,302). In many

regions of the world, health systems are ill-prepared to deal with the problem, and the prevention and management of NCD remain a significant challenge. One of the constraints to managing NCD is the poor availability of adequately trained human resources (24,302).

Community health workers have been proposed as a strategy to mitigate the shortage of healthcare professionals (25,212,303) such as nurses and doctors. CHWs' relationship with the community as well as their understanding of the context, culture and language, puts them in an ideal position to assist communities with health-related issues (25,198). Furthermore, CHW programmes provide a link with the formal healthcare system, thereby ensuring a continuum of care (303), vital for longevity and the prevention of the complications of NCD.

Studies have shown that CHWs can play a valuable role in the prevention, management and care of chronic lifelong (CLL) conditions such as human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) (221,304,305). The role of the CHWs has also been cited in the prevention and management of diabetes and hypertension in LMIC (39,40). In these contexts, CHWs have shown to be effective in providing both education and support to people with these conditions (41–43). There is also considerable evidence about the role and effectiveness of CHWs for the prevention and management of NCD in high-income countries, where their roles similarly include health education, adherence support and counselling (237,306,307). However, for CHWs to perform these tasks, they require appropriate training (44,45), supportive supervision (308), materials and equipment. Despite the potential role of CHWs in controlling NCD, studies indicate that CHWs often have poor knowledge about NCD and their risk factors (213,248).

Community health workers in many parts of South Africa are employed as intermediaries in non-governmental organisations (NGOs) that are often contracted by the government to render services to communities (277). These NGOs are responsible for the capacity development of the CHWs, including their training needs, orientation into roles and supervision. Overall, community-based approaches to NCD are underdeveloped, inadequately defined and fragmented. In South Africa, however, a diverse community-based care and support infrastructure based on lay health workers is being reorganised into a more comprehensive system of outreach. Under a set of initiatives referred to as PHC Re-engineering (47), a formalised cadre of CHWs has been piloted with expanded roles. These roles extend beyond HIV and TB to include maternal child health interventions and integrated approaches to chronic lifelong conditions (involving both communicable diseases and NCD).

This cadre of workers will be organised into ward-based outreach teams (WBOTs) supervised by a nurse and supported by health facilities. In the first phase of primary healthcare (PHC) re-engineering, the focus has been on developing the capacity for maternal child health (309).

Methods

A cross-sectional study was conducted on CHWs employed by two NGOs providing NCD care in Khayelitsha, Cape Town.

Population and sampling

Khayelitsha is a large informal settlement in Cape Town. In 2011, this township had an estimated population of 391 749 people (275). At the time of the study (2013), community-based services were provided by a network of 5000 CHWs employed by 45 NGOs which were predominantly funded by government departments, such as health and social development

(277). However, only three NGOs were supported and funded by the Ministry of Health to provide NCD care in the community. All three NGOs were purposively selected and approached for the study, two of which consented to participate. All 160 CHWs employed in the two NGOs were then approached for an interview.

Data collection

Trained research assistants using mobile phones administered a questionnaire in isiXhosa, the language most spoken in Khayelitsha. Data were collected in 2013 for 2 months.

The development of the questionnaire involved an initial phase where CHWs were observed conducting their daily activities. Insights about CHWs' scope of practice and work organisation among other things were provided by the observations of practice. The basis for designing the questionnaire for this study was provided by this formative, exploratory phase, reported elsewhere (282). Findings from this formative phase resulted in the development of four critical areas (constructs) within the CHWs' sphere of activity related to diabetes and hypertension: roles, training and induction; supervision and support; and knowledge. In an iterative process, the co-authors developed a questionnaire to assess these activities quantitatively.

Regarding their roles, CHWs were asked (without further probing): the following question: 'What are the services that you provide to clients with hypertension and diabetes?' The responses were entered into a pre-coded list by fieldworkers. Knowledge was similarly assessed through a series of closed-ended questions covering risk factors, complications and prevention of hypertension and diabetes. There were 26 and 27 possible knowledge responses about diabetes and hypertension, respectively. These were basic and appropriate to the scope of CHWs.

The data collection tool was piloted to ensure the appropriateness and understanding of questions and to test its content validity. The questionnaire was piloted in another township 15 km away from the study site with 17 CHWs, who also provided NCD care to that community's members.

Data analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) software, version 24 for Windows (Microsoft, USA). A univariate analysis was conducted on socioeconomic characteristics, NCD-related training, knowledge about NCD (including risk factors, complications, preventive measures) and the roles of participants. A multivariate analysis was conducted to establish the relationship between the independent variables (various socioeconomic factors, training) and the dependent variables (knowledge scores for diabetes and hypertension). Statistical significance was set at $p < 0.05$ in all analyses.

Responses were scored for each domain of knowledge. A score of zero was given to wrong or missing responses, and a score of one for correct answers. The means, medians and 95% confidence intervals for knowledge scores were calculated for each disease.

Results

Of the 160 CHWs approached for an interview, 150 consented to participate, giving a response rate of 94%.

Socio-demographic profile of CHWs

Table 6 shows that CHWs were mostly female ($n = 144$) rather than male ($n = 6$). The mean age of CHWs was 35.4 years; 88% had some secondary schooling, and 36% had completed grade 12. More than half (53%, $n = 79$) of the CHWs had been in employment for 4 years and

more. Seventy (47%) CHWs reported having at least one NCD, with hypertension (33%) being the most common. Nearly one quarter of the 150 CHWs ($n = 34$, 23%) had more than one NCD referring to a combination of diseases or conditions such as diabetes, hypertension, arthritis, heart diseases, asthma and strokes.

Table 7: Demographic and self-reported NCD characteristics of the community health workers ($n = 150$).

Variables	Frequency	Percentage
Gender		
Male	6	4
Female	144	96
Age		
less than 30 years	50	33
30–39 years	56	37
40–49 years	27	18
50 years and above	17	11
Mean age in years	35.4	
Educational attainment		
No schooling	0	
Primary schooling (Grades 1–7)	10	7
High school (Grades 8–11)	78	52
Matric (Grade 12)	54	36
Post-matriculation qualification	8	5
Mean number of schooling (years)	10.8	
Duration of employment		
Less than 1 year	32	21
1–3 years	39	26
4 or more years	79	53
Self-reported NCD¹		
Hypertension	50	33
Diabetes	36	24
Asthma	15	10
Arthritis	14	9
Stroke	11	7
Other heart conditions	5	3

¹ NCD, non- communicable diseases

Comorbidities		
No NCD ¹	80	53
One NCD ¹	36	24
More than one NCD ¹	34	23

Roles of CHWs related to non-communicable diseases (diabetes and hypertension)

Community health workers offered diverse responses to their roles in the management and care of NCD (Figure 1). The four most reported roles performed included the distribution of medication (84%), advising about diet (72%), the measuring of blood pressure (63%) and conducting physical activity sessions (53%). Only 21% conducted pill counts as part of their routine practice.

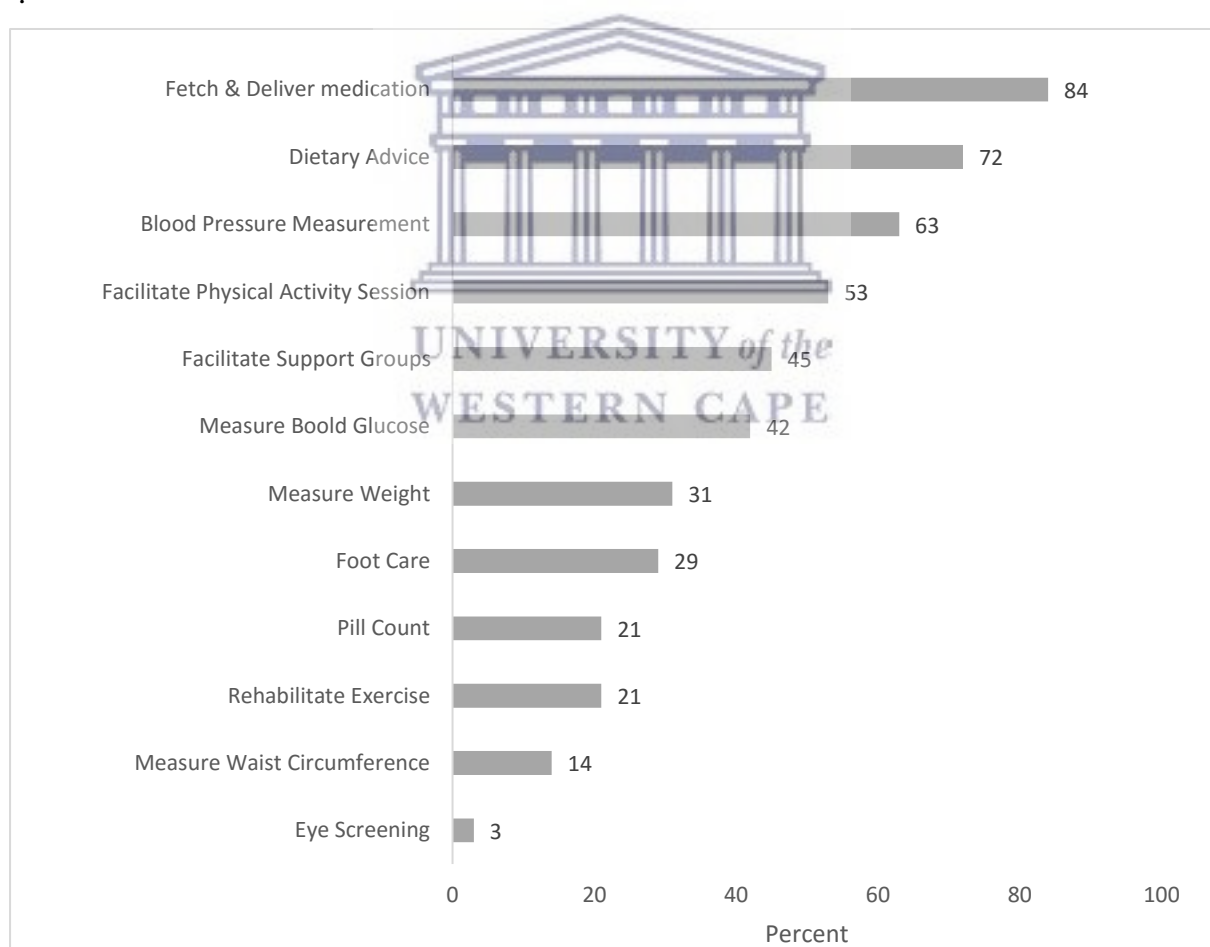


Figure 7: NCD-related roles or tasks performed in the community (n = 150)

Training related to non-communicable diseases

Of the 150 CHWs interviewed, only 79 (52%) reported having received formal NCD-related training, and of those, less than half ($n = 35$; 44%) received refresher training after the initial training.

A wide variety of training experiences and providers were reported, the duration of which ranged from 1 to 270 days (9 months) (Figure 8). More than half of the 79 respondents ($n = 46$; 58%) reported training of 14 days or less, mostly 1 or 2 days (28%), while the remainder indicated more extended periods. Training providers were a mix of higher education institutions (often as part of research), the Department of Health and independent trainers.

Although 48% ($n = 71$) of the CHWs had no NCD-related training, they reported being orientated into their NCD-related roles by supervisors (nurses) (31%), NGO coordinators (34%) and fellow CHWs (25%).

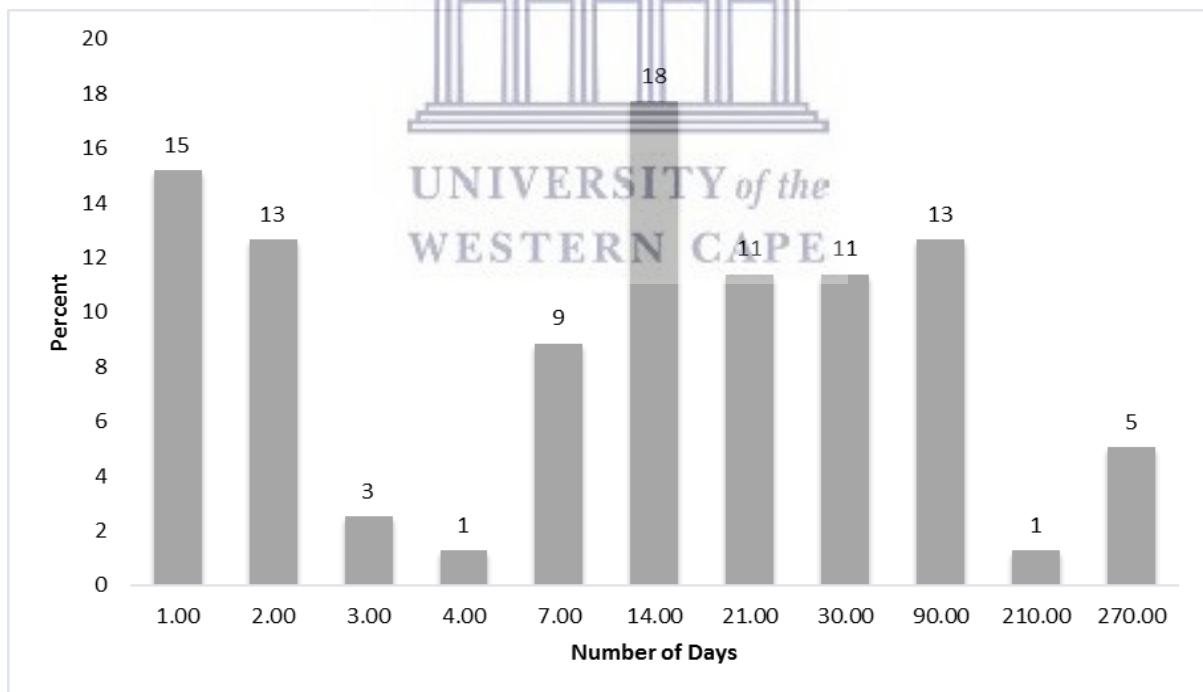
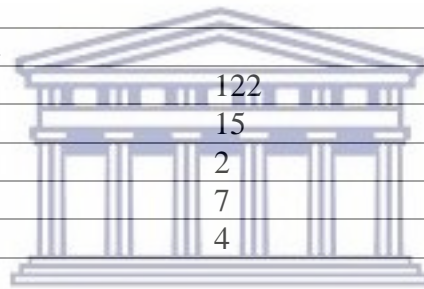


Figure 8: Duration of NCD-related training among CHW ($n = 79$)

Table 8: In-service supervision and support (n = 150).

Variables	Frequency	Percentage
Frequency of meetings with supervisor monthly		
Once	38	25
Twice	4	3
Three times	13	9
More than thrice	93	62
It depends	2	1
Frequency of observing tasks performed		
This week	51	34
Last week	22	15
Sometime this month	10	7
Last month	37	25
Two months ago or more	15	10
Don't remember	15	10
Level of supervisor support		
Very supportive	122	81
Supportive	15	10
Ambivalent about support.	2	1
Unsupportive	7	5
Very unsupportive	4	3



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Knowledge related to diabetes and hypertension

Knowledge of diabetes and hypertension among CHWs was poor, with mean scores being one-third of the expected knowledge scores (Table 8). Scores for preventive measures were slightly better than those for the risk factors and complications.

Multiple regression analyses were performed to ascertain the combined effects of any NCD training, age, years of schooling, NCD status (absence vs presence of NCD), duration of employment (≤ 3 years vs > 3 years), and frequency of supervision (< 1 per month vs. ≥ 1 per month) on diabetes and hypertension knowledge scores (as a continuous variable).

Table 9: Community health workers knowledge scores of diabetes and hypertension

Type of NCD ²	Total Value	Min. Score	Max. Score	Mean Score	Median	95% CI ³	
						Lower	Upper
Diabetes							
Risk factors	9	0	5	1.81	2	1.83	2.36
Complications	6	0	6	2.09	2	1.62	2.01
Preventive measures	11	1	10	4.33	4	3.97	4.70
Total score	26	2	21	8.24	7	7.50	8.98
Hypertension							
Risk factors	10	0	8	3.07	3	2.73	3.40
Complications	6	0	4	1.63	1	1.42	1.85
Preventive measures	11	1	10	4.8	5	4.40	5.20
Total score	27	2	22	9.50	8	8.64	10.36

² NCD, non-communicable diseases

³ CI, confidence interval.

The diagnosis of an NCD and regular supervision (≥ 1 month) were strongly associated with both diabetes and hypertension knowledge scores (Table 9). The odds of knowing about diabetes were 5.4 and 4.9 times for those with an NCD or supervised more than once a month, respectively. Similar findings were observed for hypertension knowledge. Training in NCD or years of basic schooling was not associated with improved scores.

Table 10: Multiple regression model of factors associated with diabetes and hypertension knowledge

	Knowledge of diabetes				Knowledge of hypertension			
	OR ⁴	95% CI ⁵		<i>p</i> -value	OR ⁴	95% CI ⁵		<i>p</i> -value
		Lower	Upper			Lower	Upper	
Age	0.667	-0.070	0.142	0.506	0.923	-0.068	0.186	0.357
Schooling years	1.625	-0.090	0.921	0.106	1.608	-0.113	1.099	0.110
NCD ⁶ status (presence of NCD ⁶)	5.360	2.391	5.183	0.001	4.189	1.874	5.223	0.001
Employment (>3 years)	-0.964	-2.221	0.765	0.337	-0.867	-2.575	1.005	0.387
Supervision (≥ 1 per month)	4.939	1.945	4.541	0.001	4.530	2.010	5.123	0.001
Training (any NCD ⁶ training)	-0.134	1.945	4.541	0.894	0.627	-1.117	2.154	0.532

⁴ OR, odds ratio.

⁵ CI, confidence interval.

⁶ NCD, non-communicable diseases

Discussion

The primary objective of this study was to assess NCD-related roles, training, and CHWs' knowledge of diabetes and hypertension. CHWs in this study had high levels of schooling, and the majority were women. In many CHW programmes, females are the preferred gender because of the type of tasks required (210). Many were themselves diagnosed with an NCD. More than half of CHWs had been employed for four or more years, indicating a relatively stable cohort.

In this context, CHWs work as generalists, i.e. that they provide a broad range of services in the community. The management of NCD forms only a part of the package of services offered by CHWs among others. The NCD-related roles they performed ranged from the distribution of medication to measuring blood pressure and giving advice about diets. These roles are a clear indication of the CHWs' efforts in assisting clients to better self-manage their conditions. Self-management is a critical component of chronic disease management (263). CHWs' ability to be efficient can, however, be inhibited by their being offered a broad range of services. There is, thus, a need to develop a set of realistic roles that not only cater for the needs of the community but also consider the realities of CHWs.

Training, together with technical and material support, is regarded as one of the crucial factors in CHW performance (25,310). Despite their designated roles in NCD, only 52% of the CHWs reported having received formal training in this domain. In addition, there was a lack of standardisation of both trainers and training duration. Inconsistencies in the training result in discrepancies in practice, which may contribute to differences in care between and within organisations. Models of standardised and structured approaches to CHW training in NCD have

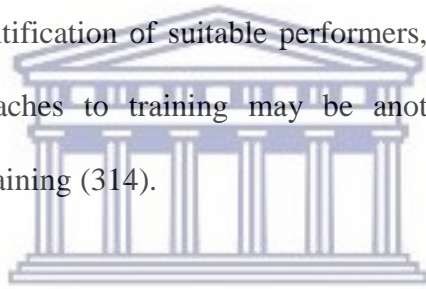
been documented elsewhere (311) and could serve as a basis for developing programmes in South Africa.

To retain knowledge, follow-up or refresher training is necessary. In the study, a few CHWs received refresher training. In the absence of refresher training, knowledge and the ability to perform specific tasks can be quickly lost (26). In a study in Nepal, three days of additional training of CHWs once a year was found to improve the quality of services provided (312).

The work of CHWs requires them to be knowledgeable about the most prevalent diseases in the community. Overall, knowledge scores were poor for both diabetes and hypertension. This lack of knowledge has implications for their roles, such as the provision of information, advising on dietary intake and the facilitation of support groups. Cherrington et al. found in their study that CHWs' lack of knowledge regarding diabetes provided misguided information to patients (237). Misinformation has the potential to lead to serious medical consequences. The above authors warn that the scope of information that CHWs are responsible for should, however, be re-examined to avoid overburdening CHWs.

The multivariate analysis showed that having an NCD and regular supervision was associated with better knowledge scores. Such findings suggest that CHWs with a condition could also act as expert patients and because they have the condition, they may be more motivated to acquire knowledge. Supervision is well established as a positive influence on CHW performance and has been associated with improved diabetes and hypertension knowledge when coupled with training (313).

The results of this study suggest that there are multiple potential sources of NCD-related knowledge apart from formalised training; acknowledging these processes of knowledge acquisition is, therefore, essential in the debate on the capacity building of CHWs. These alternative sources of knowledge open the possibility of informal training where knowledge transfer occurs through supervisor-led induction and peer-led education. Although relatively few respondents ($n = 18$; 25%) indicated that they had received induction from other CHWs, in a previous study which observed daily activities of CHWs, it became apparent that peer-to-peer training or peer-led education is an essential source of learning and knowledge transfer (282). This approach offers CHWs an opportunity to learn from each other outside hierarchical settings, which often is the case in formal training settings. Although peer training requires facilitation skills and the identification of suitable performers, it still shows some promise. Furthermore, peer-led approaches to training may be another way of supporting and supplementing standardised training (314).



Many have viewed effective and regular supervision as a strategy to assist with work-related challenges experienced by CHWs (306,310). Others have reported that the quality of support and supervision provided to CHWs, together with the promotion of their safety and well-being, resulted in improved motivation and performance (256). Also, supervision can assist in identifying and correcting poor practices, thus aiding in building the capacity of CHWs. In this study, CHWs reported that they were under regular supervision and supervisors, who are professional nurses, often observed their work. It has been shown that diversity in supervision approaches and the quality of supervision yielded a more significant impact compared to the frequency of supervision (306).

Conclusion

Suggested in this study is a need for an integrated approach to building the capacity of CHWs for NCD care that combines considerations of selection (as an expert patient) with structured training and supportive supervision. This work also provides insight into the need for the standardisation of training material as well as follow-up training that is structured and linked to basic training. Furthermore, the study highlights informal training systems that exist within NGOs, and these need to be considered when designing training systems

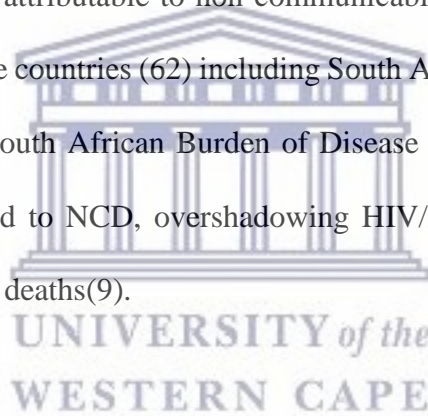


CHAPTER SIX: COMPARISON OF ACTUAL AND ENVISAGED PRACTICES

The actual and envisaged roles of CHWs are compared in this chapter. It further examines the key support structures that currently exist as well as those stipulated in the policy documents. The potential of generalist community health workers (CHWs) in managing and preventing non-communicable diseases (NCD) will be explored through the lens of an adaptation of the World Health Organisation's Integrated Chronic Care Model. Lastly, this chapter suggests a competency framework for CHW driven NCD care.

Background

Both mortality and morbidity attributable to non-communicable diseases (NCD) continue to rise in low- and middle-income countries (62) including South Africa (315) alongside a burden of infectious diseases. The South African Burden of Disease Study reported that 43.4% of deaths in 2012 were attributed to NCD, overshadowing HIV/AIDS and Tuberculosis (TB) which accounted for 33.6% of deaths(9).



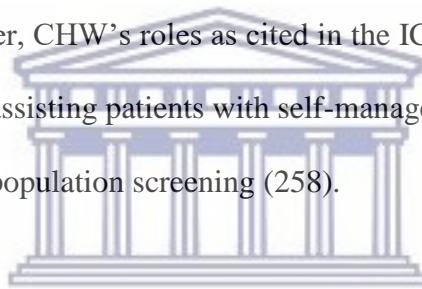
Several factors have contributed to the rise in the burden of NCD. These include urbanisation (152,162), demographic transition (6,64), and rapid changes in diets high in fat, sugars and refined carbohydrates(138,316), all of which are attributed to globalisation and other factors (106,108,144). Apart from the traditional risk factors, inadequate healthcare has played a significant role in exacerbating the burden of NCD in South Africa. Despite the presence of disease management protocols, the quality of care for victims of NCD is poor, with generally low adherence and follow-ups(286,317). The rates of glycemic and blood pressure control among diabetic and hypertensive patients, respectively, (318,319) are low, and screening for complications at follow-up is frequently suboptimal(317,320). Clients do not receive adequate information, counselling or support from healthcare providers to actively self-manage their

diabetes or hypertension(321). Health facilities are overburdened with patient numbers and little time is available to provide holistic care or patient education.

Given the scale and complexity of the health problem, innovative strategies will be required if the management of NCD is to be improved. One such approach is task sharing with lower cadres of workers, such as CHW. Leveraging on the capacity and lessons of HIV/AIDS responses provides some opportunities for improving healthcare delivery for chronic diseases including NCD(37,38), including to guide the process of task shifting (197). For example, facility-based lay counsellors and peer supporters trained in the management of HIV could be utilised in NCD management(37). Community-based CHWs could assist in the continuity of care and community level interventions for NCD, and strengthen the preventive and promotive components of NCD programs(255,322).

Both the management and control of NCD call for comprehensive approaches to care using models relevant to low- and middle-income countries. Several models are used to describe the processes of chronic care management across the world. They include the Chronic Care Model (CCM), Improving Chronic Illness Care, Innovative Care for Chronic Conditions, the Stanford Model and the Community-based Transition Model (323). The CCM, initially designed by Wagner et al.(263), is one of the commonly used approaches to chronic care management (262), especially in diabetes interventions(271,324,325) and mainly in developed country clinical settings.(271,326,327) This model concentrates on six critical elements with the aim of improving and optimising them: healthcare organisation, delivery system design, clinical information systems, decision support, self-management support, and community resource linkages (262,263).

In its response to the growing NCD epidemic, the South African government adopted an integrated approach to chronic diseases management that is derived from a combination of the CCM and the World Health Organisation's improved care for a chronic conditions framework which combines communicable diseases (especially HIV) and NCD care (328). The integrated chronic disease management (ICDM) model represents a holistic approach to organising a continuum of care and prevention through collaborations and partnerships between the health system and communities (Figure 1). The ICDM model was integrated and seen as an integral part of the Primary Health Care (PHC) Re-engineering Strategy. Envisaged roles of CHWs, as stipulated in the Re-engineering Strategy, include basic home treatment and support, psychosocial support, screening, assessment and referral, supporting community assessments, and health education. Moreover, CHW's roles as cited in the ICDM will be at population and community level and include assisting patients with self-management of chronic conditions as well as health promotion and population screening (258).



The Re-engineering Strategy includes numerous 'streams', one of which is the deployment of generalist CHWs who are part of Ward-based Primary Health Care Outreach Teams (WBOT), linked to PHC facilities and supervised by a professional or enrolled nurse(52), but still based in the community. Nevertheless, the implementation of WBOT has had its challenges, including the availability of professionals to lead teams, inadequate supervision, poorly constituted teams, poor infrastructural and material resources, limited scope and levels of competencies, and the tendency to be drawn into facility-based activities, with limited community reach (227,230).

The WBOT model has not been implemented uniformly in all provinces of South Africa. In some provinces, community-based services continue to be provided through non-governmental

organisational intermediaries who are funded by the government(27). The use of government-funded non-governmental organisations (NGOs) is a prevailing practice in the Western Cape Province where this research was conducted. Although the models of community-based services vary, across all provinces there is a process of harmonisation towards comprehensive (including NCD) roles for CHW and community-based teams.

Drawing on empirical evidence from an urban area of the Western Cape Province, the researcher aims to compare actual and envisaged roles of CHWs in the management and prevention of NCD, using the ICDM to assess the gaps and potential future roles in this paper. Furthermore, it describes the competencies and critical support systems necessary for CHW to fulfil NCD roles.

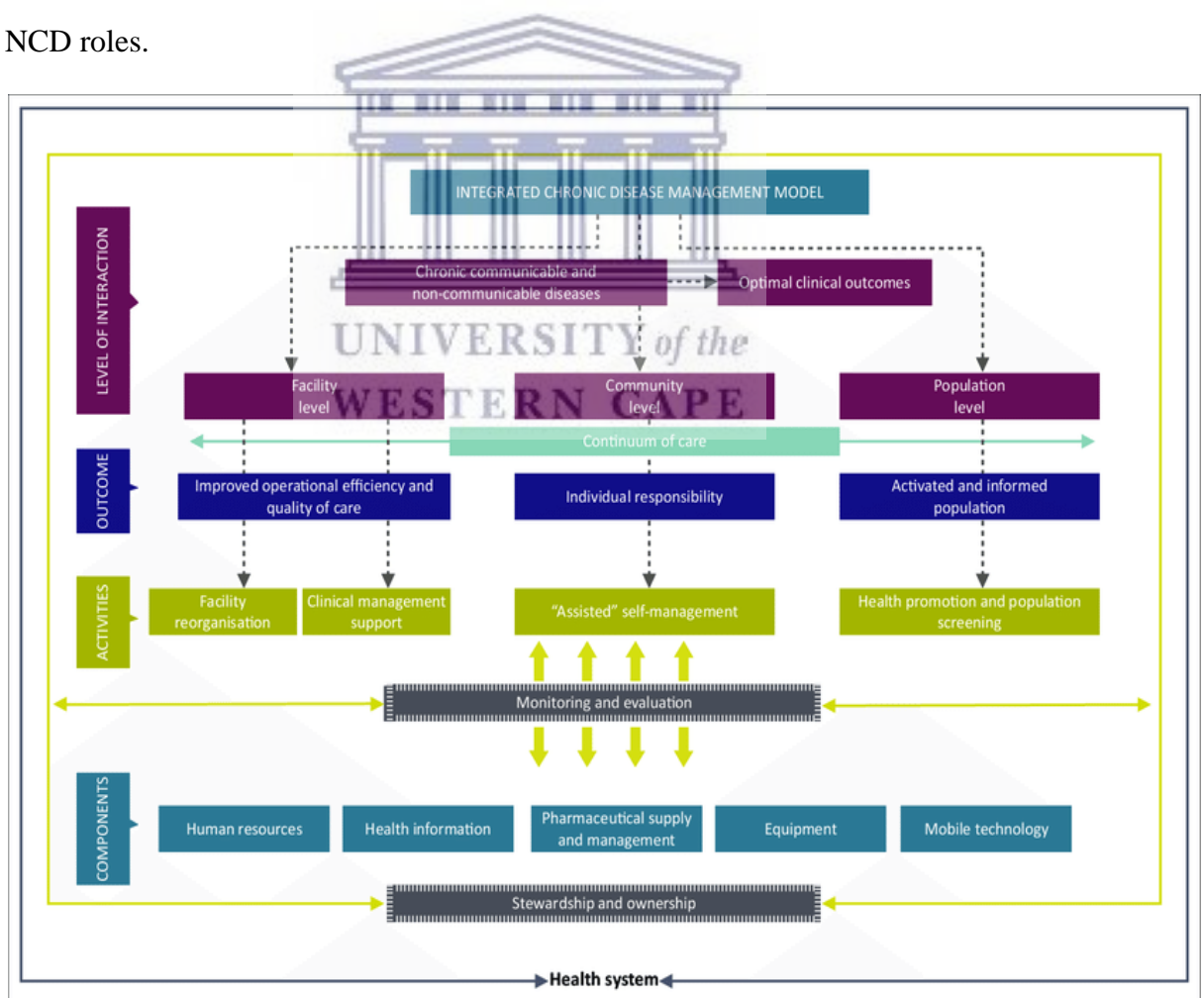


Figure 9: The integrated chronic disease management model adopted by the South Africa government (258)

Methods

Mixed methods were utilised in this study to describe the current and envisaged roles of CHWs in NCD prevention and management at the community and population level. These included qualitative and quantitative studies and a desktop review of policy documents about the use of CHWs in the prevention and management of NCD.

The qualitative enquiry consisted of observations of the CHWs and in-depth and unstructured interviews with them and the coordinators. Ten naturalistic observations conducted in Khayelitsha facilitated an understanding of the complex realities of CHWs working with clients with NCD. Unstructured interviews with coordinators assisted in clarifying and verifying issues raised during observations about daily activities. A more detailed description of the qualitative data collection is reported elsewhere (282).

A cross-sectional, quantitative study of CHW practices was conducted through interviewer-administered questionnaires on a sample of 150 CHWs. The questionnaire focused on four domains, i.e. (a) roles, (b) training and induction, (c) supervision and support, and (d) knowledge related to risk factors, complications, prevention strategies and nutrition of hypertension and diabetes. Nutrition-related questions derived from the South African Food-Based Dietary Guidelines (329) were also scored. Incorrect or missing responses were given a score of zero, while a score of one was awarded for correct responses. There were 12 possible responses. The questionnaire was piloted in another township with CHWs who were providing NCD care to community members to ensure that it was appropriate and comprehensible. Content validity was tested through this process.

A desk review of selected published material from 2010 to 2017, including policy documents on CHW programmes in South Africa, was conducted. The search terms included ‘roles,’ ‘training,’ ‘capacity building,’ ‘referral,’ and ‘NCD’. The search in this study was not exhaustive and did not seek to review all writings about the topic but rather to scope the boundaries of the field concerning frameworks and models, roles and policies for the community-based delivery of NCD prevention and care.

The qualitative observations and unstructured interviews were analysed using thematic content analysis. Data analysis started with the identification of units of meaning. These were then categorised, and this led to the development of central themes. Data from the survey were analysed descriptively.

Roles, as stipulated in the ICDM framework, are compared with actual and potential additional roles based on field observations and interviews, along with the five dimensions, i.e. promotive, preventive, curative, rehabilitative, and supportive/palliative care. Le Deist and Winterton’s (283) holistic model of competence, categorised into cognitive, functional, social and meta competence dimensions, is used to represent the multiplicity and complexities of CHW competencies.

Findings

An overview of general CHWs’ roles, actual and envisaged commences a discussion of the findings, with specific reference to their non-NCD roles. This is followed by a consideration of the CHWs actual and envisioned NCD-related roles, and by a list of proposed competencies to support NCD roles and a description of key systems support.

NCD care by community health workers

In practice, the work of CHWs consists mainly of a combination of psycho-social and adherence support for chronic lifelong conditions (including HIV/TB and NCD), home-based nursing care, and preventive maternal and child services. The frequency of non-NCD roles inventoried in the survey is represented in Figure 10. The most frequently reported tasks fulfilled by CHWs included health talks, reminders about medication, bathing clients, and referrals to the facility. Additional tasks identified included building the capacity of other CHW and administration (282).

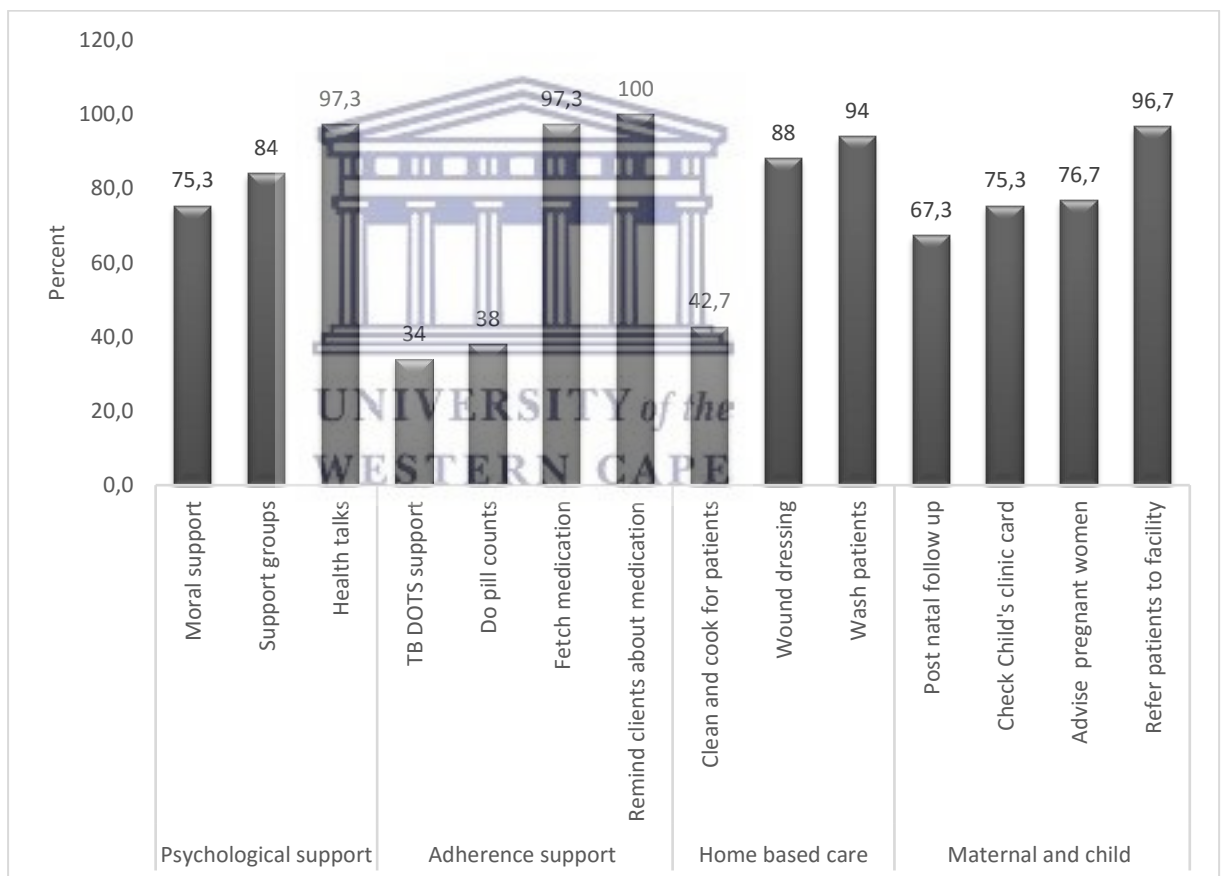


Figure 10: Generalist roles of community health workers (excluding NCD) (n=150)

In the PHC Re-engineering Strategy, CHW tasks are organised along the quadruple burden of disease, i.e. maternal and child health, HIV/AIDS and TB, violence and injuries, and chronic NCD (Table 1).

Table 11: The role of community health workers in non-NCD programs

<i>Role</i>	<i>Maternal and child</i>	<i>HIV or TB</i>	<i>Violence and injuries</i>
<i>Psychosocial support</i>	Psycho-social support is offered to teenagers, parents of high-risk babies and children.	Integrated approach to treatment adherence support, patient and family education, linked to community-based and other resources.	
<i>Basic home treatment and support</i>	Offer post-natal care, care for newborn babies, oral rehydration treatment for diarrheal cases, de-worming, refer pneumonia cases.		First aid and emergency care.
<i>Information & education</i>	Provide information on pregnancy, childbirth, parenthood, nutrition.	Provide information on HIV, TB prevention, early intervention treatment of HIV and TB.	Education on violence and injury prevention.

*Source: Adapted from the table on CHW roles about the quadruple burden of disease by the Department of Health.*⁴¹

NCD-related roles of community health workers

An analysis of the quantitative data showed that the curative activities, i.e. distribution of medication (84%) and preventive strategies, i.e. providing dietary advice (72%) were the most commonly reported current NCD-roles (Figure 11). Other secondary preventive tasks, such as foot care and pill count were least reported.

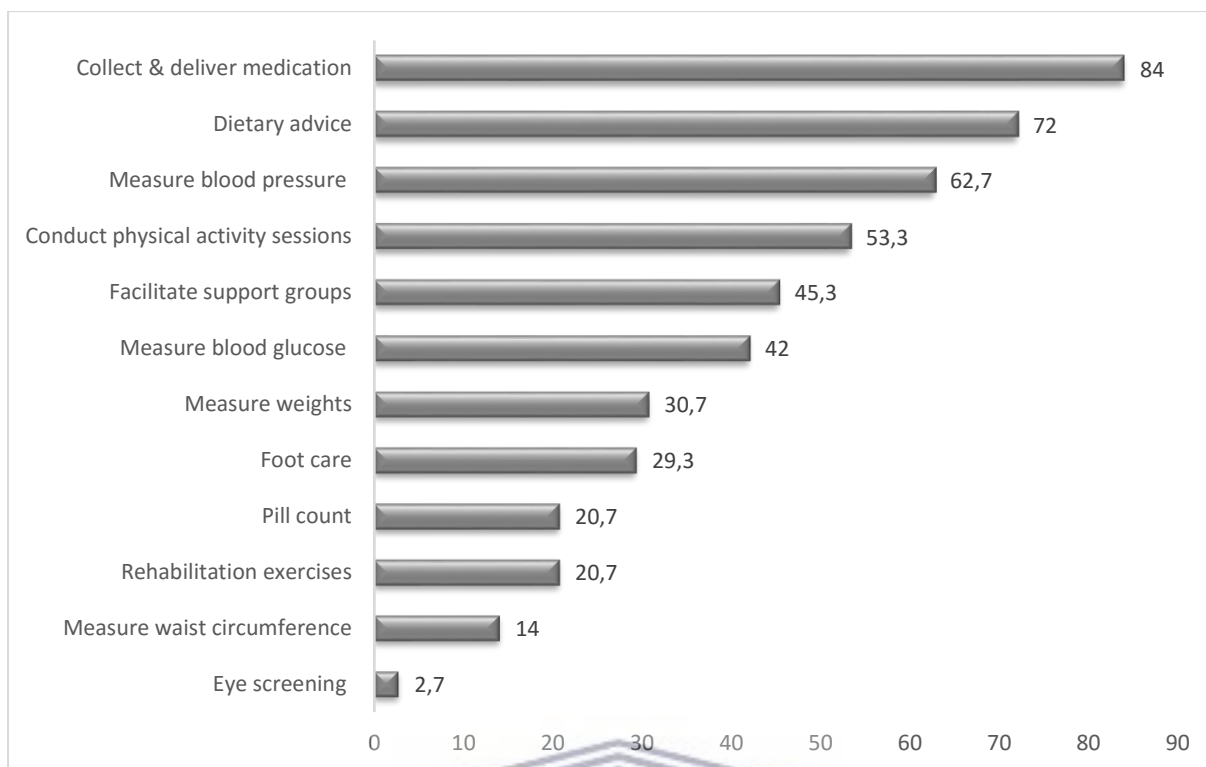


Figure 11: NCD-related roles performed by CHWs in the community (n=150).

While advice on diets was one of the most frequently reported activities, when questions were used in the survey to assess nutrition knowledge, there appeared to be discrepancies between the ideal and actual practices. CHWs lacked knowledge about nutrition as it relates to NCD. Less than half of the CHWs (48.7%) spontaneously mentioned five or more of the twelve strategies listed in Table 11 (results not shown).

When asked in closed-ended questions about nutrition-related prevention strategies for diabetes and hypertension, 77.3% mentioned increasing the portion of fruit and vegetable consumption, and 76.5% cited the reduction of fat intake (Table 2). Findings from the qualitative study also revealed significant gaps in their knowledge of nutrition, showing their limited understanding of the importance of this issue.

Table 12: Distribution of nutrition knowledge responses of CHWs related to NCD

<i>Responses</i>	<i>N</i>	<i>%</i>
<i>Consume 3-5 fruits and vegetables a day</i>	116	77.3
<i>Reduce fat intake</i>	115	76.7
<i>Drink lots of clean, safe water</i>	80	53.3
<i>Reduce salt intake</i>	75	50
<i>Reduce sugar intake</i>	62	41.3
<i>Reduce the intake of sugary foods</i>	44	29.3
<i>Increase fiber intake</i>	43	28.7
<i>Limit alcohol intake to 2-3 glasses a day</i>	42	28
<i>Eat dry beans, peas, lentils and soya often</i>	42	28
<i>Enjoy a variety of foods</i>	33	22
<i>Reduce portion sizes</i>	33	22
<i>Make starchy foods the basis of most meals</i>	22	14.7

In Table 12, the NCD-related roles of the CHW according to the five dimensions of comprehensive care are presented, comparing existing roles and those stipulated in the ICDM framework. Potential additional roles are also identified. The roles encompass CHW work with both individuals and populations. Some of the roles they currently fulfil, such as the rehabilitation of patients, are not mentioned in the policy documents. Potential additional roles of CHWs identified include the screening of people using non-invasive screening tools to assess NCD risk as well as act as advocates for change regarding health.

Table 13: NCD roles of CHW according to the Primary Health Care approach

	<i>ICDM framework from PHC Re-engineering</i>	<i>Existing roles (based on qualitative and quantitative analysis)</i>	<i>Potential Roles</i>
<i>Rehabilitative</i>	None.	Offer rehabilitation exercise to stroke patients.	Physical/exercise rehabilitation also among obese individuals.
<i>Curative/care</i>	Serve as a medicine courier in certain circumstances. Provide adherence support. Link the community to the facility.	Deliver medication to households and support groups in areas where such assistance is required. Serve as a link between the community and the health facility . Provide home-based care to bed-ridden clients.	Pill count, which is part of adherence support. Assist clients to create a support network to enable them to be adherent.
<i>Support/Palliative</i>			
<i>Preventive</i>	Provide health education and promotion concerning the reduction of risk factors as well as preventing complications.	Provide health talks on NCD in support groups to clients with NCD as well as physical activity demonstrations. Provide health education at health facilities on the prevention of NCD.	Interactive nutrition support and education to patients about healthy food choices. Screening using non-invasive screening tools to assess NCD risk.
	Trace patients that have been lost to follow-up or defaulted treatment. Offer point of care screening for at-risk clients during home visits.	Provide a point of care for members of existing support groups; these include measuring blood pressure; blood glucose and weight.	

	Integrated school health team providing health education, screening moreover, risk-screening for adolescents.	Assist in campaigns for NCD prevention and management.	
<i>Promotive</i>	Community awareness.	Community awareness.	Advocacy focusing on improving the environment for nutrition and physical activity,

Proposed competencies for the NCD roles of CHWs

In Table 13, the researcher proposed competencies for the NCD roles that CHWs should ideally have, are shown in the four broad categories, i.e. functional, cognitive, social, and meta-competencies based on a competency model. The two competencies that are required for NCD, are general, for example, knowledge of the community, and specific (for example, feet examination).

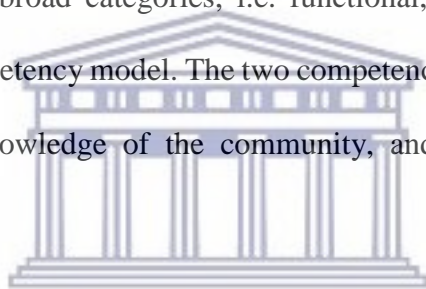


Table 14: Competency model for NCD roles of community health workers

<i>Competency category</i>	<i>Competence</i>	<i>Definition</i>
<i>Cognitive Competency</i>	Knowledge of community and needs,	<ul style="list-style-type: none"> • Have tacit knowledge about their community as well as community health needs. • Be able to refer clients to appropriate actors within the community.
	Knowledge of basic NCD management, related risk factors and prevention.	<ul style="list-style-type: none"> • Know the most prevalent NCD. • Understand self-management for NCD. • Knowledge about foot examination and care. • Knowledge of preventive measure and risk factors.
<i>Functional Competency</i>	Communication skills.	<ul style="list-style-type: none"> • Simple motivational interviewing of patients. • Communicate health messages to groups and individuals.

	<ul style="list-style-type: none"> • Clarity in spoken and written language
	<p>Group facilitation skills.</p> <ul style="list-style-type: none"> • Facilitate support groups. • Understand group dynamics.
	<p>Basic numeracy skills.</p> <ul style="list-style-type: none"> • Ability to calculate simple formulas such as body mass index used to assess risk related to the weight status or use tools that assist in calculating body mass index. • Ability to use risk scores for screening.
	<p>Capacity to teach self-management skills.</p> <ul style="list-style-type: none"> • Ability to educate clients about feet examination. • Ability to educate clients on how to measure blood glucose and pressure.
	<p>Clinical functional skills.</p> <ul style="list-style-type: none"> • Ability to measure weight, height blood pressure and glucose. • Ability to examine feet for signs of neuropathy.
<i>Social Competency</i>	<p>Empathy and sensitivity.</p> <ul style="list-style-type: none"> • Ability to treat patients with compassion. • Be sensitive to patients' situations. • Respect for patient views. • Engage with other players and assert their position in the community health system.
	<p>Ethical consideration.</p> <ul style="list-style-type: none"> • Awareness about the ethical implications of one's actions. • Respect for clients' rights.
<i>Meta-Competency</i>	<p>Coping with work pressures.</p> <ul style="list-style-type: none"> • Able to manage work-related demands and stress. • Awareness of personal limitations and well as an understanding of the need to debrief. • Capacity to learn and adapt, problem solve, manage change.

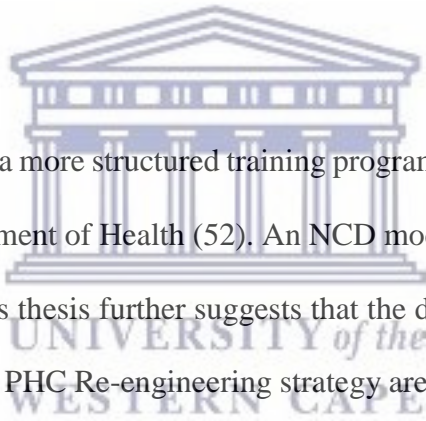
Support systems for CHW roles

Support systems are critical to the ability of CHW to perform the NCD roles described above.

Observations of practice suggest that the key support systems required include capacity building. This encompasses basic training followed by regular continuing education and mentoring, direct supervision of CHWs' activities and appropriate referral pathways. The official statements are compared with observed practices, below.

Capacity building

Findings from the qualitative (282) and the quantitative (330) studies showed that CHWs' capacity to perform tasks was not only developed through formal training but also through informal systems of knowledge transfer such as peer learning and on-the-job supervision (282). In the quantitative study, a wide variety of NCD training with a different duration was found to be provided to CHWs. Only 52% of CHWs had received some NCD training, and less than half had received refresher training for NCD. Moreover, formal training was not associated with performance on knowledge scores (330). This training was partially compensated for by systems of supervision and peer induction and mentoring, identified during the observations of CHW practice.



PHC Re-engineering proposes a more structured training programme to be provided by various trainers selected by the Department of Health (52). An NCD module has been included as part of the training curriculum. This thesis further suggests that the duration of training will be ten days. However, the ICDM and PHC Re-engineering strategy are silent about informal training systems as a vehicle that facilitates learning. Moreover, there is no mention of a refresher or continuous training for CHWs.

Supervision

Most of the CHWs reported meetings with their supervisor three or more times in a month, as shown in Table 5. Moreover, 83 (56%) CHWs stated being observed while performing tasks in the last month. They also viewed supervisors as being supportive (n=137; 91%). Further analysis of the quantitative data showed that regular supervision (\geq one month) was strongly associated with CHWs' knowledge of diabetes and hypertension, highlighting the significance of this support function(330).

In the Re-engineering Strategy, a team leader who is a professional nurse and attached to a PHC facility supervised CHWs, although the frequency of supervision is not stipulated. On the contrary, the current NGO-contracted system of service delivery in the Western Cape, a professional nurse employed by the NGO (and not attached to a facility) supervises CHW. The frequency with which the supervision and support of tasks occurs are not made explicit.

Referral pathways

The CHWs initiate the referral of clients to the facility through the NGO supervisor who is a professional nurse (Table 5). However, the health facility does not provide any feedback to CHW, and the onus is on them to follow up on the clients. CHW only receive verbal feedback from the clients, and there is no official communication from the health facility.

The PHC Re-engineering strategy explicitly outlined the referral pathways, as shown in Table 14. A professional nurse who is linked to a health facility facilitates the process of referring patients to WBOT. The health facilities communicate with a CHW through response slips, thus improving the feedback loop.

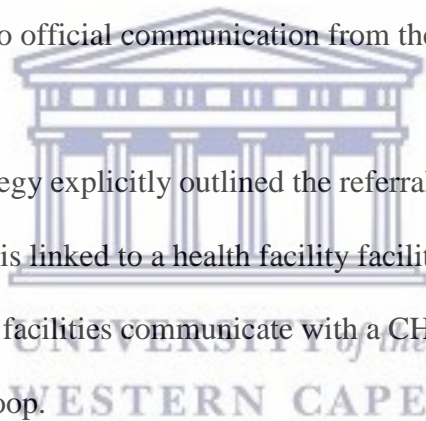


Table 15: Training, supervision of CHW and referral system for patients

SOURCES OF INFORMATION			
	Qualitative data	Quantitative data	Desk review, source document(46,52)
TRAINING			
TYPES OF TRAINING	Peer education.	Trainer-led and peer.	Trainer-led.
TRAINING PROVIDERS	Peers.	Peers and varied trainers (independent trainers, academic institutions, Department of Health).	Different training providers identified by the Department of Health.
DURATION OF TRAINING	No data collected.	A period of 1–14 days was the most commonly reported duration. The mean was 37 days, while the mode was 14 days.	Ten days.
CONTINUOUS/REFRESHER TRAINING	Conducted by CHWs.	Less than half of those trained received refresher training.	Not mentioned.
SUPERVISION			
FREQUENCY OF SUPERVISION	No data collected.	More than once a month by a professional nurse.	Frequency not stated but a professional nurse performs supervision.
REFERRAL			
PERSON REFERRING	Professional nurses refer problems identified by CHWs.	Professional nurse refers problems identified by CHWs.	A professional nurse attached to a PHC facility supervises CHWs.
RESPONSE FROM THE CLINIC	CHW follow up clients and determine if they were assisted at the clinic.	CHW follow up clients and verify if they were assisted at the clinic.	The health facilities communicate with CHW through response slips.

The figure below demonstrates a potential model of care for CHWs working on NCD. The model highlights the importance of understanding context in order to tailor training and other support systems. It further highlights the key competences that the training should focus on. These are necessary for the selection of appropriate tasks necessary for equipping CHWs to self-manage clients' conditions. Lastly, it shows the where the effort should be directed, that is on individuals and communities, however the focus should be on primary and secondary prevention.

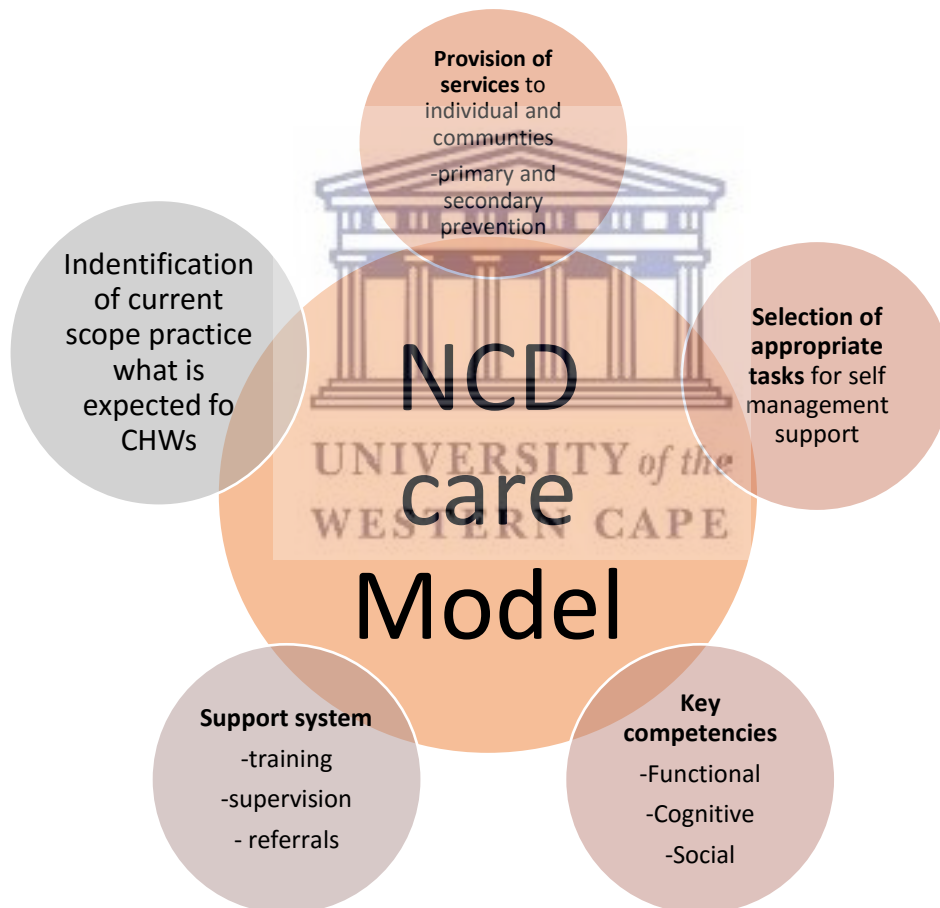


Figure 12: Model of Care of CHWs working on NCDs

Discussion

Community health workers are increasingly taking on NCD roles, potentially reducing the burden on health facilities as well as broadening the range of programmatic responses. In response to the high NCD burden in South Africa, the government has proposed several CHW roles in NCD care. These NCD-specific roles form part of a more comprehensive set of community-based roles addressing the quadruple burden of disease, as spelled out in the PHC Re-engineering Strategy and the Strategic Plan for the Prevention and Control of Non-Communicable Diseases. Empirical research in urban Cape Town revealed that CHWs already perform a variety of NCD-related roles.

A comparison of policy and practice showed that there are some overlaps but also gaps in the alignment between the two regarding the scope of practice, referral systems, training, learning and support systems.

The roles in policy emphasise specific technical acts targeting individuals, in particular, tracing defaulters, screening people at risk, and adherence support. However, current practice has tended toward more holistic responses to patient needs. These would include health promotion, such as health talks in support groups with people who have NCD as well as rehabilitation, both of which have been omitted in the policy documents. The misalignment between policy and practice relating to CHWs' scope of practice has the potential to create role conflict. Role conflict is when expectations of roles are not well aligned to the demands of practice(331). Therefore, policy needs to recognise current practices and what these practices contain to limit role conflict.

While there is a potential for practice to influence and shape policy, better knowledge of policy can conversely strengthen practice. Policy guidance can enhance practice by improving the quality of the services rendered and dictate a more realistic scope of practice. Significant weaknesses were found in the knowledge and quality of services provided by CHWs in this study. Therefore clarity and alignment of functions sensitive to everyday practice and the recognition of gaps in the quality of services is required.

The policy proposes an improved referral system that has the potential to advance communication between facilities and CHW. However, in practice the current referral system was problematic. Despite CHWs referring people with health problems, such as elevated blood pressure and glucose, clinics were not providing feedback to them so that they could further support their clients. Lack of an established and well-functioning referral system as well as a feedback mechanism between CHW and the healthcare system has been noted in other studies (231,232). A poorly designed referral system undermines the efforts of CHW as well as discourages patients from seeking care in the future.

Similarly, there were misalignments between policy and practice concerning basic training and between basic and in-service training. Existing basic training is poorly structured and non-standardised, while the policy is silent on in-service training or continuous education. The currently fragmented training results in a high degree of variability in knowledge and might affect performance. Consistent with these findings are those by O'Brien et al., who found differences in training duration, methodologies and trainers (212). The training provided to CHWs within the WBOT Strategy, although not widely implemented, offers promise for a more standardised training programme in future. The lack of attention to strategies for continuing education or refresher training, which is critical for keeping CHWs abreast about

current practices and ensure that they perform according to required norms and standards, is a concern. Similar sentiments were echoed in a rapid appraisal of WBOT which then proposed that continuous education and training need to be structured into ward-related activities and should form part of their activities (227). Beyond training, other systems of learning, such as peer learning, were identified in the study. Nonetheless, the policy does not recognise such informal knowledge acquisition processes. There is, therefore, a need to explore informal systems of knowledge acquisition that are currently utilised by CHWs.

Supervision has been identified as key to improving CHW performance and to maintaining a motivated CHW workforce (25,26,332). Constant and supportive supervision was offered to CHWs in this study. Moreover, supervision included the discussion of patients and the observation of performed tasks. Seemingly, there is alignment between policy and practice as the approach that will be used to supervise CHWs is highlighted by the PHC Re-engineering Strategy. In many instances, supervision has the potential to influence knowledge, as constant interactions can potentially allow for learning to occur as well as the development of corrective measures. However, it remains paramount to examine supervision approaches that are more context-specific and can have an impact on the quality of services provided by CHW.

Based on greater role clarity, it is possible to define a set of competencies for CHWs around NCD that considers the requirements holistically as spelled out in policy but also considers the everyday realities. These realities point to the complexities of CHWs' roles and skills needed to execute tasks. Thus, a more holistic approach to CHWs' competencies that look beyond functional skills is necessary. The proposed competencies are formulated from the roles and represent the knowledge, functional skills and appropriate behavior that a community health

worker ought to possess. The holistic model of competence reflects the unity between the types of competencies, and further shows challenges in delineating these competencies in practice (283). These competencies have the potential to guide the training, selection and recruitment processes (333) which are crucial elements for strengthening the CHW programmes. Furthermore, these are necessary in the development of a model of care for CHWs as it guides the tasks that they should undertake in order to assist client to better self-manage their conditions. Self-management is critical in the treatment of NCDs and improved management of their conditions.

Conclusion

The burden of NCD is expected to increase primarily in developing countries as new and efficient interventions are eradicating infectious diseases and prolonging life. Community health workers have the potential to act on NCD at multiple levels, in communities, households and health facilities and by targeting groups and individuals. Emerging policy in South Africa spells out CHWs' roles for NCD and, in many places, CHWs are already providing NCD care. Observations of practice suggest that CHWs' roles are broad and responsive to patient needs, even if the quality is sub-optimal. However, policy needs to be better aligned with the holistic demands of practice and patient needs. Also, the supporting structures including training, continuous education, supervision, and an efficient referral system need to be in place. Finally, clarity on the development and application of appropriate competencies and necessary skills will strengthen CHWs' efforts.

CHAPTER SEVEN: SUMMARY, DISCUSSION AND CONCLUSION

In the context of the growing burden of NCD and the critical need for care beyond the health system, there has been a shift toward a more community-based management of NCD. Therefore, the use of CHWs to manage and control NCD at the community level has been advocated in order to decrease the workload of health workers at primary facilities. The initial aim of this thesis was to develop an integrated model of care for CHWs providing NCD care to community members residing in Khayelitsha, an urban township in Cape Town. Due to changes in the organisation of CHWs and the changing policies around community health workers role, the focus was adjusted to concentrate on the roles that are necessary for NCD care, the support system that is critical for role development as well as the competencies required to train CHWs in NCD care. All these areas of work are necessary for developing a model of care for NCD at the community level.

In order to address this aim, overlapping studies were undertaken in phases using the mixed-method approach. Phase one was formative and utilised observations and in-depth interviews. This iterative phase was instrumental in shedding light about the daily realities of CHWs as well as in the development of a data collection tool for Phase Two.

In Phase Two, a cross-sectional study was designed and was employed using a closed-ended questionnaire to collect data from a total of 150 CHWs. The concentration in Phase Two was on the major domains that make up the work of CHWs. These include the roles of CHWs, namely, NCD-related and general roles, training and retraining/in-service training, supervision and support, communication, and NCD knowledge – limited to diabetes and hypertension.

Phase Three analysed current and envisaged roles using data from Phase One, Phase Two and the Re-engineering of PHC document. The five types of care embraced by the PHC approach guided the analysis of data relating to NCD roles. A holistic model of competence which comprises cognitive, social, functional, and meta-competencies was used to present the multiplicity and complexities of competencies required of CHWs to fulfil their tasks(283).

The major findings of the different phases are summarised in this chapter, significant contributions to the body of knowledge are described, implications for both policy and practice presented, and recommendations for future research are proposed.

7.1 Major findings

7.1.1 Diversity of roles

In summary, CHWs were involved in a multitude of task/roles ranging from NCD care to home-based care, all of which were conducted with minimal training and retraining. CHWs roles included linking people to the health service as well directly assisting them with the management of their NCD. The most-reported CHW roles related to NCD care included delivery of medication (84%), providing dietary advice (72%) and measuring blood pressure (63%). It was evident that community needs and the local health system context influenced the diversity in their roles. Roles also extended beyond the health domain, such as the provision of information about social services. CHWs further assisted in developing the capacity of other CHWs through peer learning to impart skills necessary for programme implementation.

7.1.2 Training and retraining

NCD training was limited, of the CHWs interviewed, 52% reported receiving formal NCD related training, and while less than half of trained CHWs (n= 35; 44%) received follow-up

refresher training. A variety of trainers provided NCD training; the trainers were drawn from a range of entities, including the Department of Health and academic institutions.

CHWs also provided informal training through 'job shadowing', this strategy was employed to induct newly appointed CHWs without previous NCD training.

7.1.3 Diabetes and hypertension knowledge

The assessment revealed that CHWs' knowledge of diabetes and hypertension was poor. However, the regression model showed higher knowledge scores were associated with having an NCD and the frequency of supervisory contact (≥ 1 per month).

7.1.4 Alignment and misalignment between policy and practice

A comparison between the re-engineering document and practice showed overlaps and gaps in the alignment regarding the scope of practice of the CHWs, referral systems, training, learning and support systems. The roles in policy emphasise specific technical acts targeting individuals, in particular, tracing defaulters, screening people at risk, and adherence support. However, current practice focuses more on holistic responses to patient needs.

Misalignments between policy and practice concerning basic training and between primary and in-service training were also found in this study. Existing basic training is poorly structured and non-standardised, while the policy is silent on in-service training or continuous education.

7.1.5 NCD competencies

Also identified in this thesis are the competencies for CHWs regarding NCD care which are necessary if role clarity is to be achieved. The competencies are holistic and incorporate both

policy recommendations and the everyday realities of the CHWs. The proposed competencies are formulated from the roles and represent the knowledge, functional skills and appropriate behaviour that CHWs ought to display. Furthermore, functional, cognitive, social and meta-competencies were identified for developing the CHWs' capacity to perform the required tasks.

7.2 The study's contribution to the production of new knowledge

While there is a growing body of evidence regarding the importance of community health workers in disease management, especially in maternal and child health (36,240), the same cannot be said about their role in NCD management, especially in resource-poor settings. With NCD becoming one of the leading causes of death globally(4,6) it has become paramount to think of their prevention and management, especially in LMIC. However, with many LMIC experiencing staff shortages, accompanied by a poorly organised primary health care system, the use of CHWs to execute tasks in NCD care has also become a necessity (197).

7.2.1 Task shifting

Task shifting, also known as task sharing, has been proposed by the World Health Organisation as a strategy to mitigate health staff shortages (35). Task shifting has been defined as shifting of tasks to a lower cadre of workers (96). In this PhD, the researcher has highlighted the comprehensive roles required for CHWs to provide NCD care and associated competencies which are necessary for undertaking the process of task shifting. Furthermore, this work shows the potential areas of care that might require specialised skills, for example, in the rehabilitation of stroke patients. With stroke becoming more prevalent in a resource-limited setting, the need for CHWs to perform such tasks might increase.

7.2.2 Role definition

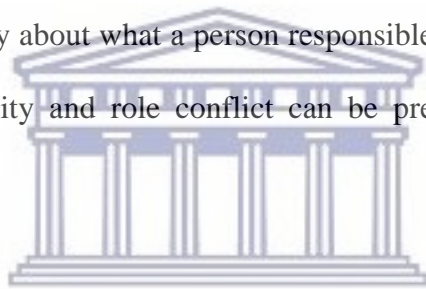
Also described in the thesis are the roles of CHWs in NCD care and how some of these roles originated in response to community needs. Historically, CHWs' tasks or roles were centred on patient and community needs as compared to fulfilling top-down demands from donor-funded projects or programmes. Chapter 5 revealed the complex and diverse nature of the community health worker's role. Some of the roles identified in the study are not included in the policy document. This implies that there are tasks that CHWs might be expected to execute which are not included in their official scope of practice. Furthermore, policy needs to consider current practices, as these are more in line with community needs and – at times – community expectations.

A greater role clarity is provided in both chapters 5 and 6 in which it is described how CHWs are to provide NCD care. Role definition is essential, as unclear roles result in a duplication of efforts, create an unpleasant work environment, and result in inefficient operations (334). Role clarity is even more critical for cadres, such as CHWs, as they are not viewed as professionals, and the absence of a clear role definition may compromise their standing in the community as well as within the health system.

In examining the roles of CHWs in NCD care, it became apparent that the primary focus was on the secondary prevention of NCD. Secondary prevention comprised adherence support, nutrition advice, physical assessment and facilitation of physical activity sessions. All these functions are crucial elements necessary for improving or enhancing self-management, an essential component of chronic disease management (263). Besides NCD care-related roles, a wider range of CHW roles was identified in this research, suggesting the need to develop realistic roles that cater to both community needs as well as government expectations.

7.2.3 Misalignment in roles

Roles relevant to current practice were more holistic and included rehabilitation, an issue that is not visible in the proposed scope of practice for CHWs as presented by the Re-engineering Strategy document. Such findings suggest that policies do not speak to the everyday realities of CHWs and the communities they serve. A critical finding, thus, is the misalignment in roles between policy and practice. The lack of synergy between policy and practice has the potential to create role conflict. Role conflict is said to arise when an employee is required to acquire new skills in order to deal with new technologies, techniques or government regulations (335). Such tensions between what is expected and actual roles may further lead to role ambiguity, which is defined as uncertainty about what a person responsible for a specific activity should do (336). Both role ambiguity and role conflict can be prevented through training that accompanies the practice.



7.2.4 CHW Training models

The training of CHWs was discussed in Chapter 5. Shown there was the variability and fragmentation in training which is offered. However, more disturbing is the lack of NCD-related training as well as continuous or in-service training to accompany standard training. Also demonstrated are the innovations employed in practice in order to counteract the absence of formal and ongoing training. Training accompanied by technical and material support is recognised as essential for CHWs' performance (25,310). Such innovations include peer education or peer-led learning.

The potential value of peer education or peer-led learning was a key finding of this study. Peer-led learning, although not a new phenomenon, could be included as a component of the training

system for CHWs. The two distinct forms of peer learning are ‘peer tutoring’ and ‘peer collaboration’. Both forms of learning have their place in providing learning, especially for lay workers. Peer tutoring has been cited as a tool for transmitting information and ‘drilling’ unique skills, while peer collaboration is meant to facilitate intellectual discovery and the acquisition of basic knowledge (337). Providing a structure for a peer education could help in standardising training.

In this work, the researcher suggests ways of thinking about the training of lay workers with varying education levels and how such training could be organised. The organisation of such training includes the recognition of formal methods of training as well as informal methods of learning. Moreover, it raises questions as to the needs for continued or in-service training in order to keep abreast with evolving knowledge as well as changes in practice. Critical questions include: Who should be responsible for offering continuous training? What will be the structure of that training? in their paper Tulenko et al. emphasised that CHWs should be trained, equipped and supported in order to fulfil those tasks adequately (338).

7.2.5 A competency framework for CHWs in NCD care

In Chapter 6 a list of competencies for CHWs was formulated. Defined competencies are vital in the process of formalising roles. A competency framework has the potential to provide role clarity and well as serve as a comprehensive guide of the skills that are necessary as well as a benchmark for performance appraisal. In the recruitment or selection of CHWs, a comprehensive list of competencies can be used to further formulate the attributes of CHWs according to the organisation’s specifications. The holistic model of competence reflects the unity between the types of competencies, and further shows challenges in delineating these competencies in practice (283).

7.3 Implications for public health and policy

The findings of this study have relevance for community based-services and policy as well as advocacy.

1. The wide range of services asked of CHWs implies they need close linkages to social support to allow them to provide appropriate services – also support for health workers especially in linking patients to appropriate care.
2. The scope of practice of CHWs suggests that the context and characteristics of CHWs be considered especially when developing training programmes for them. For example, the CHWs' levels of education differ vastly, and therefore some might lack certain skills, such as numerical skills. Thus, the development of training should consider such issues.
3. The inadequate knowledge of CHWs about diabetes and hypertension highlights the need for the development and implementation of standardised training programmes – ideally prior to employment/deployment – together with ongoing in-service training and upskilling. The implementation of training is the role of both the department of health as well as the NGO. Of particular interest is the association between knowledge of NCD and two variables, namely, supervision and the CHW's own symptoms of NCD. As expert patients themselves, CHWs could possibly play a more significant role in improving self-management as they have natural empathy with clients. The knowledge of CHWs may have an impact on the messages they convey to clients, including leading to misinformation if not well-trained and supervised. On the other hand, regular supervision could reflect the presence of someone who continually guides CHWs.

Poor knowledge might also be a reflection of the lack of supportive systems that ought to complement training, such as retraining. Thus, when considering the training of CHWs, NGOs and the Department of Health must also develop appropriate refresher or retraining material.

4. This study highlighted some of the informal strategies employed by NGOs in the absence of formal training. Often peers, i.e., other CHWs, were responsible for the practical training of newly recruited CHWs. Combining an experienced CHW with a new recruit was often done as an as an induction to NCD roles, and as an interim strategy in the absence of the availability of formal training for CHWs. Envisaging a CHW's role as a capacity builder could be considered as an element in a CHWs' career path, and thus has an impact on policy. Furthermore, such findings suggest that in settings like this, innovative strategies for training and induction that draw on CHW themselves should be considered. However, this model would need to be structured and formalised.
5. The competencies suggested in this study provide a framework for NCD, and generic roles thus have an impact on policy. The composition of a set of competencies might also assist in the selection and recruitment of CHWs as both NGOs and CHWs will have a guide to the types of people required to fulfil CHW roles.

7.4 Conclusions and recommendations

As indicated in the findings, South Africa has taken a relevant step in terms of policy development in order to strengthen community health workers' roles as well as community-based health services. Despite this, there are apparent misalignments between policy and practice. Programmatic areas, such as in-service training, need to be included in order to ensure

that the skills that were acquired during training are retained. Furthermore, in-service training could assist in keeping CHWs abreast with current care practises that relate to NCD care.

Also revealed is that the levels of knowledge regarding risk factors, prevention measure and nutrition about diabetes and hypertension were poor among CHWs. This could partly be due to limited numbers of CHWs being trained in NCD care as well as a lack of in-service training to bridge the gap between training and practice. It is suggested that in order to improve NCD care, holistic competencies should be designed for CHWs, as these competencies could inform the training curriculum for NCD care within communities. Findings illustrate the importance of understanding the roles of CHWs and the support systems necessary to develop a model of care for CHWs working with clients with NCDs

To move forward the agenda of NCD care roles for the development of a model of care for NCD, further research questions much be explored within CHW programmes. They include:

1. The examination of the role of CHWs as capacity builders. Such research should carefully examine the skills required by CHWs to serve as capacity builders. It should further examine strategies necessary for developing and formalising this role. Lastly, the role of CHWs as capacity builders should be assessed within CHW programmes, so that it can be replicated.
2. The identification of a set of NCD care roles for CHWs that are effective and in line with self-management
3. Supervision, especially supportive supervision, is viewed as critical to the success of the CHW programme. However, the desired frequency of supervision is often mentioned but not well described. For an effective CHW programme to be executed,

more research is needed to assess the necessary frequency, the type of supervision, the characteristics of the supervisor, as well as the ratio of CHW to supervisors required.

4. Although the issue of cost-effectiveness was not explored in this study, future studies should focus on the cost-effectiveness of the NCD care provided by CHWs. Also, the assessment of health outcomes for interventions driven by CHWs providing NCD care should be conducted. This includes the randomised trials that will show the effectiveness of CHWs in improving health outcomes of patients with NCD, such as diabetes and hypertension, as this will provide the evidence required for sound policy decision-making
5. The development of competences is helpful in the formulation of roles and attributes that may assist NGOs in their selection and recruitment processes. Thus, it is recommended that the development of competencies should accommodate their general roles as well. Competencies are usually studied without linking them to training. Thus, future research should examine the links between competencies and training.



7.5 Strengths and limitations of the study

The use of different methodologies in this study has its strengths and limitations. These are the suggestions in the section below from the viewpoint of each phase.

The use of observations in the first phase was helpful in providing the researcher with deep and rich insights into the organisation of CHWs' work. It also assisted in the development of a comprehensive data collection tool. The use of observations, although an acceptable qualitative data collection method, is limited to the context under investigation. Secondly, an alteration in behaviour by the participant during observations might occur, thus affecting how

the findings are interpreted. Nonetheless, the study findings shed light on the issues related to the roles of CHWs in NCD care.

The use of a cross-sectional study design allowed the researcher to examine the association between specific variables which could not have been ascertained were qualitative observations not used. This design also provided a snapshot of the broad range of activities of CHWs. In addition, highlighted in this study were training gaps within organisations that may also have an effect on other issues, including the provision of services. The questionnaire focused mainly on the knowledge of diabetes and hypertension, thus leaving out other NCD that may be affecting members of the community. Another limitation was the small sample of NGOs which were selected and which has a bearing on the generalisability of study results. The sample size (i.e., of CHWs) also limited the possibility of disaggregated analyses. The nature of questions could have introduced recall bias and misclassification. Despite the limitations, this study still provides valuable information about community-based NCD care, training, supervision, knowledge, and roles of CHWs responsible for providing NCD care.

The study also focused on the two most prevalent NCD in the communities namely diabetes and hypertension therefore it is important not to generalise the findings as the management of other NCDs such as cancer could require a different approach.

The use of mixed methods in the third phase allowed the researcher to identify gaps between current practices regarding roles and what is stipulated in the policy documents. Using this method also allowed the researcher to explore the topic first qualitatively, and then to build up to a quantitative phase where the initial findings were tested.

The limitations included the fact that observations were only of one sub-district in Western Province. Thus, the findings may not generalisable to other provinces, as there might be variations in the implementation of the CHW programme.



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APPENDIX 1: QUESTIONNAIRE

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7. What kind of clients do you as CHWs work with? (Tick all categories)

Newborn	1=Yes	2=No	
Children	1=Yes	2=No	
Adults	1=Yes	2=No	
Pregnant women	1=Yes	2=No	
Elderly	1=Yes	2=No	
Other (Specify)	1=Yes	2=No	

8. What kind of conditions/diseases of clients do you see on a daily basis? Don't prompt (Tick only categories mentioned by respondent)

TB	1= Mentioned	2= Not mentioned	
HIV/AIDS	1= Mentioned	2= Not mentioned	
Hypertension	1= Mentioned	2= Not mentioned	
Diabetes	1= Mentioned	2= Not mentioned	
Epilepsy	1= Mentioned	2= Not mentioned	
Arthritis	1= Mentioned	2= Not mentioned	
Chronic respiratory	1= Mentioned	2= Not mentioned	
Heart Diseases	1= Mentioned	2= Not mentioned	
Mental Health	1= Mentioned	2= Not mentioned	
Substance Abuse	1= Mentioned	2= Not mentioned	
Pregnancy	1= Mentioned	2= Not mentioned	
Dehospitalised care (post discharge)	1= Mentioned	2= Not mentioned	
Bedridden	1= Mentioned	2= Not mentioned	
Other	1= Mentioned	2= Not mentioned	

If the CHW works with clients that have hypertension and/or diabetes then go to question 9, if not then skip and go to question 10.

9. What are the roles or activities you provide to patients with non-communicable diseases such as hypertension and diabetes? Don't prompt (Tick only categories mentioned)

Fetch and deliver medication to the patients	1= Mentioned	2= Not mentioned	
Do pill counts	1= Mentioned	2= Not mentioned	
Measure blood pressure	1= Mentioned	2= Not mentioned	
Measure blood glucose	1= Mentioned	2= Not mentioned	
Foot care	1= Mentioned	2= Not mentioned	
Eye Screening	1= Mentioned	2= Not mentioned	
Facilitate support groups in the community	1= Mentioned	2= Not mentioned	
Conduct physical activity sessions	1= Mentioned	2= Not mentioned	
Advise on diet	1= Mentioned	2= Not mentioned	
Rehabilitation exercises to stroke patients	1= Mentioned	2= Not mentioned	
Measure weights of clients	1= Mentioned	2= Not mentioned	
Measure waist circumference	1= Mentioned	2= Not mentioned	
Conduct spirometry test	1= Mentioned	2= Not mentioned	
Other (Specify).....	1= Mentioned	2= Not mentioned	

10. Where do you provide most of your services? Don't prompt (Tick all relevant categories)			
Home	1=Yes	2=No	<input type="checkbox"/>
Support groups in the community	1=Yes	2=No	<input type="checkbox"/>
Health Facility	1=Yes	2=No	<input type="checkbox"/>
School	1=Yes	2=No	<input type="checkbox"/>
Crèches/ educare	1=Yes	2=No	<input type="checkbox"/>
Other (specify).....	1=Yes	2=No	<input type="checkbox"/>

11. Can please tell me what you did at work OR the last day/time you were at work?

.....

.....

.....

.....

.....

.....

PART 3: TRAINING

12. Have you ever received any training on non communicable diseases such as diabetes and hypertension?

Yes	1	<input type="checkbox"/>
No (<i>Go to question 15</i>)	2	<input type="checkbox"/>

12a. If yes, who provided the training?

12 b. When was the training (year) and how long was it (duration)?

.....

13. What are the topics that were covered in this course that you attended?(*Don't prompt*)

.....

.....

.....

.....

14. Since the training, have you had any refresher courses or training related to chronic non communicable diseases inside or outside the organisation?

Yes	1	<input type="checkbox"/>
No (<i>Go to question 16</i>)	2	<input type="checkbox"/>

15. If you have not received formal training from a service provider, who inducted you into providing care for patients with diabetes or hypertension? Don't prompt (Tick all relevant categories)

Supervisors (Nurse)	1=Yes	2=No	<input type="checkbox"/>
Co-ordinators	1=Yes	2=No	<input type="checkbox"/>
Fellow Community health worker	1=Yes	2=No	<input type="checkbox"/>
University Students	1=Yes	2=No	<input type="checkbox"/>
Other (specify)	1=Yes	2=No	<input type="checkbox"/>

16. Since you started working as a community health worker did you receive EPWP training?

Yes	1	<input type="checkbox"/>
No (<i>Go to question 17</i>)	2	<input type="checkbox"/>

If yes, Have you completed? (tick only one option)

Level 0 (dropped out)	0	<input type="checkbox"/>
Level 1	1	<input type="checkbox"/>
Level 2	2	<input type="checkbox"/>
Level 3	3	<input type="checkbox"/>
Level 4	4	<input type="checkbox"/>
Currently enrolled in the program	5	<input type="checkbox"/>

17. What other training have you received either from this NGO or from others you've worked with previously? **Prompt** (Tick all relevant categories)

	1=Yes	2=No	Year
Rehabilitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HIV/AIDS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Home-based care	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
First AID	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Eye Care	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Foot Care	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TB care	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Integrated maternal and childhood illnesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adherence support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Psycho social support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Women's Health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Death and Dying	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other Specify	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PART 4: REFERRAL SYSTEM

18. Do you ever refer patients with illnesses directly to the clinic?

Yes	1	<input type="checkbox"/>
No (<i>Go to question 21b</i>)	2	<input type="checkbox"/>

19. If yes, which patients do you refer to the clinic? (Tick all relevant categories)

Uncontrolled hypertension	1=Yes	2=No
Uncontrolled blood glucose levels	1=Yes	2=No
Non-compliant to medication	1=Yes	2=No
High blood pressure readings	1=Yes	2=No
High blood glucose readings	1=Yes	2=No
Diarrhoea that is not responsive to sugar salt solution	1=Yes	2=No
Other Specify.....	1=Yes	2=No

21. Do clinics ever refer patients to you?

Yes	1
No	2

21 b Do you recommend clients to be referred by the supervisor.

Yes	1
No	2

20. If yes, which patients do you refer to the clinic? (Tick all relevant categories)

Uncontrolled hypertension	1=Yes	2=No
Uncontrolled blood glucose levels	1=Yes	2=No
Non-compliant to medication	1=Yes	2=No
High blood pressure readings	1=Yes	2=No
High blood glucose readings	1=Yes	2=No
Diarrhoea that is not responsive to sugar salt solution	1=Yes	2=No
Other Specify.....	1=Yes	2=No

22. Do you follow up patients that you have referred to the clinic?

Yes	1
No (Go to Question 23)	2

22a. If yes, explain how you follow-up the referred patients?

.....

.....

.....

23. When last did you refer a patient to the clinic? (Tick only one option)

This week	1
Last week	2
Sometime this month	3
Last month	4
Two months ago	5
More than two months ago	6
Don't know/Can't Remember	7

		<i>Office use</i>
24. Do you feel that the local clinic is supportive of your work?		<input type="checkbox"/>
Very supportive	1	
Supportive	2	
Neither supportive nor unsupportive	3	
Unsupportive	4	
Very unsupportive	5	
<i>PART 5: SUPERVISION</i>		
25. How many times do you meet with a supervisor in a month? (<i>Tick only one option</i>)		<input type="checkbox"/>
Once	1	
Twice	2	
Three times	3	
More than trice	4	
It depends on (specify).....	5	
26. When last did you meet with your supervisor to discuss your patients on a one-on-one basis? (<i>Tick only one option</i>)		<input type="checkbox"/>
This week	1	
Last week	2	
Sometime this month	3	
Last month	4	
Two months ago or More	5	
Don't know/Can't Remember	6	
27. When last did a supervisor observe you while facilitating a support group or during a home visit? (<i>Tick only one option</i>)		<input type="checkbox"/>
This week	1	
Last week	2	
Sometime this month	3	
Last month	4	
Two months ago or More	5	
Don't know/Can't Remember	6	
28. How supportive is your supervisor to your work? (<i>Tick only one option</i>)		<input type="checkbox"/>
Very supportive	1	
Supportive	2	
Neither supportive nor unsupportive	3	
Unsupportive	4	
Very unsupportive	5	
<i>PART 4: COMMUNICATING WITH CLIENTS</i>		
29. Do you ever counsel your clients on a one on one basis? (<i>Tick only one option</i>)		<input type="checkbox"/>
Yes	1	
No	2	

	<i>Office use</i>																														
<p>30. Do you always feel that you need to tell your clients what they are supposed to be doing?</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Yes</td> <td style="width: 40%; text-align: center;">1</td> </tr> <tr> <td>No</td> <td style="text-align: center;">2</td> </tr> </table>	Yes	1	No	2	<input type="checkbox"/>																										
Yes	1																														
No	2																														
PART 5: KNOWLEDGE ABOUT DIABETES AND HYPERTENSION																															
<p><i>In this section you will be asked a number of questions relating to hypertension and diabetes, to see what might be needed in future educational programmes. If you don't know the answer please feel free to say that you do not know. (Tick all that apply Q 31-38)</i></p>																															
<p>31. Have you ever been told that you have any of the following conditions? Prompt</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Arthritis/joint pain every day</td> <td style="width: 25%;">1=Yes</td> <td style="width: 25%;">2=No</td> </tr> <tr> <td>Diabetes</td> <td>1=Yes</td> <td>2=No</td> </tr> <tr> <td>Hypertension</td> <td>1=Yes</td> <td>2=No</td> </tr> <tr> <td>Asthma</td> <td>1=Yes</td> <td>2=No</td> </tr> <tr> <td>Stroke</td> <td>1=Yes</td> <td>2=No</td> </tr> <tr> <td>Other Heart conditions</td> <td>1=Yes</td> <td>2=No</td> </tr> </table>	Arthritis/joint pain every day	1=Yes	2=No	Diabetes	1=Yes	2=No	Hypertension	1=Yes	2=No	Asthma	1=Yes	2=No	Stroke	1=Yes	2=No	Other Heart conditions	1=Yes	2=No	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>												
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<p>32. What do you think are the causes or risk factors for diabetes? Don't prompt</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 35%;">Taking too much sugar</td> <td style="width: 30%;">1= Mentioned</td> <td style="width: 35%;">2= Not mentioned</td> </tr> <tr> <td>Eating a lot of starch</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Eating a lot of fats</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Lack of exercise</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Overweight/Obese</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Inheritance</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Defective pancreas</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Don't know</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Other (specify)</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> </table>	Taking too much sugar	1= Mentioned	2= Not mentioned	Eating a lot of starch	1= Mentioned	2= Not mentioned	Eating a lot of fats	1= Mentioned	2= Not mentioned	Lack of exercise	1= Mentioned	2= Not mentioned	Overweight/Obese	1= Mentioned	2= Not mentioned	Inheritance	1= Mentioned	2= Not mentioned	Defective pancreas	1= Mentioned	2= Not mentioned	Don't know	1= Mentioned	2= Not mentioned	Other (specify)	1= Mentioned	2= Not mentioned	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
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<p>33. What do you think are the causes or risk factors for hypertension? Don't prompt</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 35%;">Too much salt in the diet</td> <td style="width: 30%;">1= Mentioned</td> <td style="width: 35%;">2= Not mentioned</td> </tr> <tr> <td>Eating a lot of fats</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Too much alcohol consumption</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Overweight/Obese</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Lack of exercise</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Inheritance</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Stress</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Smoking</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Don't know</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> <tr> <td>Other (specify)</td> <td>1= Mentioned</td> <td>2= Not mentioned</td> </tr> </table>	Too much salt in the diet	1= Mentioned	2= Not mentioned	Eating a lot of fats	1= Mentioned	2= Not mentioned	Too much alcohol consumption	1= Mentioned	2= Not mentioned	Overweight/Obese	1= Mentioned	2= Not mentioned	Lack of exercise	1= Mentioned	2= Not mentioned	Inheritance	1= Mentioned	2= Not mentioned	Stress	1= Mentioned	2= Not mentioned	Smoking	1= Mentioned	2= Not mentioned	Don't know	1= Mentioned	2= Not mentioned	Other (specify)	1= Mentioned	2= Not mentioned	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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34. What are complications of poorly controlled diabetes? **Don't prompt**

Amputation	1= Mentioned	2= Not mentioned
Stroke	1= Mentioned	2= Not mentioned
Blindness	1= Mentioned	2= Not mentioned
Kidney failure	1= Mentioned	2= Not mentioned
Coma	1= Mentioned	2= Not mentioned
Other Specify	1= Mentioned	2= Not mentioned

35. What are complications of poorly controlled hypertension? **Don't prompt**

Heart failure	1= Mentioned	2= Not mentioned
Heart attack	1= Mentioned	2= Not mentioned
Stroke	1= Mentioned	2= Not mentioned
Kidney failure	1= Mentioned	2= Not mentioned
Other Specify	1= Mentioned	2= Not mentioned
Don't know	1= Mentioned	2= Not mentioned

36. What advice (lifestyle modification and patient education) should be given to a patient who is treated for Diabetes? **Don't Prompt**

Don't use sugar	1= Mentioned	2= Not mentioned
Eat less fat	1= Mentioned	2= Not mentioned
Eat meals at regular times	1= Mentioned	2= Not mentioned
Eat fruits and vegetables	1= Mentioned	2= Not mentioned
Avoid/eat less starchy foods	1= Mentioned	2= Not mentioned
Drink lots of clean, safe water	1= Mentioned	2= Not mentioned
Limit alcohol intake	1= Mentioned	2= Not mentioned
Do exercise or be physically active	1= Mentioned	2= Not mentioned
Reduce your weight if overweight or obese	1= Mentioned	2= Not mentioned
Take your medication	1= Mentioned	2= Not mentioned
Other (specify)	1= Mentioned	2= Not mentioned

37. What advice (lifestyle modification and patient education) should be given to a patient who is treated for Hypertension? **Don't Prompt**

Eat less salt	1= Mentioned	2= Not mentioned
Eat less fat	1= Mentioned	2= Not mentioned
Do not smoke	1= Mentioned	2= Not mentioned
Drink lots of clean, safe water	1= Mentioned	2= Not mentioned
Do exercise or be physically active	1= Mentioned	2= Not mentioned
Have time to relax	1= Mentioned	2= Not mentioned
Limit alcohol intake	1= Mentioned	2= Not mentioned
Reduce your weight if overweight or obese	1= Mentioned	2= Not mentioned
Eat fruits and vegetables	1= Mentioned	2= Not mentioned
Take your medication	1= Mentioned	2= Not mentioned
Other (specify)	1= Mentioned	2= Not mentioned

			<i>Office Use</i>
38. What NUTRITION advice is given to a patient who is treated for hypertension OR diabetes? Don't Prompt			
Reduce salt intake	1= Mentioned	2= Not mentioned	
Reduce fat intake	1= Mentioned	2= Not mentioned	
Reduce sugar intake	1= Mentioned	2= Not mentioned	
Reduce intake of sugary foods	1= Mentioned	2= Not mentioned	
Limit alcohol intake to 2-3 glasses a day	1= Mentioned	2= Not mentioned	
Consume 3-5 fruits and vegetables a day	1= Mentioned	2= Not mentioned	
Increase fiber intake	1= Mentioned	2= Not mentioned	
Eat dry beans, peas, lentils and soya often	1= Mentioned	2= Not mentioned	
Drink lots of clean, safe water	1= Mentioned	2= Not mentioned	
Enjoy a variety of foods	1= Mentioned	2= Not mentioned	
Reduce your portion sizes	1= Mentioned	2= Not mentioned	
Make starchy foods the basis of most meals	1= Mentioned	2= Not mentioned	
Other Specify.....	1= Mentioned	2= Not mentioned	

THANK YOU



APPENDIX 2: INFORMATION SHEET



UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2809, Fax: 27 21-959 2872

E-mail: soph-comm@uwc.ac.za

Study Title: Development of an integrated model of care for community health workers working with chronic non-communicable diseases in Khayelitsha, South Africa

Dear Participant

1. What is this study about?

This is a research project being conducted by Lungiswa Tsolekile a PhD student at the University of the Western Cape. We are inviting you to participate in this research project because you either work with community health workers or works as a community health worker in the field of Chronic non-communicable diseases. The purpose of this research project is to develop and test an integrated model of care for community health workers with chronic non-communicable diseases in Khayelitsha.

2. What will I be asked to do if I agree to participate?

You will be asked to answer questions using a structured questionnaire. In addition, you may be asked to have an individual interview. All the interviews will be recorded. It is estimated that each interview will not be longer than an hour and thirty minutes.

3. Would my participation in this study be kept confidential?

We will keep your personal information confidential. To help protect your confidentiality, your name will not be recorded; codes will be used. All the tapes and questionnaires will be stored in a place where only the researcher will have access to the documents. If we write a report or article about this research project, your identity will be protected to the maximum extent possible. To ensure confidentiality in the group discussion, only those participating in group discussions will be allowed in the session. In addition, all the participants in the group

discussions will be requested not to discuss group issues outside of the focus group setting, in order to respect each participant's right to privacy.

4. What are the benefits of this research?

This research may not help you personally, but it will contribute to a better understanding of ways that will assist NGO and community health workers working in the field of community health worker to better assist their clients who suffer from chronic non-communicable diseases.

5. What are the risks of this research?

There are no known risks associated with participating in this research project.

6. Do I have to be in this research and may I stop participating at any time?

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. Your decision to participate or not in this research project or deciding to leave the study before it is over, will not affect or influence the treatment you get in this facility

7. What if I have questions?

This research is being conducted by **Lungiswa Tsolekile**, School of Public Health at the University of the Western Cape. If you have any questions about the research study itself, please contact **Prof. Thandi Puoane** at the following address:

Tel: +27 21 959 3084
Cell: +27 21 82 707 5881
Fax: +27 21 959 2872
Email: tpuoane@uwc.ac.za

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

Head of Department: Uta Lehman
Dean of the Faculty of Community and Health Sciences:
University of the Western Cape
Private Bag X17
Bellville 7535

This research has been approved by the University of the Western Cape's Senate Research Committee and Ethics Committee

APPENDIX 3: XHOSA INFORMATION SHEET



UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2809, Fax: 27 21-959 2872

E-mail: soph-comm@uwc.ac.za

Mthathi nxanxheba Obekekileyo

1. Lungantoni oluphando?

Oluphando luqhutywa nguLungiswa Tsolekile ofundela iziqu zokuba ngu kwi Dyunivesithi yaseNtshona Koloni. Siyakumema ukuba uthathe inxaxheba koluphando kuba usebenza noonompilo okanye ungunompilo wena buqu osebenza kwicandela lezigulo ezinganyangekiyo ezinjenge swekile eKhayelitsha.

2. Ndizakucelwa ukuba ndeze ntoni ukuba ndiyavuma?

Uzakucelwa ukuba uphendule eyakuthi ibhalwe umaphetshana. Ungacelwa ukuba uthathe inxaxheba kudliwanondlebe uwedwa. Zonke ezingxoxo ziyakuthi zicishilelwe. Xa siqikelela uyakuthi uchithe ixesha elingange yure ukuya kwiyure enecala kudliwano-ndlebe.

3. Ingaba ukuthatha kwan inxaxheba kuzakugcinwa emfihlakalweni

Zonke inkcukaca malunga nawe zizakugcinwa emfihlakalweni. Igama lakho alisokuze livele emaphepheni ethu sizakusebenzisa amanani ukuzama ukugcina yonke into emfihlakalweni. Onke amakhasethi namaphepha anemibuzo azakugcinwa kwindawo eyakhuthi isetyenziswe ngumphandi kuphela. Xa kubhalwa amaphepha malunga nophando asiyokuze silikhankanye nanye igama lakho. Ukuzama ukukhusela amalungu eqela leengxoxo, sizakuvumela amalungu kukphela kwiiseshoni zezingxoxo. Onke amalungu azakucelwa ukuba angaze athethe izinto ezakuthi zixolwe ngaphandle kweligela, ngokwenza oko sizakube sizama ukuhlonipha amalungelo amalungu eqela kwaye.

4. Yintoni indzuzo yoluphando?

Oluphando lunga-ngakuncedi wena buqu, kodwa luyakuthi lusinike ulwazi olungcono malunga neendlela azinokuthi zincipisane nemiibutho ezimeleyo kwakunye noonompilo abasebenza kwicandelo lezifo ezingosuleliyo njenge swekile. Yonke lento iyakuthi isincedise ekubeni sikwazi ukucedisana ngcono neziguli esithi sisebenze nazo ezinezizifo.

5. Ziyintoni ingozi zoluphando?

Akukho ngozi eyaziwayo enxulumene nokuthatha inxaxheba koluphando.

6. Ingaba kunyanzelekile ukuba ndithathe inxaxheba koluphando kwaye ndingakwazi ukurhoxa nangaliphi ixesha?

Ukuthatha kwakho inxaxheba koluphando kayisosinyanzelo. Ungakhetha ukungathathi inxaxheba konke konke. Ukuba ugqiba ekubeni uthathe inxaxheba koluphando. Ukuba ugqiba ekubeni ungathathi inxaxheba okanye urhoxe nangaliphi na ixesha, lonto ayizukwenza ukuba wohlwaywe okanye ulahlekelwe lilungelo elikufaneleyo. Isigqibo sakho sokuthatha inxaxheba okanye ukungathathi inxaxheba koluphando okanye ushiye uphando lungekagqitywa, ayisayi kuphazamisa okanye ibenefuthe kunyango othi ulufumane kwiziko lezwempilo .

7. Kwenzeka ntoni ukuba ndinemibuzo?

Oluphando luqhutywa nguLungiswa Tsolekile, kwisikolo sempilo kawonke-wonke kwidyunivesithi yaseNtshona koloni. Ukuba unemibuzo malunga noluphando qhakamshelana noNjingalwazi kule dilesi ilandelayo.

Iphoni +27 21 959 30 84

Cell +27 21 82 707 5881

Fax +27 21 959 2872

Email : tpuoane@uwc.ac.za

Ukuba unemibuzo malunga noluphando kwakunye namalungelo akho njengomnxaxhebi okanye ufuna ukuchaza ngenxaki othe wahlangana nayo malunga noluphando nceda uqhakamshelane

Head of Department: Uta Lehman

Dean of the Faculty of Community and Health Science

University of the Western Cape

Private Bag x17

Bellville7535

APPENDIX 4: CHW ENGLISH CONSENT FORM



UNIVERSITY OF THE WESTERN CAPE

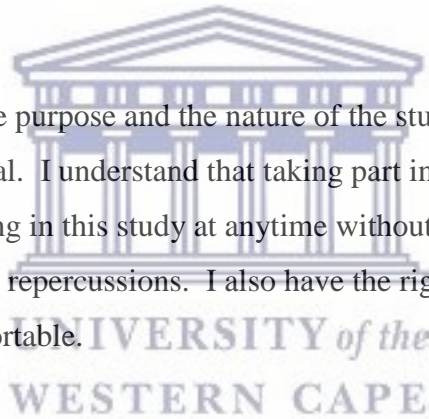
Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 2809, Fax: 27 21-959 2872

E-mail: soph-comm@uwc.ac.za

Study Title: Development of an integrated model of care for community health workers working with chronic non communicable diseases in Khayelitsha, South Africa

I have been informed about the purpose and the nature of the study. I understand that all information will be confidential. I understand that taking part in this study is voluntary. I can withdraw from participating in this study at anytime without giving any reasons and my doing so will have no negative repercussions. I also have the right to refuse answering questions when I feel uncomfortable.



Name of the participant:.....

Signature:.....

Date:.....

Interviewer :

APPENDIX 5: CHW XHOSA CONSENT FORM



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Iphepha Mvume Lomthathi nxaxheba

Isihloko Sophando: Development of an integrated model of care for community health workers working with chronic non communicable diseases in Khayelitsha, South Africa

Ndixelelwe malunga nenjongo kwanendlela yoluphando. Ndiyaqonda ukuba yonke into endizakuyithethe izakungcinwa iyimfihlo. Xa ndifuna ukurhoxa koluphando ndinako. Ndinako ukurhoxa koluphando naliphi na ixesha ndingakhange ndanika sizathu. Ndinalo ilungelo lokurhoxa ekuphenduleni imibuzo nakulo oluphando kwaye oko akungeze kundichaphazele ngendlela embi.

Igama lomthathi nxaxheba:.....

Tyikitya:.....

Usuku:.....

Igama omntu owenze udliwano-ndlebe.....

APPENDIX 6: ETHICS APPROVAL

**OFFICE OF THE DEAN
DEPARTMENT OF RESEARCH
DEVELOPMENT**

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20 May 2011

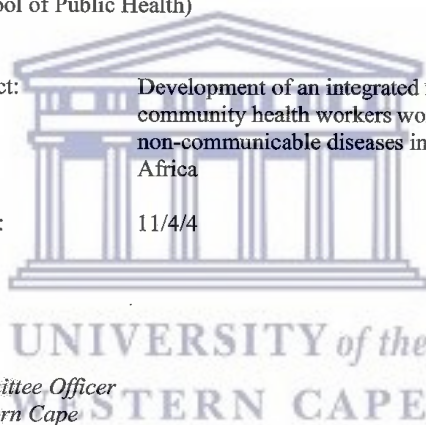
To Whom It May Concern

I hereby certify that the Senate Research Committee of the University of the Western Cape has approved the methodology and ethics of the following research project by:
Miss L Tsolekile (School of Public Health)

Research Project: Development of an integrated model of care for
community health workers working with chronic
non-communicable diseases in Khayelitsha, South
Africa

Registration no: 11/4/4


Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape



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