



Development of an integrated, evidence-based management model for chronic non-communicable diseases and their risk factors, in a rural area of Limpopo Province, South Africa.

by

Eric Maimela

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**Doctor of Philosophy in Medical Sciences at the University of Limpopo (UL)
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Student number UL: 9641256

Student number UA: 20137874

Pathology and Medical Sciences
School of Health Sciences
Faculty of Health Sciences
University of Limpopo (Turfloop Campus)

Epidemiology for Global Health Institute
Department of Epidemiology and Social Medicine
Faculty of Medicine and Health Sciences
University of Antwerp

Supervisors:

Professor M. Alberts,

Professor J.P. Van geertruyden,

Professor H. Meulemans,

Dr. SEP Modjadji

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DEDICATIONS

This work has been dedicated to the Maimela family members, particularly my beloved boys (Tumelo and Ntsako), parents, brother, sisters, uncles and niece who have tirelessly made provision for me both morally and materially throughout my entire life as a student. Your selfless dedications to my life and for all the sacrifices you have made over the years are well appreciated. They all played a pivotal role by having an understanding of being far away as a result of this study and you all continue to be a constant source of inspiration and mentor figures in defining the true meaning of success and achievement. I therefore, share this success with you all and may God Almighty add more years to your lives to see my further success.

Throughout my PhD studies I had ups and downs but it was through the grace of the Lord which kept me going....

Be strong and courageous. Do not fear or be in dread of them, for it is the LORD your God who goes with you. He will not leave you or forsake you.”

Deuteronomy 31:6

Fear not, for I am with you; be not dismayed, for I am your God; I will strengthen you, I will help you, I will uphold you with my righteous right hand.

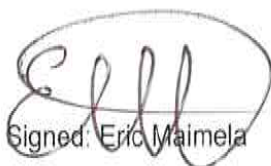
Isaiah 41:10

Even though I walk through the valley of the shadow of death, I will fear no evil, for you are with me; your rod and your staff, they comfort me.

Psalms 23:4

DECLARATION

I Eric Maimela, hereby declare that this is my own work presented here and submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy in Medical Science at the University of Limpopo in the Department of Medical Sciences, Public Health and Health Promotion, of School of Health Sciences within the faculty of Health Sciences (UL) and Doctor in Medical Sciences at the University of Antwerp in the Faculty of Medicine and Health Sciences. This has been done in accordance with the academic regulations of University of Limpopo and University of Antwerp. This work has not been submitted for any degree or examination purposes at any other university, except University of Limpopo and University of Antwerp. All the sources I have used or quoted have been indicated and acknowledged by complete references.



Signed: Eric Maimela

Date: 20 May 2016

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My acknowledgements are random and thus no part of the list is secondary to any other. The list is however, very incomplete.

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Abstract

Background: Chronic disease management (CDM) is an approach to health care that keeps people as healthy as possible through the prevention, early detection and management of chronic diseases. This approach offers holistic and comprehensive care, with a focus on rehabilitation, to achieve the highest level of independence possible for individuals. The aim of this study was to develop an integrated, evidence-based model for the management of chronic non-communicable diseases in a rural community of the Limpopo Province, South Africa.

Methods: The study was conducted at Dikgale Health and Demographic Surveillance System (HDSS) site is situated in Capricorn District of Limpopo Province in South Africa. This study followed mixed methods methodology with an aim on integrating quantitative and qualitative data collection and analysis in a single study to develop an intervention program in a form of model to improve management of chronic diseases in a rural area. Therefore, this included literature review and WHO STEPwise approach to surveillance of NCD risk factors for quantitative techniques and focus group discussions, semi-structures interviews and quality circles for qualitative techniques. In the surveillance of NCD risk factors standardised international protocols were used to assess behavioural risk factors (smoking, alcohol consumption, fruit and vegetable consumption, physical activity) and physical characteristics (weight, height, waist and hip circumferences, and blood pressure). A purposive sampling method was used for qualitative research to determine knowledge, experience and barriers to chronic disease management in respect of patients, nurses, community health workers (CHWs), traditional health practitioners (THPs) and managers of chronic disease programmes. Data were analysed using STATA 12 for Windows, INVIVO and Excel Spreadsheets.

Results: The study revealed that epidemiological transition is occurring in Dikgale HDSS. This rural area already demonstrates a high burden of risk factors for non-communicable diseases, especially smoking, alcohol consumption, low fruit and vegetable intake, physical inactivity, overweight and obesity, hypertension and dyslipidaemia, which can lead to cardiovascular diseases. The barriers mostly mentioned by the nurses, patients with chronic disease, CHWs and THPs include lack of knowledge of NCDs, shortages of medication and shortages of nurses in the clinics which cause patients to stay for long periods of time in a clinic. Lack of training on the management of chronic diseases, supervision by the district and provincial health managers, together with poor dissemination of guidelines, were contributing factors to lack of knowledge of NCDs management among nurses and CHWs. THPs revealed that cultural insensitivity on the part of nurses (disrespect) makes them unwilling to collaborate with the nurses in health service delivery.

The model developed in this study which was the main aim of the study describes four interacting system components which are health care providers, health care system, community partners and patients with their families. The main feature of this model is the integration of services from nurses, CHWs and THPs including a well-established clinical information system for health care providers to have better informed patient care. The developed model also has an intervention such as establishment of community ambassadors.

Conclusion: Substantially high levels of the various risk factors for NCDs among adults in the Dikgale HDSS suggest an urgent need for adopting healthy life style modifications and the development of an integrated chronic care model. This highlights the need for health interventions that are aimed at controlling risk factors at the population level in order to slow the progress of the coming non-communicable disease epidemic. Our study highlights the need for health interventions that aim to control risk factors at the population level, the need for availability of NCD-trained nurses, functional equipment and medication and a need to improve the link with traditional healers and integrate their services in order to facilitate early detection and management of chronic diseases in the community. The developed model will serve as a contribution to the improvement of NCD management in rural areas. Lastly, concerted action is needed to strengthen the delivery of essential health services in a health care system based on this model which will be tasked to organize health care in the rural area to improve management and prevention of chronic illnesses. Support systems in a form of supervisory visits to clinics, provision of medical equipments and training of health care providers should be provided. Contribution from community partners in a form of better leadership to mobilise and coordinate resources for chronic care is emphasized in the model. This productive interaction will be supported by the district and provincial Health Departments through re-organization of health services to give traditional leaders a role to take part in leadership to improve community participation.

Key Words: Dikgale Health and Demographic Health Surveillance, Behavioural and Biochemical risk factors, Non-communicable diseases, Public health and Health System Performance, Chronic Disease Management, Perception, Experiences, Barriers, Knowledge.

Samenvatting

Achtergrond: Chronische ziekte management (CDM) is een benadering tot de gezondheidszorg die probeert mensen zo gezond mogelijk te houden door middel van preventie, vroegtijdige detectie en controle van de chronische ziekten. Deze aanpak biedt holistische en totale zorg, met een focus op rehabilitatie, om het hoogst mogelijke niveau van onafhankelijkheid te bereiken voor het individu. Het doel van deze thesis is om een geïntegreerd empirisch onderbouwd model te ontwikkelen voor de behandeling van chronische, niet-overdraagbare ziekten (NCD) in een landelijke gebied in de provincie Limpopo, Zuid-Afrika.

Methoden: De studie werd uitgevoerd in het Dikgale gezondheid en demografische Surveillance systeem (HDSS) site in Capricorn District van de Limpopo provincie in Zuid-Afrika. De studieopzet volgde een ontwikkelingsproces dat gebaseerd is op type 2 ontwikkelingsonderzoek. Het was gericht op een algemene analyse van een ontwerpmodel en zijn ontwikkeling, dat in zijn geheel of via specifieke componenten wordt bekeken. De gebruikte onderzoeksmethoden volgde een mix van kwantitatieve en kwalitatieve technieken, waaronder een literatuurstudie, de WHO STEP-enquête voor de surveillance van NCD risicofactoren, Focus Group Discussies, semi-gestructureerde interviews en kwaliteitscirkels. Gestandaardiseerde internationale gevalideerde vragenlijsten werden gebruikt om gedrags-risicofactoren (roken, alcoholgebruik, groente en fruit, fysieke activiteit) en fysieke kenmerken (gewicht, lengte, taille- en heupomtrek, bloeddruk) te meten. Een doelgerichte selectie methode werd gebruikt voor het kwalitatief onderzoek naar de kennis over, ervaring rond en hindernissen bij het beheer van NCD bij patiënten, verpleegkundigen, gezondheidswerkers (Community Health Workers (CHW)), traditionele gezondheidswerkers (traditional health practitioners (THPS)) en managers van chronische ziekte control programma's. De gegevens werden geanalyseerd met behulp van STATA 12 voor Windows, in vivo-en Excel-spreadsheet.

Bevindingen: Uit het onderzoek blijkt dat een epidemiologische transitie ook plaatsvindt in Dikgale HDSS. Dit rurale gebied heeft al een hoge aanwezigheid van risicofactoren voor niet-overdraagbare ziekten, in het bijzonder roken, alcoholgebruik, laag groente- en fruitconsumptie, gebrek aan lichaamsbeweging, overgewicht en obesitas, hoge bloeddruk en hoge cholesterol waarden die allen bijdragen tot cardiovasculaire ziekten. De meest voorkomende belemmeringen die door zowel de verpleegkundigen, patiënten met chronische aandoeningen, CHWs en THPS worden aangegeven zijn: het gebrek aan kennis, een gebrek aan medicatie en een tekort aan verpleegkundigen in de ziekenhuizen. Daardoor zijn patiënten vaak genoodzaakt voor een lange periode in het ziekenhuis te verblijven. Een goede opleiding in de controle van NCD ontbreekt, alsook de supervisie door de district en provinciale verantwoordelijken in de gezondheidszorg versterkt door een beperkte verspreiding van

de richtlijnen. Dit zijn factoren die bijdragen aan een gebrek aan kennis bij verpleegkundigen en CHWs. THPS verklaarden dat de culturele ongevoeligheid van de verpleegkundigen (respectloos) ertoe leidt dat ze niet samenwerkten met verpleegkundigen in de gezondheidszorg.

Het model ontwikkeld in deze thesis --het belangrijkste doel van de thesis-- beschrijft vier interagerende componenten zijnde de zorgverleners, Gezondheidszorg systeem, wijkgezondheidswerkers en patiënten met hun gezinnen. Het belangrijkste kenmerk van dit model is de integratie van diensten van de verpleegsters, CHWs en THPs met inbegrip van het bestaande klinische informatiesysteem voor zorgverleners hebben om een beter geïnformeerde patiëntenzorg te creëren. Het ontwikkelde model heeft ook een interventie zoals oprichting van bevolkingsambassadeurs.

Conclusies: De grote aanwezigheid van verschillende risicofactoren voor chronische ziekten bij volwassenen in de Dikgale HDSS wijzen op een dringende behoefte aan evolutie naar een gezondere levensstijl en de ontwikkeling van een geïntegreerd model voor de zorg in chronische ziektes. Dit benadrukt de noodzaak van de introductie van gezondheidsinterventies op bevolkingsniveau gericht op de risicofactoren, zodat we de opmars van de epidemie in niet-overdraagbare ziekten vertragen. Onze studie benadrukt de behoefte aan gezondheidsinterventies die gericht zijn op het controleren van de risicofactoren op bevolkingsniveau, de nood aan NCD-opgeleide verpleegkundigen, functionele apparatuur en medicatie en een verbetering van de relatie met de traditionele zorggevezers en hun diensten te integreren om vroegtijdige detectie en beheer van chronische ziekten in de bevolking te bevorderen. Het ontwikkelde model zal dienen als een bijdrage aan de verbetering van beheer van het NCD in landelijke gebieden. Ten slotte is een gecoördineerde actie vereist om de bevoorrading van medicijnen te verzekeren, de kennis van chronische ziektes kennis te vergroten, een link te maken met de traditionele genezers (THPS) en hun diensten in de gezondheidszorg te integreren om op die manier chronische ziekten in de gemeenschap vroegtijdig op te sporen en te controleren.

Steekwoorden: Dikgale Gezondheids en Demografisch Toezicht op Volksgezondheid, Gedrag en biochemische risicofactoren, niet-overdraagbare ziekten, Volksgezondheid en Health System Performance Chronic Disease Management, Perceptie, Ervaringen, Barrières, Kennis.

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Abbreviations and Acronyms

ACS	=	Acute Coronary Syndrome
BMI	=	Body Mass Index
BP	=	Blood Pressure
CCM	=	Chronic Care Model
CDL	=	Chronic Diseases of Lifestyle
CDM	=	Chronic Disease Management
CDOP	=	Chronic Disease Outreach Programme
CHD	=	Coronary Heart Disease
CHIPS	=	Community Health Intervention Programme
CKD	=	Chronic Kidney Disease
COPD	=	Chronic Obstructive Pulmonary Disease
CVD	=	Cardiovascular Disease
CHWs	=	Community Health Workers
CoGHSTA	=	Department of Corporate Governance Human Settlement and Traditional Affairs
DALY	=	Disability-Adjusted Life Year
DBP	=	Diastolic Blood Pressure
DoH	=	Department of Health
EDL	=	Essential Drug List
ESRD	=	End-Stage Renal Disease
FAO	=	Food and Agriculture Organisation
FPG	=	Fasting Plasma Glucose
FV	=	Fruits and Vegetables

GBD	=	Global Burden of Diseases
HAART	=	Highly Active Antiretroviral Therapy
HbA1C	=	Glycated Haemoglobin
HBM	=	Health Belief Model
HDL-C	=	High Density Lipoprotein Cholesterol
ICDM	=	Integrated Chronic Disease Management
IDF	=	International Diabetes Federation
IFG	=	Impaired Fasting Glucose
IGT	=	Impaired Glucose Tolerance
LDL	=	Low-Density Lipoprotein
LDL-C	=	Low-Density Lipoprotein Cholesterol
LMICs	=	Low and Middle-Income Countries
MCOs	=	Managed Care Organisations
MDGs	=	Millennium Development Goals
MetS	=	Metabolic Syndrome
MRC	=	Medical Research Council
NCDs	=	Non-Communicable Diseases
NGOs	=	Non-Governmental Organisations
NGT	=	Normal Glucose Tolerance
OGTT	=	Oral Glucose Tolerance Test
PA	=	Physical Activity
PHC	=	Primary Health Care
PHR	=	Personal Health Record

RCTs	=	Randomised Clinical Trials
SADHS	=	South Africa Demographic and Health Surveys
SAGE	=	Study of Global Ageing and Adult Health
SBP	=	Systolic Blood Pressure
SCT	=	Social Cognitive Theory
Soweto	=	South Western Township
SSA	=	Sub-Saharan Africa
STEPS	=	Stepwise Approach to Chronic Non-Communicable Disease Surveillance
STGs	=	Standard Treatment Guidelines
TC	=	Total Cholesterol
TG	=	Triglycerides
THPs	=	Traditional Health Practitioners
TTM	=	Trans-Theoretical Model
WHO	=	World Health Organization

Glossary

Alcohol consumption refers to intake of at least one alcoholic drink in the last 12 months.

Alcohol in 30 days refers to intake of at least one alcoholic drink in the last 30 days

Chronic disease management (CDM) an approach to health care that keeps people as healthy as possible through the prevention, early detection and management of chronic diseases.

Community ambassadors in our study community ambassadors refers to the community members who have suffered or are currently suffering from any chronic non-communicable disease but are managing their conditions.

Community Health Workers (CHWs) well trusted and knowledgeable frontline health personnel who typically come from the communities they serve. CHWs bridge cultural and linguistic barriers, expand access to coverage and care, and improve health outcomes.

Ever consumed alcohol refers to consumption of alcohol in the past.

Low fruit and vegetable intake refers intake of combined fruit and vegetable of less than 5 servings per day (Hughes et al., 2004; Erinoshu et al., 2012).

Health care provider refers to a person who helps in identifying or preventing or treating illness or disability at a primary health care level and includes nurses, community health workers and traditional healers.

Highest level of education, the highest level of education achieved by the survey respondents.

Literacy, the ability to read or write.

Metabolic equivalent (MET), is the amount of energy consumed while sitting quietly or at rest which is equivalent to a caloric consumption of 1 kcal/kg/hour.

Moderate intensity physical activity, an activity which requires moderate physical effort and cause small increases in breathing or heart rate.

Non-communicable diseases (NCDs), diseases that are not passed from person to person and are of long duration and generally slow progression.

Passive smoking, a nonsmoker inhaling the cigar, cigarette, or pipe smoke of others (called second-hand smoke) in the same area.

Risk Factor, any attribute, characteristic, or exposure of an individual, which increases the likelihood of developing a disease, or other unwanted condition/event.

Standard drinks per drinking day, a standard drink contains approximately 10 g. of pure alcohol. Number of standard drinks consumed on a drinking day among those respondents who have drunk in the last 12 months.

Vigorous intensity activity, activities that require hard physical effort and cause large increases in breathing or heart rate.

SCIENTIFIC OUTPUT

Publications

- Maimela E, Van geertruyden JP, Alberts M, Modjadji SEP, Fraeyman J, Meulemans H, Bastiaens H. The perceptions and perspectives of patients and health care providers on chronic diseases management in rural South Africa: a qualitative study. Published in the BMC Health Science Research Journal, (2015) 15:143.
- Maimela E, Alberts M, Modjadji SE, Choma SS, Dikotope SA, Ntuli TS, Van Geertruyden JP. The Prevalence and Determinants of Chronic Non-Communicable Disease Risk Factors amongst Adults in the Dikgale Health Demographic and Surveillance System (HDSS) Site, Limpopo Province of South Africa. PloS one. 2016 Feb 16;11 (2):e0147926.

Submitted articles for publication

- Maimela E, Alberts M, Van Geertruyden JP, Fraeyman J, Meulemans H, Bastiaens H. Addressing non-communicable diseases through community health workers and traditional healers in Dikgale Health and Demographic Surveillance System Site: A qualitative study. Africa Journal of Physical, Health Education, Recreation and Dance (AJPHED). Under Review
- Maimela E, Alberts M, Van Geertruyden JP, Meulemans H, Fraeyman J, Wens J, Bastiaens H. Evidence based interventions for improving management of chronic non-communicable diseases in Dikgale in Limpopo Province, South Africa. Cardiovascular Journal of Africa. Under review.
- Maimela E, Van Geertruyden JP, Alberts M, Modjadji SEP, Fraeyman J, Meulemans H, Bastiaens H. Perceived barriers for improving management of chronic non-communicable diseases by managers of health facilities, district and provincial chronic disease programme managers in Dikgale in Limpopo Province, South Africa. Curationis Journal. Under Review.

Congress contributions

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1. Prevalence of Non-Communicable Disease risk factors among adults in Dikgale HDSS centre, Limpopo Province of South Africa.
Maimela E^{1,2,3}, Alberts M¹, Modjadji SEP¹, Dikotope SA¹, Choma SS¹, Ntuli TS¹, Van Geertruyden JP³
2. The social construction of chronic disease management by patients and nurses in Dikgale Health and Demographic Surveillance Site: A qualitative study
Maimela E^{1,2,3} Alberts M¹, Modjadji SEP¹, Van geertruyden JP², Bastiaens H³, Fraeyman J⁵, Meulemans H⁶.
3. Integrated evidence-based chronic non-communicable disease management model in Dikgale HDSS
Maimela E^{1,2,6} Alberts M¹, Bastiaens H⁴, Fraeyman J⁵, Meulemans H⁶, Wens J⁵, Van Geertruyden JP⁶.

European Congress on Tropical Medicine and International Health (ECTMIH), BASEL, Switzerland September 2015.

1. The perceptions and perspectives of patients and health care providers on chronic diseases management in rural South Africa: a qualitative Study
Eric Maimela^{1,2*}, Jean-Pierre Van Geertruyden², Marianne Alberts¹, Sewela EP Modjadji¹, Herman Meulemans^{3,6}, Jesicca Fraeyman⁴ and Hilde Bastiaens⁵.
2. Prevalence of Non-Communicable Disease risk factors among adults in Dikgale HDSS centre, Limpopo Province of South Africa.
Maimela E^{1,2,3} Alberts M¹, Modjadji SEP¹, Dikotope SA¹, Choma SS¹, Ntuli TS¹, Van Geertruyden JP³
3. Development of an integrated evidence-based management model for chronic non-communicable diseases and their risk factors, in a rural area of Limpopo Province, South Africa.
Maimela E^{1,2,6} Alberts M¹, Bastiaens H⁴, Fraeyman J⁵, Meulemans H⁶, Wens J⁵, Van Geertruyden JP⁶.
4. Barriers and facilitators for improving management of chronic non-communicable diseases at primary healthcare level in rural area of Limpopo Province, South Africa.
Maimela E^{1,2}, Alberts M¹, Van Geertruyden JP², Meulemans H³, Fraeyman J⁴, Bastiaens H⁵.

CHAPTER 1: INTRODUCTION

1.1 Background and motivation

Diseases characterised by the slow progression and prolonged occurrence are termed chronic diseases (Westaway, 2009). These diseases are not limited to non-infectious illnesses, but span a wide spectrum of health conditions, including, amongst others, diseases such as HIV/AIDS and tuberculosis (Stuart 2008). These diseases also include non-communicable diseases (NCDs), such as heart disease, stroke, cancers, diabetes, chronic obstructive pulmonary disease (COPD), asthma, cataracts and long-term mental disorders (Stuart 2008, Beaglehole et al., 2008, Puoane et al., 2012). The global health system is challenged by these chronic health conditions and it is estimated that these diseases will account for approximately 73% of all deaths by the year 2020, constituting 60% of the global burden of disease (Epping-Jordan et al., 2005).

Low- and middle-income countries are experiencing a high burden of chronic diseases (Beaglehole et al., 2008). This increased burden is predicted not to subside due to factors such as ageing of populations, urbanisation and globalisation of risk factors (Beaglehole et al., 2008). Evidence shows that the burden of NCDs in South Africa has increased over the past 15 years, causing an estimated 37% of mortalities and 16% of disability-adjusted life years (Puoane et al., 2012). It has been reported that mortality due to NCDs is similar in all provinces in South Africa, even though the specific causes are different (Bradshaw, 2001).

In recent years most of the NCDs have been found to share many modifiable risk factors (Cerqueira et al., 2011, Hoy et al., 2013), which are usually adopted early in life as people are growing (Bradshaw, 2001). The most prevalent risk factors for NCDs globally are an unhealthy diet, physical inactivity, tobacco use, and harmful use of alcohol, overweight, raised blood pressure and raised total cholesterol and blood glucose levels (van Zyl et al., 2010). These modifiable risk factors are grouped into two groups, namely, primary risk factors (unhealthy diet, physical inactivity, alcohol and tobacco use) and intermediate risk factors (overweight, raised blood pressure, raised total cholesterol levels and raised blood glucose) (WHO, 2003a). In South Africa the increase in the prevalence of NCDs is accompanied by an increase in modifiable risk factors such as physical inactivity, use of tobacco products and unhealthy diets (van Zyl et al., 2010; Kolbe-Alexander et al., 2013).

The increase in the global burden of chronic diseases constitutes a substantial challenge to global healthcare systems (Hernandez et al., 2014). In the current health care system, patients receive fragmented health care services, as most services are provided by health care providers who work

independently of one another (Shih et al., 2008). This challenge, therefore, raises the need to change the approach to management of chronic diseases (McDonald et al., 2007, Shih et al., 2008). The concept of care coordination, which is a core function of the patient-centered approach, has been defined as "the deliberate organization of patient care activities between two or more participants involved in a patient's care to facilitate the appropriate delivery of health care services" (McDonald et al., 2007). This concept will make patient follow-up an integral part of standard procedures in the health care facilities so that patients are not left on their own after being seen by health care workers (Wagner et al., 1996b, Calkins et al., 1999).

Chronic NCDs can be significantly prevented by the utilisation of public health measures, together with community-based interventions (Strong et al., 2005, Stuart, 2008; Westaway, 2009). This brings about the need to manage chronic diseases in a well-organised and coordinated fashion, focussing on improving quality of life through the implementation of specific health policies. Priority should be given to the establishment of preventative programmes at primary, secondary and tertiary levels, with the aim of improving quality of life. The expansion of access to proper health care by marginalised persons, who are susceptible to chronic diseases, including the creation of proper infrastructure for the prevention of chronic diseases at a population level, is also critical (Strong et al., 2005, Epping-Jordan et al., 2005; Stuart, 2008; Westaway, 2009).

A multifaceted health transition has been experienced in the South Africa since 1990, mainly because of the HIV/AIDS epidemic, coupled with NCDs, other health outcomes causing child mortality and unnatural causes of death such as violence and accidents (Mayosi et al., 2009, Levitt et al., 2011). South Africa, like other low- and middle- income countries, has challenges in critical functions of the health care system, such as the financing and health care delivery, which makes the resources in the country to be unbalanced with the populations needs (Ataguba and McIntyre, 2012; Mills, 2014). Different methods are used in South Africa to finance health care, including general tax, private medical schemes and out-of-pocket payments (Ataguba, 2010). Most people rely on health services provided by the public health care sector, which is funded by general taxation, while only a minority of South Africans can afford better health care which is provided through a private health care system (Mills, 2014). Numerous types of schemes cover health insurance in South Africa but these are targeted at workers in the formal sector, although not all formal-sector workers belong to private insurance schemes (Mills et al., 2012). The demand for provision of essential medicines has also increased, coupled with a human resource crisis as nurses are mainly at the forefront of primary health care services (Magadzire et al., 2014).

As most South Africans depend on the public health sector for their health care needs (Peltzer 2009), the country is undergoing health care system restructuring in order to move towards a universal system. This universal system provides financial risk protection and, therefore, promotes equity as far as access to health care services is concerned (Ataguba and McIntyre, 2012). The health care system in South Africa structurally is composed of the National Department of Health under the political leadership of the Minister of Health and the nine provincial health departments under the political leadership of the members of executive councils (MECs) (Coovadia et al., 2009). Policy development and overall health system co-ordination is the responsibility of the National Department of Health, while health care service delivery is the responsibility of the provincial departments (McIntyre, 2012). All nine provinces in South Africa have several health districts with limited management authority. These districts are largely responsible for supporting and coordinating the provision of primary health care and district hospital services, including the payment of public health care workers (McIntyre, 2012). Primary health care services are delivered via a district health system which is the cornerstone of health policy in South Africa (Coovadia et al., 2009). Health services at community level are rendered by community health workers (CHWs) who are employed by Non-Governmental Organisations funded by the government of South Africa (Schneider et al., 2008).

The weak health care system in South Africa has a negative impact on rural areas Sips et al., (2014) and, as such, most rural community members rely on lay health workers who only have basic training in aspects of palliative care Petersen et al., (2014), Sips et al., (2014) and who are supervised by professional health care providers (Campbell and Amin, 2014). Traditional healers are also consulted in most rural communities in South Africa for health services (Campbell and Amin, 2014). Traditional healers are not paid by government and, therefore, rely on the fees that they charge their patients.

In South Africa, the government has recognised the need for different government sectors and non-governmental sectors to collaborate in in order to tackle the burden of NCDs (Puoane et al., 2012; National Department of Health South African Declaration on the Prevention of NCDs, 2013). Despite the establishment of the Directorate for Chronic Diseases, Disabilities and Geriatrics in 1996, prioritisation of interests for the primary prevention of chronic diseases has been minimal. This situation has worsened because of the HIV/AIDS epidemic in South Africa, which has resulted in a growing burden of cardiovascular diseases (CVD) receiving limited response from the health system (Marezda et al., 2011). In response to the challenge of NCDs, the South African Government has made a declaration on the prevention of NCDs (National Department of Health South African Declaration on the Prevention of

NCDs, 2013) and increased the availability of essential medicines for treatment of CVDs to the poorer and less accessible communities through the implementation of Standard Treatment Guidelines (STGs) and the Essential Drug List (EDL) in health facilities (Marezda et al., 2011).

Currently there is paucity of data on the development of intervention programmes based on an integrated patient centered chronic NCD management system to improve Primary Health Care facilities in rural communities. The development in South Africa with regard to the availability and coverage of highly active antiretroviral therapy (HAART) will contribute to the improvement of people's life expectancy. As such this might have a negative impact on the management of chronic non-communicable diseases as there will be more people living with HIV/AIDS contributing to a probable increase in morbidity, and risk related to NCDs (Tollman et al., 2008).

Taking into consideration the projected increases of NCDs in South Africa, it is imperative for policymakers and the Department of Health to be advised about the risk factors in rural communities and on how to cope with a burgeoning demand for health care services. This will assist in determining what needs to be done in local health care systems and in rural health facilities to improve the coordination of patient care. Consideration should be given to change the current health care systems to be consistent with fundamentals such as accountability of patients and nurses, relationships between nurses, patients, community health workers and traditional health practitioners, patient support in the community and connectivity with other stakeholders (Glasgow et al., 2012).

Integrated health care strategies enhancing the linkages between different levels of care have been found to be pivotal in the improvement of chronic care management in which patients assume an active role in their care (Shaw et al 2011; Hernandez et al., 2014). Therefore, transformation of the present health care system from being a reactive system (responds mainly when a person is sick) to a system which is proactive will help chronic patients to focus on keeping healthy through prevention or minimisation of risk factors (Wagner et al., 1996a). Furthermore, the development of community interventions and the reworking of the current health care system, including strengthening of the local evidence-base to support the provision of locally appropriate services, are necessary to address the changing profile of chronic diseases in rural areas (Kahn et al., 2009). Consequently, in the current study the risk factors related to NCDs in the Dikgale HDSS, Limpopo Province will be investigated. The knowledge of nurses, chronic disease patients, community health workers (CWHs) and traditional health practitioners (THPs) about chronic disease management will be investigated. The information will be used to develop an evidence-based, integrated model for prevention and management of non-

communicable diseases in Dikgale HDSS. The developed model will serve as an intervention strategy to integrate services, as different health care providers (nurses, CHWs and THPs) operate independently of each other in this rural area. There is marked variation in the management of chronic diseases in South African rural areas due to poor functioning of primary care services. An insight into the extent of risk factors for non-communicable diseases in rural communities in Limpopo Province of South Africa is crucial for the development of effective advocacy and action. This is supported by the execution of this study, as there is evidence that the burden of non-communicable diseases is predicted to increase substantially in South Africa over the coming decades if measures are not taken to combat the trend (Mayosi et al., 2009).

1.2 Problem statement

The barriers and challenges encountered by chronic disease patients and health care providers (nurses, CHWs and THPs) within the health care facilities have not been documented in rural areas of the Limpopo Province in South Africa. Before one can plan on how to improve the public health system and improve chronic disease management these barriers should be addressed. The mechanisms and the processes of restructuring and reshaping the primary health care system with an aim to contribute to the reduction of morbidity and mortality due to chronic illness should be established. These mechanisms and processes should effectively address the factors associated with NCDs, such as social, cultural and behavioural issues, which are complex. This can be attained by implementing a health system which is oriented towards health promotion, prevention and the delivery of cost effective interventions through a primary health care approach. Therefore, this study aimed at determining how an integrated model involving nurses, chronic patients, CHWs and THPs can be developed to improve chronic disease management in a rural community of the Limpopo Province of South Africa.

1.3 Research question

The overall research question to be answered in this study was “How can an integrated, evidence-based model in rural primary health care settings be developed to improve outcomes among patients with chronic non-communicable diseases?”

1.4 Aim of the study

The aim of this study was to develop an integrated, evidence-based model for the prevention and management of chronic non-communicable diseases in a rural area of South Africa.

1.5 Objectives of the study

The specific objectives of the study were:

- To determine the prevalence of chronic non-communicable disease risk factors in the Dikgale HDSS
- To describe the knowledge of chronic disease patients, nurses, community health workers and traditional practitioners have regarding chronic diseases and their risk factors in the Dikgale HDSS.
- To describe problems and challenges encountered by chronic disease patients, nurses, community health workers and traditional practitioners in the management of chronic diseases in the Dikgale HDSS.
- To use these findings to develop an evidence-based model to prevent and manage chronic non-communicable diseases in the Dikgale HDSS.

1.6 Organisation of the thesis

This thesis is organised into five chapters and the details of each chapter are presented below as follows:

- **Chapter 1** comprises of an introduction, the aim of the study, the research question, objectives of the study and the organisation of the thesis.
- **Chapter 2** consists of a general literature review and is sub-divided into specific sections, namely: the burden of chronic diseases and their risk factors; perspectives on chronic disease management; theories of model development for disease management; integration of Health Care Practitioners in health care services; primary health care and chronic disease in South Africa; and, deficiencies of the South African health care system.
- **Chapter 3** presents the methodologies used for the study
- **Chapter 4** presents the findings of the study which is presented in phases based on the methods used in data collection as follows:
 - Phase I:
 - The prevalence and predictors of chronic Non-Communicable Disease risk factors among adults in the Dikgale HDSS in the Limpopo Province of South Africa.

- Phase II:
 - The perceptions and perspectives of chronic disease patients and health care providers on chronic diseases management in the Dikgale HDSS: A qualitative study.
 - Addressing non-communicable diseases through community health workers and traditional healers in the Dikgale HDSS: A qualitative study.
 - Perceived barriers to improving management of chronic non-communicable diseases by managers of health facilities, specifically district and provincial chronic disease programme managers in Dikgale in Limpopo Province, South Africa
- Phase III:
 - Development of an integrated evidence-based management model for chronic non-communicable diseases and their risk factors, in a rural area of Limpopo Province, South Africa.
- **Chapter 5** presents a general discussion on the findings of the overall study, their public health implications for chronic disease management and the recommendations from the study findings.

CHAPTER 2: LITERATURE REVIEW

2.1 Definition of chronic non-communicable diseases

Chronic non-communicable diseases are generally defined as illnesses that last a long time (Westaway, 2009; Bloom et al., 2011), which are rarely cured and often result in disability later in life (McKenna and Collins, 2010). These diseases span a wide spectrum of health conditions and are not limited to non-infectious illnesses (Stuart, 2008). Chronic non-communicable diseases include health conditions such as Non-Communicable Diseases (NCDs), long-term mental disorders and persistent communicable diseases, such as HIV/AIDS and tuberculosis (Stuart, 2008, Beaglehole et al., 2008, Maher et al., 2009). Also included are heart disease, strokes, cancers, diabetes, chronic obstructive pulmonary disease (COPD), asthma, cataracts and more (Puoane et al., 2012). Non-communicable diseases (NCDs) are a group of chronic diseases which are characterised by non-transmissibility, meaning that they are not transmissible from one person to another and are also not acquired due to injury (Puoane et al., 2012; Basu et al., 2013).

2.2 The Burden of chronic non-communicable diseases

2.2.1 The Global Burden of chronic non-communicable diseases

The consistent and comparative description of burden of diseases and injuries, including their associated risk factors, are an important input into decision-making and planning processes in population health and public health programmes in general (Lopez et al., 2006). NCDs pose public health challenges in the world (Habib and Saha, 2010). Morbidity and mortality due to NCDs are mainly caused by cardiovascular diseases (including heart disease and strokes), diabetes, cancers and chronic respiratory diseases (including chronic obstructive pulmonary disease and asthma) (Bloom et al., 2011; Hughes et al., 2012; Puoane et al., 2012).

The NCD pandemic continues to grow globally (Habib and Saha, 2010) and it is predicted that approximately 4.1 million people will die from NCDs by 2015 if relevant preventative measures are not put in place (Kim et al., 2013). As a result of this huge burden, NCDs are regarded as the main causes of death and disability in the world, according to the WHO Global Status Report on Non-communicable Diseases (NCDs) 2010 (WHO Global Status Report 2010, Wagner and Brath 2012). Approximately 63% of deaths in 2008 were due to NCDs, accounting for 36 million of the total 57 million global deaths in that year (Abegunde et al., 2007; Alwan et al., 2010; Wagner and Brath, 2012). The projected global annual increase in NCD prevalence and related deaths is a major challenge facing the human race (Boutayeb et al., 2013). Public health specialists and governments have increased their focus on chronic NCDs because these diseases have a huge negative economic impact (Maher et al., 2009).

The international community can no longer continue to ignore the impact of NCDs in low- and middle-income countries (Miranda et al., 2008). This is mainly because NCDs are becoming particularly important due to the rapid increase in their prevalence as these countries undergo socio-economic improvement (Fritzen, 2007; Beaglehole et al., 2008; Hanson et al., 2011). The coming decade will see an increase of approximately 17% in global NCD deaths, according to the WHO (Maher et al., 2009).

2.2.2 The Burden of chronic non-communicable diseases in Africa

The World Health Organization (WHO) and global health estimates suggest that the second leading cause of death in Africa is chronic NCDs (Global Status Report on Non-Communicable Diseases 2010, Kengne and Mayosi, 2013) and that this figure will rise by 27% between 2005 and 2015 (Hughes et al., 2012). Health and demographic transitions leading to the upsurge in NCDs in Africa are occurring faster than those observed in developed countries, thereby compressing the timeline for effective adaptation. The epidemic of NCDs is occurring in African countries that are yet to develop economically and are still confronted with vital priorities in areas such as maternal and child health, including major infectious diseases (Kengne and Mayosi, 2013). African countries seem unprepared to cope with the growing challenge of providing preventive and curative care for NCDs (Kengne and Mayosi, 2013).

The population of sub-Saharan Africa (SSA) in the age group 50 years and above is expected to be the highest than in any region in the world by the year 2030 but the health of this age group is still generally ignored on this continent (Negin et al., 2011). NCDs are predicted to increase by more than 20% in low- and middle-income regions, like the African region (Bradshaw et al., 2010). By the year 2020 NCDs in Africa will be responsible for almost three-quarters as many deaths as from other health conditions, such as infectious diseases, including diseases related to women's health and nutritional diseases (Bradshaw et al., 2010).

A reported estimate of approximately 2 million deaths due to NCDs occurred in SSA in 2010, which is a 46% increase from deaths reported in 1990 (Naghavi and Forouzanfar, 2013). NCDs accounted for 30% of the 9.5 million deaths and 25.8% of the 675.4 million disability-adjusted life years (DALYs) recorded in Africa in 2011 (Kengne and Mayosi, 2013). In 2008 the African Region reported the highest age-standardised NCD mortality rates for all ages, namely, 844 per 100 000 for males and 724 per 100 000 for females. (Wagner and Brath, 2012). The World Health Organization (WHO) reported that in 2008 age-standardised diabetes and cardiovascular disease (CVD) related mortality among 30–70-year-olds was 382 per 100 000 people in Africa. This was the highest in the world and more than double that of

the Americas, the WHO region with the lowest mortality rate, with 169 per 100 000 people, (Peer et al., 2014).

2.2.3 The Burden of chronic non-communicable diseases in South Africa

In South Africa, estimated all-cause mortality and disability-adjusted life years of 37% and 16% respectively are due to NCDs but with significant variation between population groups (Puoane et al., 2012). Approximately 56% of the population of South Africa lives in urban centres and in these areas, there is high urbanisation of the black population (Nugent, 2008). The rapid urbanisation has caused a large shift in the health patterns displayed by South Africans, with evidence of an increased prevalence of non-communicable diseases (Todes et al., 2010). NCDs disproportionately affect poor people living in urban settings, while the demand for chronic care increases in South Africa as most poor people are dependent on the public health care system, which is free (Tollman et al., 2008; Mayosi et al., 2009).

An increase in chronic non-communicable diseases has been reported from some rural areas in South Africa, such as the Agincourt HDSS situated in rural area of the Mpumalanga Province of South Africa, indicating an emergence of non-communicable diseases. In this rural area NCDs have increased from 197 per 100 000 in 1992 to 227 per 100 000 in 2005 (Tollman et al., 2008). The prevalence of hypertension and obesity were also found to be high in this rural area, coupled with the high prevalence of strokes. In 2001 the prevalence of strokes was approximately half that typically recorded in high-income regions of the world but double that noted elsewhere in Africa (Tollman et al., 2008). A high prevalence of risk factors for NCDs was also reported in a rural area of the Limpopo Province (Alberts et al., 2005).

The prevalence of diabetes in South Africa in the year 2011 was estimated at 6.5% in the age group 20–79 years, making it the fourth most common diagnosis in primary care (van der Does and Mash, 2013) and which contributes significantly to the burden of disease in South Africa. Strokes, hypertension and type 2 diabetes were found to be the most common causes of morbidity and mortality associated with NCDs in the urban black population of South Africa (Bradshaw et al., 2010). A similar trend is observed globally (Alberts et al., 2005, Puoane et al., 2008, Bradshaw et al., 2010).

2.3 The impact of chronic non-communicable diseases

The increased NCD burden is becoming a major barrier to development and the achievement of the MDGs, contributing to poverty in both low- and middle-income countries (Beaglehole et al., 2011). NCDs have a significant impact on population health in terms of avoidable deaths, disabilities and the

economy (Bloom et al., 2014) globally. This poses a multi-layered challenge which requires responses and interventions at every level of society (Hughes et al., 2012). This is mainly because NCDs are of long progression and require more frequent health care services than infectious diseases do (Global Status Report on Non-Communicable Diseases 2010, Atun et al., 2013). Some of the implications of an increase in NCDs include the burden of health care costs and lost economic productivity due to illness and premature death (Saeed, 2013).

Very few low- and middle-income countries have the fiscal strength to meet the future health, economic, and social burdens imposed by NCDs (Atun et al., 2013). The economic consequences of an increase in the prevalence of non-communicable diseases are huge globally, with costs estimated to increase to \$13 trillion in 2030 (Beaglehole et al., 2011). Evidence shows that a 10% rise in NCDs leads to a 0.5% decrease in gross domestic product. Therefore between the years 2011 and 2030 the projected cumulative global loss of economic output of \$46.7 trillion will be due to NCDs and \$21.3 trillion (46%) of this loss of output will occur in low- and middle-income countries (Hunter and Reddy, 2013).

2.4 The Risk Factors for Chronic Non-Communicable Diseases

Risk factors are defined as any attribute, characteristic or exposure of an individual, which increases the likelihood of developing a disease or injury (Ogoina and Onyemelukwe 2009, WHO, 2010). The main risk factors for NCDs have been well known for many years and are similar in almost all countries (Habib and Saha, 2010). The established conventional risk factors for development of many NCDs include tobacco use, excessive alcohol consumption, low physical activity, unhealthy diet (low fruit and vegetable intake), overweight, obesity, raised blood pressure, increased blood glucose levels and dyslipidaemia (Ogoina and Onyemelukwe, 2009; Bradshaw et al., 2010). These risk factors remain targets for NCD prevention and control strategies (World Bank, 2006; WHO, 2010) as these risk factors cause more than two-thirds of all new cases of NCDs and increase the risk of complications in people with NCDs (Habib and Saha, 2010). The prevalence of NCD risk factors in South Africa is very high and a large proportion of the burden of disease can be attributed to these potentially modifiable risk factors (Mayosi et al., 2009). Clustering of these risk factors significantly increases the risk of morbidity and mortality from cardiovascular disease (Nawi et al., 2009).

2.4.1 Tobacco use and chronic non-communicable diseases

The greatest threat to global health is tobacco as it is used, in various forms, by approximately 2.2 billion adults around the world (Kakde et al., 2012). Amongst NCD risk factors, the use of tobacco remains one of the most modifiable risk factors and it is the single most preventable cause of death in the world today

(Puoane et al., 2012). Globally, approximately one billion men and 250 million women, aged 15 years and older, smoke tobacco. Of these, 50% of the men and 9% of the women live in developing countries (Coovadia et al., 2009). Cigarettes are the most common form of tobacco used in the world and cause 443,000 deaths in the United States each year (Townsend et al., 2006).

The use of both cigarettes and smokeless tobacco products are associated with increased risk of chronic diseases, which include periodontal diseases, oral and pharyngeal cancers, myocardial infarction, strokes, erectile dysfunction and problems in pregnancy, such as stillbirth and low birth weight (Kakde et al., 2012). Oral use of smokeless tobacco products results in high venous concentrations of nicotine, equal to those for use of cigarettes (U.S. Department of Health and Human Services, 2010). The addiction potential may be higher for smokeless tobacco products than for nicotine nasal spray because the rate of nicotine absorption for smoke-less tobacco products is faster (Holm et al., 1992; U.S. Department of Health and Human Services, 2010; Mackay and Samet, 2014). Smokeless tobacco use, which involves chewing tobacco - often along with betel quid (betel leaf, areca nut, lime and cateche), is an addiction for millions of people worldwide and research indicates increasing use by young individuals in many countries (Kakde et al., 2012).

Pathways and mechanisms by which active and passive smoking contribute to causation of disease, including cardiovascular disease, are illustrated in Figure 1. The depiction of cigarette components in the “tar phase” and “gas phase” shows their action through several interacting pathways, indicating a role for genetic and other factors (U.S Department of Health and Human Services, 2010). The characterisation of mechanisms through which smoking causes disease could lead to application of this knowledge to reduce the risk caused by tobacco, looking into the following aspects (U.S Department of Health and Human Services, 2010):

- i. Assessing tobacco products for their potential to cause injury,
- ii. Development of biomarkers of injury to identify early stages of disease development in smokers,
- iii. Identifying persons at risk on a genetic basis through the operation of a particular mechanism,
- iv. Providing a basis for preventive therapies that block or reverse the underlying process of injury,
and
- v. Identifying the contribution of smoking to causation of diseases with multiple etiologic factors.

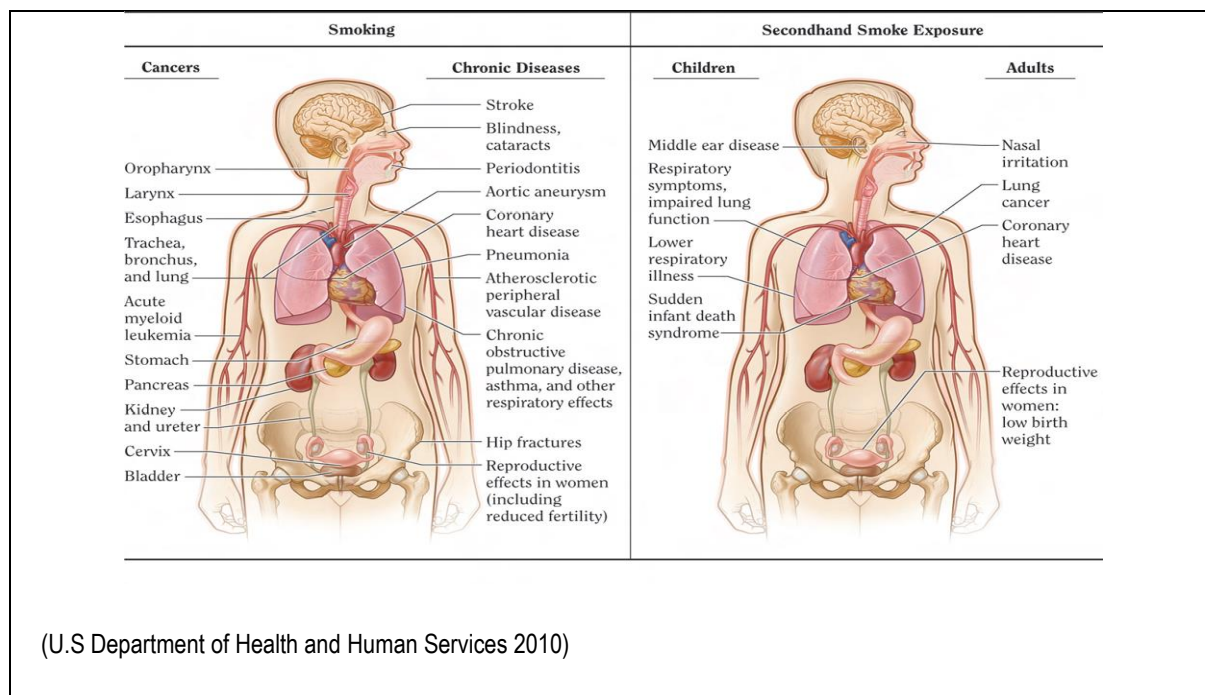


Figure 1: The health consequences causally linked to smoking and exposure to second-hand smoke

Smoking is an urgent public health concern in South Africa (Dutra et al., 2014). To advocate for national tobacco control strategies, a country should have local reliable population-based data on the burden of tobacco use and tobacco-attributable morbidity, including mortality, as well as their predictors (Ashraf et al., 2009). The public health implications of smoking among South Africans are best viewed in the context of the country's other public health and social concerns, as the overall smoking prevalence is high. The prevalence of smoking is disproportionately high in certain racial groups such as in Indian men 55.5%, Coloured men with 52.1% Coloured women 41.8% and White women 27.3% (WHO, 2011a; Dutra et al., 2014).

2.4.2 Alcohol consumption and chronic non-communicable diseases

Alcohol is the world's third largest disease risk factor, causing 2.5 million deaths annually worldwide (Martineau et al., 2013). Alcohol consumption is a lifestyle behaviour that has been extensively studied for potential benefits and risks to health (Eigenbrodt et al., 2001). Alcohol, when consumed in excess, has been associated with negative outcomes, such as cognitive decline, repeated falls, strokes, malnutrition and social isolation (Eigenbrodt et al., 2001). When alcohol intake is low or moderate, it may have beneficial effects on cardiovascular disease, resulting in a decrease in all-cause mortality (Eigenbrodt et al., 2001). Epidemiological and experimental investigations have established a close association between alcohol consumption and hypertension (Fuchs et al., 2001).

Developing countries have reported an increase in the prevalence of chronic diseases, including cancers, as the result of increased alcohol consumption (Tesfaye et al., 2006). The global burden of disease shows that increased alcohol consumption has contributed to numerous health problems, such as neuropsychiatric disorders, unintentional and intentional injuries (Rehm et al., 2009). There is a need to establish interventions, targeting multiple points, to address the complex causal pathways of alcohol-related harm as the consequences span a range of biological, behavioural, social and economic dimensions (Martineau et al., 2013).

2.4.3 Physical inactivity and chronic non-communicable diseases

Physical activity encompasses all forms of muscular movement that result in considerable energy expenditure (Shephard, 2003). Physical inactivity is one of the lifestyle factors that has been identified as being, in part, responsible for the early development of many chronic diseases (Durstine et al., 2013). Physical inactivity increases the risk of many adverse health conditions, including major non-communicable diseases such as coronary heart disease, type 2 diabetes, colon and breast cancer, which shortens life expectancy (Guthold et al., 2008; Kohl et al., 2012). Health care systems have been burdened by an increase in health disorders related to physical inactivity, including health-related quality of life, as well as direct and indirect economic costs to the society (Lee et al., 2012).

Physical inactivity is the most important modifiable risk factor which contributes to an increase in the global burden of chronic diseases (Guthold et al., 2008). Therefore, promotion of physical activity is considered an important aspect of wellbeing and is one of the “best buys” to combat heart disease, diabetes and strokes in Africa (Sampson et al., 2013). Health promotion, coupled with being physically active or engaging in physical activities, is an important component of a comprehensive approach to chronic disease prevention and health promotion (Haskell et al., 2009).

Physical activity is considered the principal intervention for primary and secondary disease prevention (Sigal et al., 2006). Many of the harmful effects of chronic diseases are improved, and in some cases (e.g., type 2 diabetes) the disease progression is slowed or halted, if physical activity and exercise are initiated after diagnosis (Sigal et al., 2006; Durstine et al., 2013). Regular physical activity is an important therapeutic lifestyle change in diabetes mellitus and was shown to reduce the risk of diabetes-related complications and morbidities (Geulayov et al., 2010). Among diabetic patients, people who are less fit have twice the risk of death from all causes, while being physically active improves insulin sensitivity and glucose metabolism, which delays progression to diabetes (Abubakari et al., 2009).

If physical activity and exercise are used as part of the medical management plan for secondary disease prevention, the quality of life will be improved and potentially extend the life of people living with chronic diseases (Durstine et al., 2013). This has been shown to improve diabetes-related outcomes (Piette et al., 2004, Geulayov et al., 2010) and reduce all-cause (30–40%) cardiovascular- and cancer-related deaths among chronic disease patients and among healthy individuals (Abubakari et al., 2009). Other studies have shown that socio-demographic and health characteristics, such as low socioeconomic status, older age, ethnicity and presence of chronic diseases, are associated with physical inactivity (Lambert et al., 2001; Glover et al., 2004; Geulayov et al., 2010).

Physical inactivity is escalating around the world (Durstine et al., 2013) and the WHO estimates that 41% of the global population is insufficiently active, whilst up to 60% of the global population fails to achieve the recommended 30 minutes of moderate activity for most days of the week (Abubakari et al., 2009). In South Africa, it has been found that approximately 45% of adults are physically inactive (Guthold et al., 2008; Jemmott et al., 2014) and physical inactivity accounts for 30% of heart disease in the country (Jemmott et al., 2014). Therefore, promotion of active lifestyles is an important public health priority because sedentary lifestyles have become a worldwide phenomenon with the social and economic changing patterns. This is solely associated with increased obesity, type 2 diabetes, and cardiovascular disease (Lee et al., 2011).

Physical inactivity is a lifestyle factor and a complex behaviour which is difficult to measure in free-living individuals (Assah et al., 2011) and, therefore, there is a need to undertake precise measurements of habitual physical activity, which are essential to the recommendation of an appropriate pattern of physical activity to maintain good health (Shephard, 2003). Pedometry is considered a valid and reliable objective measure of free-living physical activity but it has a disadvantage because the primary measure, which is usually reported as the number of steps an individual takes, provides no information as to the intensity of the ambulation (Cook et al., 2010). The possibility of significant physical activity/inactivity misclassification as a result of self-reporting measures has been raised in South Africa (Cook et al., 2012). Discrepancies between objective and subjective measures of physical activity and self-reporting measures in South Africa indicate over-reporting of sedentary activities and under-reporting of physically active behaviours (Cook et al., 2012).

More baseline information at country- and sub country-level on the prevalence of physical inactivity is needed for governments to be able to formulate policies and programmes aimed at the reduction of

physical inactivity (Guthold et al., 2008). In South Africa, a reliable estimate to objectively measure physical activity levels is lacking (Cook and Lambert 2008).

2.4.4 Unhealthy diet (low fruit and vegetable intake) and chronic non-communicable diseases

Fruit and vegetable (FV) are rich in important nutrients such as fiber, antioxidants and phytochemicals; and are high in water content and are low in fat, (Fisk et al., 2011; Kris-Etherton et al., 2014). FV intake is associated with reduced risk of CVD (Kris-Etherton et al., 2014). The mechanisms by which the nutrients from FV intake decrease CVD risk include lowering BP and LDL-C (Kris-Etherton et al., 2014). FV will displace other energy-dense foods (Fisk et al., 2011) because FV is nutrient dense and provide relatively few calories (Kris-Etherton et al., 2014). High FV intake can lead to a decreased risk in developing metabolic syndrome (MetS), cardiovascular disease (CVD), coronary heart disease (CHD), strokes, type 2 diabetes and some cancers (Fisk et al., 2011; Mirmiran et al., 2013). Part of the effect for weight loss is a consequence of a reduction in fat intake, coupled with fruit and vegetable consumption, which shows that adding fruits and vegetables to a fat restriction diet results in significantly more weight being lost than occurs with a fat restriction diet alone (Singh et al., 1992; Rodríguez-Rodríguez et al., 2010).

A high fruit and vegetable intake provides high potassium and anti-oxidants, which are associated with reduced prevalence of coronary heart disease, strokes, hypertension and overall lower cardiovascular diseases (Cappuccio et al., 2003; Brunt et al., 2011; Erinoshio et al., 2012). The protective constituents of fruits and vegetables, such as potassium, magnesium, folate, vitamins, fiber and other phytochemical compounds, are responsible for possible protective qualities, such as reducing oxidative stress and inflammatory markers, lowering blood pressure, increasing insulin sensitivity and improving homeostasis regulation (Mirmiran et al., 2013).

Most adults do not meet the “5-A-Day” recommendation of at least 5 servings of fruit and vegetable daily. One possible explanation for the low fruit and vegetable intake is that many adults are probably not aware of the recommendation to consume at least 5 servings of fruits and vegetables per day (Hughes et al., 2004; Erinoshio et al., 2012). Studies show that adults are more likely to consume large amounts of fruit and vegetable if they know the daily intake recommendation (Wolf et al., 2008; Erinoshio et al., 2012), thus public and private partnerships have been forged in many countries to inform consumers about the recommended daily intake. These include the serving size, nutrition and strategies to increase consumption among children and adults (Rekhy and McConchie, 2014).

It is estimated that up to 2.6 million deaths per year are attributable to inadequate consumption of FV worldwide. Increasing FV consumption to 600 g per day could reduce the burden of CHD by 31% (Mirmiran et al., 2013). However, the current average daily consumption of fruit and vegetable globally is much lower than the WHO recommended intake (Rekhy and McConchie, 2014). Dietary Approaches to Stop Hypertension (DASH) is a total diet plan which emphasises fruits, vegetables, (Conlin et al., 2003; Rankins et al., 2005), whole grains, poultry, fish, nuts, red meat, sweets and sugar-containing beverages (Svetkey et al., 1999). This diet significantly lowers blood pressure (BP) (Conlin et al., 2003), without weight loss or reduced sodium intake (Svetkey et al., 1999). Studies have shown the Dietary Approaches to Stop Hypertension (DASH) diet to be as effective for lowering blood pressure (BP) levels as the daily consumption of one prescription medication (Scisney-Matlock et al., 2006). A sustained reduction of 2 mmHg in diastolic blood pressure (DBP), which is achievable with lifestyle modifications, would result in a 17% decrease in the prevalence of hypertension, as well as a 6% reduction in the risk of coronary heart disease in the elderly people (Scisney-Matlock et al., 2006). DASH was effective in persons with elevated but non-hypertensive blood pressure and in those with stage 1 hypertension, suggesting a role for this dietary pattern in the prevention and treatment of hypertension (Svetkey et al., 1999).

Surveillance in South Africa indicates the presence of a double burden of nutrition-related diseases in that both under- and over-nutrition are common (Naude, 2013). The South African diet, which is high in salt and bread, contributes approximately 25 - 40% of sodium intake (Charlton et al., 2004, Bertram et al., 2012). The reduction in salt consumption as a strategy to reduce blood pressure, which contributes to strokes and heart disease (Beaglehole et al., 2011), should be a priority in South Africa.

2.4.5 Overweight, obesity and chronic non-communicable diseases

Overweight and obesity are defined by the WHO as abnormal or excessive fat accumulation that may impair health (Gunaid, 2012). Worldwide, the prevalence of overweight and obesity has increased dramatically, leading to an estimated 35% of adults (1.5 billion) being overweight, while obesity affects approximately 200 million men and nearly 300 million women (Yeon et al., 2012). The obesity epidemic is rapidly becoming a worldwide problem and has spread to low- and middle-income countries as a result of new dietary habits and sedentary ways of life. This fuels the occurrence of chronic diseases and premature mortality in the world (Cecchini et al., 2010). The prevalence of childhood overweight and obesity is projected to increase to approximately 60 million children by the year 2020, which is a 9.1% increase from the 6.7% level in 2010 (Cecchini et al., 2010).

There is a gap between available and required resources to tackle the global burden of obesity and chronic diseases. This gap is already very large and, based on the present disease trends, it is set to grow further (Cecchini et al., 2010). Among all countries the prevalence of obesity has increased the fastest in South Africa (Guthold et al., 2008; Cecchini et al., 2010). Increased body mass index (BMI) among women is associated with chronic diseases, especially coronary heart disease (Kruger et al., 2002).

Overweight and obesity are not only limited to the adult South African population but are prevalent among almost all age groups (Puoane et al., 2002; Zhou et al., 2012), which is a major public health concern (Puoane et al., 2002; Toriola et al., 2012). South Africa has the highest overall prevalence of overweight (BMI >25) and obesity (BMI >30) with more than 29% of men and 56% of women being classified as overweight or obese. This is higher than the prevalence reported in other African countries (Toriola et al., 2012).

2.4.6 Raised blood pressure

Hypertension, or raised blood pressure, is an important worldwide public-health challenge because of its high frequency of occurrence and concomitant risks of cardiovascular and kidney disease (Kearney et al., 2005). Hypertension is the leading risk factor for mortality (Kearney et al., 2005) and accountable for approximately 7.1 million deaths globally (Mohan et al., 2005), while it is ranked third as a cause of disability-adjusted life-years (Kearney et al., 2005). The detection and control of hypertension is improving in many countries, while challenges remain with respect to medication supply and lifestyle adherence by patients, which form part of patient-related barriers to optimising blood pressure (BP) (Jolles et al., 2013).

Hypertension is a significant medical issue and the management of hypertension is, therefore, of great public health importance in the developing world, as the world is currently faced with the dual challenge of concurrently combating both communicable diseases and the emerging epidemic of chronic non-communicable diseases (Mohan et al., 2005). Hypertension prevalence data is crucial for developing public health interventions in order to prevent the risk of CVD (Steyn, 2006). It is estimated that from 2008 to 2025 the number of hypertensive subjects in Africa will increase from 75 to 126 million, representing a 68% increase in prevalence (Guthold et al., 2008). Hypertension is a common public health problem in South Africa and most people are unaware of their BP levels, unless they visit a health care facility for other medical problems and have their blood pressure measured (DeFronzo et al., 2011).

The health system is currently giving more attention to health promotion and cardiovascular disease (CVD) prevention in sub-Saharan Africa (SSA), mainly because of the added burden of NCDs (Sampson et al., 2013). Screening for hypertension in health facilities provides patients with an opportunity to be educated about prevention of complications, as this is a first step in hypertension management. Health facilities should, therefore, have accurate measuring devices for proper diagnosis and treatment of hypertension (Mohan et al., 2005). In South Africa, evidence shows that a nurse-led clinical protocol based in primary care clinics succeeded in achieving hypertension control in 68% of patients. This is a good model, which relied on optimal use of existing services for hypertension management (Mohan et al., 2005).

2.4.7 Type 2 Diabetes

Diabetes mellitus is a non-communicable disease which affects people worldwide and which poses major public health and socioeconomic challenges (Mbanya et al., 2010). This condition is on the rise in low-income countries (Maher et al., 2011, Mayega et al., 2014). Over the past few decades, diabetes has appeared to be an important NCD in rural Africa (Mbanya et al., 2010). In 2008, it was reported that Africa had age-standardised diabetes and cardiovascular disease (CVD) related mortality among 30–70-year-olds of 382 per 100,000, which was the highest in the world (Peer et al., 2014). The projections made by the International Diabetes Federation show that the number of adults with diabetes in the world will increase by 54%. This burden of diabetes will increase from 284.6 million affected people in 2010 to 438.4 million affected people in 2030 (Mbanya et al., 2010; Echouffo-Tcheugui et al., 2012). Projections are also high for SSA being, increasing from 12.1 million affected people in 2010 to 23.9 million affected people in 2030 (Mbanya et al., 2010).

The major determinants of type 2 diabetes are overweight and obesity, which contribute to the abnormal glucose metabolism, mediated by increased insulin resistance (Li et al., 2014). Type 2 diabetes mellitus and hypertension often co-exist and are two major risk factors for cardiovascular morbidity and mortality (Frontoni et al., 2014). The association between the level of plasma glucose concentration and blood pressure exists in non-diabetic individuals and it is reported that the prevalence of hypertension is increased in diabetic patients when compared with non-diabetic individuals (Tai et al., 1991).

The prevalence of type 2 diabetes, which accounts for 90–95% of all diabetes, was relatively low at 4.9% in the African Region and the figures are projected to increase from 19.8 million persons affected in 2013 to 41.5 million persons affected in 2035, representing a 110% increase in prevalence (Peer et

al., 2014). The prevalence of type 2 diabetes in 2013 was not uniformly distributed in Africa Region (AFR) which is comprised of countries in sub-Saharan Africa. The prevalence of diabetes in AFR has showed an apparent increase associated with economic development, ranging from 4.4% in low-income countries to 5.0% in lower-middle income and 7.0% in the upper-middle income countries (Peer et al., 2014). Benin had the lowest prevalence rate of 3% followed by Mauritania; Cameroon and Congo with a prevalence rate of 6%, 6.1% and 7.1% respectively. Zimbabwe and Democratic Republic of Congo had diabetes prevalence rates of 10.2% and 14.5% respectively (Mbanya et al., 2010). The challenge faced by sub-Saharan Africa is that treatment of diabetes mellitus must compete for resources with communicable diseases, such as HIV (Katz et al., 2009).

Several studies conducted in South Africa and other African countries confirm both the increase in the prevalence of diabetes and the shifting epidemiology of diabetes complications (Kengne et al., 2005, Hall et al., 2011; Webb et al., 2014). The Indian community is more insulin resistant than other ethnic groups in South Africa and, therefore, this population group is at high risk of developing type 2 diabetes as well as ischaemic heart disease (Mayosi et al., 2009). In South Africa, diabetes, together with other chronic diseases such as heart disease and strokes, constitute the second most important cause of death in adults (Bradshaw et al., 2003; Mayosi et al., 2009). Again, diabetes, together with resultant complications, is becoming a major problem in South Africa, as in other countries in the world (Katz et al., 2009). There is limited data on the quality of diabetes care in South Africa,, however, there are guidelines for the prevention and treatment of diabetes developed by the South African Society for Metabolism, Diabetes and Endocrinology (SEMDSA). These guidelines clearly stipulate minimum diabetic care requirements; for example, frequency of blood tests and physical examinations. The guidelines have been adopted by the South African Department of Health for implementation in health facilities (Kengne et al., 2005; Hall et al., 2011; Webb et al., 2014).

The fundamental issue in the management of diabetes lies in control and intervention measures (Westaway, 2009). The challenge in South Africa is that chronic disease management, including the management of diabetes, is poor (Westaway, 2009) and includes the late presentation to health care services, lack of education and poor quality of care at primary health care level (Katz et al., 2009). The other contributing factor to the poor management of diabetes mellitus is lack of public health surveillance data, which can be used to advise relevant authorities on the prevalence and major modifiable risk factors associated with diabetes (Abubakari et al., 2009).

2.4.8 Serum lipids concentrations and chronic non-communicable diseases

Serum lipids are mainly cholesterol, triglycerides, and phospholipids (Boullart et al., 2012), which are transported in the plasma as lipoproteins. Dyslipidaemia is defined as having any of the following abnormalities in the lipid profile: Total cholesterol (TC) ≥ 5 mmol/l, triglycerides (TG) ≥ 1.7 mmol/L, High density lipoprotein (HDL-C) < 1.30 mmol/L for females and HDL-C < 1.00 mmol/L for males (Motala et al., 2011, Oldewage-Theron and Egal 2013). There is a well-known relationship between lipid concentration and cardiovascular disease (Mark and Jardine 2011, Nejat et al., 2014). There is also an association between the TG/HDL-C ratio and insulin resistance and it is suggested that the TG/HDL-C ratio may be a better predictor of cardiovascular events than other lipid parameters (Tsuruya et al., 2014).

Poor diet is an important potentially modifiable risk factor for lipid abnormalities (Bradlee et al., 2013). There is evidence from several epidemiological studies of an association between triglyceride levels and the incidence of CHD and cerebrovascular diseases (Labreuche et al., 2010). Therefore, modifying high-density lipoprotein cholesterol (HDL-C) and triglyceride levels may provide incremental clinical benefits in cardiovascular disease prevention (Labreuche et al., 2010). From a quantitative and qualitative perspective dyslipidaemia is an important cardiovascular risk factor in all population groups of South Africa (Maritz, 2005).

2.5 Chronic Non-Communicable Disease Prevention and Control

Non-communicable diseases (NCDs) can be prevented if a community received appropriate information, education and communication on possible risk factors (Alemseged et al., 2013). Most of the risks are attributable to lifestyle and behavioural patterns, and can, therefore, be changed (Alemseged et al., 2013). Determining the burden of risk factors for NCDs in a population would help to design and implement promotive and preventive measures. The World Health Organization (WHO) has recommended three planning steps for the prevention and control of NCDs and their risk factors in a population (WHO, 2003b; Msyamboza et al., 2011), which are:

- i. Determining the epidemiological situation of chronic diseases at a country level by investigating the prevalence of NCD risk factors among different populations,
- ii. The formulation and adoption of an NCD policy and plan of action;
- iii. Lastly, provide guidance to policymakers by identifying the proper steps for policy implementation, which will include, amongst other areas, health financing, legislation and regulations, advocacy, community-based interventions and health services delivery.

Accurate public health surveillance information is an essential component of any effort to combat NCDs. Sustainability of long term preventative measures is mainly based on the National Health Systems infrastructure to monitor, measure and evaluate progress made in the reduction of NCDs and their underlying risk factors (Sacco et al., 2012).

2.5.1 The STEPwise approach to surveillance (STEPS)

The determination of the distribution of NCD risk factors at a population level can be performed using the STEPwise approach to surveillance (STEPS) formulated by the World Health Organization (WHO) (Msyamboza et al., 2011). This approach is based on conducting population surveys to collect information on the major modifiable NCD risk factors and has been used in many studies globally (WHO, 2003b; Raban et al., 2012). WHO STEPwise approach was designed for use in low- and middle-income countries (Raban et al., 2012) and uses standardised instruments and protocols (Nawi et al., 2009). STEPwise has a set of core indicators, derived nationally and globally, which are deemed practical and easily obtainable by countries, regardless of technical capacity (Raban et al., 2012). STEPS has been piloted and implemented as a demonstration in 41 different countries, spanning all income categories (IOM, 2012).

The first recommended step in the planning of prevention and control of NCDs is to undertake a surveillance of NCD risk factors at population level (Alikhani et al., 2009; Msyamboza et al., 2011). To accurately plan targeted prevention and treatment interventions, including control activities for individuals and groups with different risk profiles (Msyamboza et al., 2011; Atun et al., 2013), a national risk factor profile for NCDs should be developed at both the individual and the population level (Atun et al., 2013). The future burden of disease can also be projected using information about a risk factor profile (Msyamboza et al., 2011). The STEPwise survey focuses on the collection of data on key risk factors associated with major chronic diseases, repeated periodically so that comparisons can be made with the previously collected data to determine if there has been any improvement in the control of chronic diseases in the community under study (Nawi et al., 2009). The collected information is useful for countries to design interventions which are focused on high risk communities to reduce the NCD risk factors in the population (Nawi et al., 2009). The process will ideally be used by countries to advocate for high-level support from government and politicians as it constitutes an evidence base for planning of interventions at policy, environmental and health system levels (Msyamboza et al., 2011). Findings from the Agincourt HDSS suggest that the burden of chronic diseases has increased disproportionately when compared with the burden of acute diseases in the rural Mpumalanga Province of South Africa. This has

major implications for the delivery of acute and chronic health-care services and emphasises the need to scale up the delivery of primary health-care services to meet the increasing demand for chronic care (Mayosi et al., 2009).

2.5.2 The formulation and adoption of chronic non-communicable diseases policy and plan of action

The second step in the prevention and control of chronic diseases entails the process of formulating and adopting policies and action plans to address NCDs (Msyamboza et al., 2011). The World Health Organization (WHO) has developed a generic NCD Policy and Plan of Action to help in this process (WHO, 2009; Msyamboza et al., 2011), as governments around the world become increasingly aware of the threat to public health posed by the emergence of a chronic disease epidemic (Burgess et al., 2014). Developing countries face more health policy-related challenges due to their limited economic resources, which have been drained in recent years by the increasing burden of chronic diseases (Trisolini et al., 1999; Bloom et al., 2011).

Countries should have a comprehensive health policy to improve chronic disease management (Burgess et al., 2014). This policy should comprise of a broad range of individual and population-wide interventions (Beaglehole et al., 2007) dealing with prevention, early intervention and management related to chronic disease (Burgess et al., 2014). A public health approach that incorporates interventions that are evidence-based, affordable and cost-effective should be used to prevent incidence and impacts of NCDs. These interventions should mainly focus on a population-wide, multisectoral approach and address the underlying social, economic and environmental conditions that impact on causes of NCDs, which are well established worldwide (Raine et al., 2013).

South African policy interventions to reduce the impact of chronic non-communicable diseases include, amongst other aspects, food-based dietary guidelines, the Tobacco Products Control Act (Act 83 of 1993) and the Liquor Act (Act 59 of 2003) (Puoane et al., 2012). These have been widely used as educational interventions for prevention of chronic diseases (Puoane et al., 2012). The National Department of Health in South Africa has developed a Strategic Plan for the years 2013 to 2017 which requires the implementation of three major components, namely, (i) the prevention of NCDs and promotion of health and wellness at population, community and individual levels; (ii) the improvement of control of NCDs through strengthening and reform of health systems; and, lastly, (iii) the monitoring of NCDs and their main risk factors, including conducting innovative research (NDoH Strat Plan 2013-17).

2.5.3 Identifying policy implementation steps for chronic non-communicable diseases

The third planning step for the prevention and control of chronic diseases is to identify policy implementation (Msyamboza et al., 2011). This step focuses on the processes required for the implementation of policies and plan of actions, especially in the areas of health financing, legislation and regulations, advocacy, community-based interventions and health services delivery (WHO, 2007; Msyamboza et al., 2011). The development and implementation of plans of action for prevention and control of chronic diseases has been undertaken by several low- and middle-income countries, despite global economic weariness (Beaglehole et al., 2007).

Individual and community-based interventions, together with public health policies targeting social and environmental determinants, are important components of efforts to prevent obesity and its associated health consequences (von Tigerstrom, 2013). For example, taxes and subsidies on food and beverage products, food labelling requirements, regulation of food content and regulation of food marketing, especially to children (WHO, 2010; von Tigerstrom, 2013), can be used to encourage healthier eating and, therefore, prevent obesity and other chronic diseases (WHO, 2007; Ries and Tigerstrom, 2010). Coordinated, multisectoral initiatives can address the current gaps in nutrition programmes, which do not incorporate the dietary elements needed for prevention of chronic disease, especially among the vulnerable (Magnusson, 2009).

The policies required to address national and global determinants of chronic diseases extend well beyond the boundaries of health departments and national healthcare systems (Magnusson, 2009). Public health interventions that can help to prevent or reduce the risk of chronic diseases, include the implementation of policy measures related to tobacco control, regulation of production and supply of unhealthy foods in the communities (Reddy et al., 2005). The planning of urban areas to promote physical activity, together with community empowerment through health promotion programmes, can also reduce the risk of chronic diseases. This will help to enhance the knowledge of community members to foster awareness and adoption of healthy behaviours (Reddy et al., 2005). In terms of disease management, early detection of individuals at high risk of developing chronic diseases, and those with an early manifestation of disease, can also reduce the risk of chronic disease complications (Reddy et al., 2005). Lastly, secondary prevention in people who have developed chronic diseases will also reduce the risk of complications through the provision of cost-effective and life-saving acute care (Reddy et al., 2005).

2.6 Chronic Disease Management

Chronic disease management (CDM) refers to an approach to public health care that emphasises and encourages individuals living with chronic diseases to maintain their independence in managing their health conditions and functional capacity (Willison et al., 2007). This approach helps people living with chronic diseases to keep as healthy as possible through the prevention, early detection and management of chronic diseases (Willison et al., 2007). Holistic and comprehensive care is offered by CDM with its focus on rehabilitation (Willison et al., 2007). There are on-going community-based evaluations looking into CDM pathways currently used in different countries and what should be undertaken by public health officials in order to monitor and help establish CDM initiatives (Willison et al., 2007). CDM is important for public health officials concerned with maintaining, not only a healthy quality of life for the individual, but also stability and equality among society members as a whole. With the increasing elderly population, chronic diseases are the cause of increasing medical costs and decreased quality of life (Kim et al., 2013).

According to Wagner (1997), the greatest challenge faced by organised health care systems is to meet the complex needs of people living with chronic diseases. If people living with chronic diseases do not receive effective therapy and support this will lead to poor disease control and they become unhappy with the care they receive (Wagner 1997). To this end, improvement of chronic diseases care and disease outcomes will not come easily and thus ambulatory care systems should be reshaped with an aim to improve provision of health care for most people living with chronic diseases (Wagner 1997).

The provision of primary health care (PHC) services is a significant element for determining health care utilisation, mainly because this is the first point of contact with the health system for most people (Carey et al., 2013). Primary health care practice was largely designed to provide ready access and care to patients with acute and varied problems, with an emphasis on triage and patient flow. These patients would have short appointments, be diagnosed and then receive medical treatment as determined by laboratory investigations (Light, 1997; Llovera et al., 2003). Others would get prescriptions, coupled with brief patient education and patient-initiated follow-up care (Light, 1997; Llovera et al., 2003). But people living with chronic diseases have different needs from patients suffering from acute conditions and these needs are unlikely to be met by the culture designed for acute health care organisations. Therefore, these people require planned and regular interactions with their caregivers in the health facilities and in the community (Wagner et al., 1996a). This regular interaction includes systematic patient assessments using treatment guidelines and support for the patients, who need to play a major role in the self-management of their health (Wagner et al., 1996b). A surveillance system to provide relevant clinical

information about the patient's progress is important, as is continuing follow-ups initiated by health care practitioners, to manage these patients (Wagner et al., 1996b; von Korff et al., 1997).

As patients in a health facility interact with health care practitioners, chronic disease management (CDM) begins by focusing on preventing disease progression and minimising the complications that might be caused by the disease (Health Council Canada, 2009). As the disease progresses the aspect of continuity and integration of care for the individual patient becomes increasingly important, to the extent that patients become active partners in managing their health. The quality of life of people living with chronic diseases may be improved by even slight reductions in risk factors for chronic illness (Health Council Canada, 2009). The provision of group-based education, coupled with active engagement of patients in their own care, is one approach to reduce the burden associated with chronic conditions (Nolte et al., 2007). Hence, there are self-management courses which have been developed to empower people living with chronic disease, designed to increase their confidence, to teach them skills and techniques and to improve their interaction with the health care practitioners to enable them to improve the management of their condition (Newman et al., 2004; Nolte et al., 2007).

Primary health care teams based in the communities should form the basis for the care for people living with chronic diseases because team-based care can “reduce waiting times for appointments in health facilities (Health Council Canada, 2008). This will strengthen the providers' ability to focus on prevention, coordinate care among health care providers and help patients better manage their chronic conditions” (Health Council Canada, 2008). CDM must be evidence-based and patient-centred in order to be successful as the evidence suggests that involving patients in decision-making can make patients become more actively involved in health care decisions. Patient participation might not be at the same level, which calls for a meaningful dialogue between patients and health care workers, including shared decision-making (Neuner-Jehle et al., 2013).

2.6.1 Global perspective of chronic disease management

The World Health Organization (WHO) conducted a two-year review of healthcare models and best practices from around the world as part of the response to the huge challenge posed by chronic diseases (Education and debate, 2002; WHO, 2002). The findings in this report provide a comprehensive conceptual framework, highlighting strategies for prevention and management of chronic diseases in poorly- or under-resourced settings (WHO, 2002). The report also highlights an urgent need for health systems to shift away from a model of care that is mostly acute care-based, reactive and episodic (WHO, 2002). Instead, health care should be organised in such a way that it

facilitates an on-going relationship between provider and patient. The patients, therefore, should be able to make full use of their own resources, including the resources found in the community, for health care delivery (WHO, 2002). The proposed model of care should focus on the person's own context and not simply on the disorder or health condition (WHO, 2002). The partnership between the patient and health care provider is also emphasised, not just as a resource for understanding health problems, but also as a basis for the prevention and intervention to control chronic diseases (Education and Debate, 2002, WHO, 2002).

Wagner and colleagues in the USA, after extensive review of the literature, developed the Chronic Care Model (CCM). The CCM is the most widely known model dealing with care of people with chronic conditions (Wagner et al., 1996b) and it has been applied extensively in the USA., the U.K., Australia, New Zealand, parts of Europe and Canadian Provinces, such as British Columbia (Ontario's Framework, 2007). The CCM was developed within the context of the managed care organisations (MCOs) in the USA in an attempt to improve the management of chronic disease and to reduce costs to the Organization (Wagner et al., 1996a). The focus of this model is on primary care to improve the lives of people living with chronic conditions (Hung et al., 2008) and includes interactions between prepared, proactive practice teams and well informed, motivated patients (Wagner et al., 1996a, Wagner et al., 1996b).

The CCM developed by Wagner and colleagues had an overall aim of producing well-informed patients and a relevant health care system that features six major areas for quality improvement (Baker et al., 2005; Hung et al., 2008), which are:

- 1) the health system and organisation of care,
- 2) self-management support for patients to participate in managing their own care,
- 3) a delivery system design that proactively determines and addresses health needs,
- 4) decision support for clinicians based on scientific evidence,
- 5) clinical information systems that provide access to patient population data, and
- 6) linkages to community resources to facilitate care outside the clinical setting.

There have been reports of positive impacts of the CCM on patient health outcomes, including hospital utilisation, quality of life (QoL), functional health and patient satisfaction (Brand et al., 2014). This also includes improvements in patients' health behaviour (Cramm et al., 2014). The existence of one or more of the components of the CCM improves clinical outcomes of patients and processes for care of chronic conditions. The evidence is strongest for diabetes, heart failure, asthma and depression. By

extrapolating the results from implementation of the model in diabetes to a population level, a reduction of greater than 10% in mortality can be expected (Nuño et al., 2012).

There has been promising but inconclusive results on the effectiveness of care delivery based on the CCM (Cramm et al., 2014). Evidence found by Pearson and colleagues (Pearson et al., 2005) suggests that the CCM is a useful framework for quality improvement as it has provided evidence of positive changes in proactive follow-ups, patient registries and capacity to support care management decisions. Others provided strong evidence that the CCM led to significant improvements in process outcome measures and clinical outcomes (Tsai et al., 2005). Lastly other researchers have found indications that programmes based on the CCM prevent disease complications (Cramm et al., 2014).

The chronic care model (CCM) guides quality improvement in chronic care delivery by providing a framework of how primary health care practices can change the healthcare delivery from acute and reactive care to chronic and proactive care that is organised, structured and planned, through a combination of effective multidisciplinary teams and planned interactions with chronically ill patients (Cramm et al., 2014).

2.6.2 African perspective of chronic disease management

The African continent is confronted by an increasing epidemic of chronic illnesses which have been neglected (Mayosi et al., 2009; de-Graft et al., 2010). These diseases are strongly ascribed to behavioural practices which are ever changing in the communities (e.g., sedentary lifestyles and diets high in saturated fat, salt and sugar) (de-Graft et al., 2010). The health systems in Africa are weak and, therefore, most countries are unable to cope with the double burden of infectious and chronic diseases (de-Graft et al., 2010, Echouffo-Tcheugui and Kengne, 2012). A three-pronged approach has been recommended by several experts to address the burden of chronic diseases (de-Graft et al., 2010). These approaches cover aspects, such as epidemiology, to determine the burden of disease; primary prevention of chronic diseases in healthy populations and secondary prevention strategies focusing on preventing the complications from chronic diseases to improve the quality of life in affected communities. Unfortunately the primary and secondary preventative strategies have been largely neglected, with the exception of community-based interventions in countries like Mauritius, Tanzania and South Africa (de-Graft et al., 2010).

Existing economic and human resources in Africa have to be used in an efficient way to develop interventions which will complement the challenges faced by African health systems. This should be

done with guidance from experts from several institutions in a well-organised manner (de-Graft et al., 2010). There are several national surveys which have been conducted in Africa on risk factors for chronic disease (de-Graft et al., 2010). These surveys include, amongst others, the WHO STEPwise Surveys for Non-Communicable Disease Risk Factor Surveillance, Global Youth Tobacco Surveys, Global School Health Surveys, Demographic and Health Surveys, World Health Surveys and the Study of Global Ageing and Adult Health (SAGE) (de-Graft et al., 2010).

The approach of the African region to tackling the burden of chronic diseases and reducing the prevalence rates should emphasise primary prevention strategies which focus on improving the knowledge of community members on the risk factors for chronic diseases, such as diabetes, hypertension and strokes (de-Graft et al., 2010). These chronic diseases, including cancers, contribute to a greater number of adult medical admissions than do HIV/AIDS or tuberculosis in countries like Ghana, Nigeria and Cameroon (de-Graft et al., 2010).

2.6.3 South African perspective on chronic disease management

South Africa, like other African countries, is challenged by the crucial need to shift from an acute care model to a chronic care model that is better organised to manage the growing burden of non-communicable diseases (Epping-Jordan et al., 2005). The management of chronic diseases in South Africa received inadequate attention in the past due to the competing interests of managing more acute and urgent conditions, such as trauma or severe illness caused by active infections (Kahn et al., 1999). This challenge is exacerbated by the lack of urgency in the allocation of resources at every level to combat chronic diseases in South Africa (Kahn et al., 1999). To achieve an improvement in the lives of people living with chronic diseases will need a new approach to health systems development (Puoane et al., 2008; Steyn et al., 2008).

2.6.3.1 South African response on models for chronic disease management

The multiple burden of disease in South Africa has placed a huge demand on the health services (Kahn et al., 1999). The contribution made by community health workers (CHWs) in the effective management of HIV and TB suggests that this cadre of health care workers could contribute positively in the management of chronic diseases in South Africa (Ndou et al., 2013). Because South Africa has limited resources for health services (Kahn et al., 1999) CHWs were used for services such as pre- and post-test counselling, administering treatment, treatment adherence and tracing of treatment defaulters in the communities (Ndou et al., 2013).

South Africa is one of the first countries in Africa to respond to the challenge of reorganising the health care along the lines of chronic care, with the introduction of an integrated chronic disease management (ICDM) model in three pilot districts (Petersen et al., 2014a). The ICDM model services all chronic care patients at one service point and provides regular and planned health visits for follow-up care; provides specialist decision support to PHC using a set of nurse-led clinical guidelines developed for the identification and management of multiple chronic diseases, called Primary Care 101 (PC 101) (Petersen et al., 2014a). This model incorporates a registry of chronic patients to assist with tracking and follow-up of defaulters and to provide linkages to community resources through community health worker-driven outreach teams. These teams screen and identify patients with chronic conditions, as well as follow-up non-adherent patients (Petersen et al., 2014a).

In response to the growing burden of chronic diseases in South Africa, there are several existing community-based intervention models for the control and management of non-communicable diseases (Mayosi et al., 2009; Todes et al., 2010). In light of the poor control of diabetes mellitus in South Africa, an outreach programme called Chronic Disease Outreach Program (CDOP) was established in the South Western Township (Soweto), located southwest of Johannesburg to respond to a high prevalence of risk factors for chronic diseases and non-communicable diseases, such as obesity, hypertension and diabetes mellitus (Katz et al., 2009). In addition to this, a nurse-led non-communicable disease primary health care programme was established using a comprehensive care approach in which nurses were able to achieve good disease control among most of the patients, resulting in 68% of patients with hypertension, 82% of those with diabetes and 84% of those with asthma being well managed (Epping-Jordan et al., 2004).

Amongst the achievements is the Community Health Intervention Programme (CHIPS), which has over 40 branches in South Africa and more than 300 leaders have been trained in this programme, the programme has contributed positively to the lives of more than 8 000 individuals (Mayosi et al., 2009; Todes et al., 2010). Another programme implemented is the Woolworths Health Promotion Programme, which provided health education to children, caregivers, parents and teachers. The health education was tailored around how to make physical activity an integral part of the lives of children and distributed DVD's to homes and schools. The Soul City Health Promotion Programme was also associated with positive change in intention and actual behaviour and has resulted in increased knowledge and awareness of high blood pressure, leading to the adoption of a more healthy lifestyle, through the prevention and treatment of hypertension in communities (Mayosi et al., 2009; Todes et al., 2010).

Community health workers in the Khayelitsha Project took part in the Promoting Healthy Lifestyles programme between 2001 and 2005. As a result of this programme, approximately 2 000 local community members were capacitated, resulting in the development of health promoters who later formed support groups. A gym was established, with support from Virgin Active, for community members to have access to facilities in order to participate in physical activity (Mayosi et al., 2009; Todes et al., 2010). Lastly, the Vuka South Africa programme, the Move for Your Health Initiative of the National Department of Health, was established. Workshops were organised and the Move for Your Health Don Lock Memorial 8km run and 5km run/walk were held in 2007 in Cape Town as an opportunity for community members to increase their physical activity (Mayosi et al., 2009; Todes et al., 2010).

The main challenge in South Africa is that the optimal chronic disease care model, one which focuses on the role of the patient along with that of the health care provider, has not been achieved (Steyn and Levitt, 2006). This might be due to high patient loads as well as the historical dominance of biochemical task-oriented care typically associated with advice giving and, therefore, a gap exists with respect to the provision of psychosocial interventions to promote self-management and behaviour change (Petersen et al., 2014a). Several non-governmental organisations (NGOs) have been concerned with the prevention of non-communicable diseases but the links between different stakeholders are very weak as they don't have a shared vision (Mayosi et al., 2009). In response to this challenge the National Department of Health in South Africa has developed policies for non-communicable diseases that are guided by WHO. The aim of these policies is to guide in the development of an effective chronic care model, which can be achieved when a prepared, proactive practice team interacts with an informed, activated patient (Steyn and Levitt, 2014). However, at provincial level the programme managers are working largely in isolation. They are unable to engage with the health-service managers, resulting in insufficient multisectoral coordination, with fewer efforts towards a concerted programme of action for non-communicable diseases in South Africa (Mayosi et al., 2009).

2.7 Theories of Model Development for Chronic Disease Management

A model has been defined as, 'an imaginative representation of practice which sufficiently represents the real thing' (Davidson and Elliott, 2001). For a model of care to be comprehensive and beneficial to the health system it should be based the following critical, which include the following (Davidson and Elliott, 2001):

- the development of a model should be based on evidence and/or grounded in theoretical propositions;
- a model should be based upon the assessment of the needs of both the patient and health provider;
- the evaluation of health-related and intervention outcomes should be incorporated into the model development and key stakeholders should be part of the consultative process;
- a model should consider aspects of safety and wellbeing of health care workers;
- the development of a model should also involve a multidisciplinary approach in which the optimal and equitable utilisation of available healthcare resources is considered;
- the model should optimise equity of access for all members of society and should also include interventions that are culturally sensitive and appropriate to the local community.

The key strategy to be employed in the chronic disease prevention and management at primary health care level involves mainly health promotion, which will contribute to the early detection of the disease and implementation of actions to minimise complications attributable to the disease (Maloney, 2006). Therefore, as the model development is comprehensive (Sackett et al., 2000, Cretin et al., 2004) emphasis should also be placed on the complex and dynamic settings in which the delivery of nursing care occurs, as it involves social, political, economic and clinical factors (Davidson et al., 2006).

2.8 Integration of Health Care Practitioners in Health Care Services

The concept of integration can be contemplated from several viewpoints, as a means to achieve several goals (Sobczak, 2002). There are several words which can be used interchangeably with integration, such as collaboration, co-operation, co-ordination, concentration, consolidation, joint ventures, programmes and projects, interdependence, adjustment, continuity, etc. (Sobczak, 2002). Integration of health care services is mainly done to achieve at least three desired outcomes, which are:

- to control or regulate expenditure to meet the needs of community members;
- to increase the provision of efficient health services; and,

- the implementation of new patterns of health services.

These will result in a shift in the continuum of health care, thus improving patient's satisfaction as well as improving the quality of services, resulting in health gains (Sobczak, 2002).

The integration of services from different health care professions, including institutions that have traditionally operated in isolation, requires multifactorial models of care (Nolte and McKee, 2008). There is a great difference in the planning of health care services in rural and that in urban areas. The majority of health care providers in remote rural areas face challenges in providing coherent and integrated services (Rygh and Hjortdahl, 2012). This leads to difficulties in ensuring greater equity in health services and health outcomes are affected as the proportion of older people is often higher in rural areas (Rygh and Hjortdahl, 2012). As a consequence, unfavourable health outcomes have been linked to rural populations as rural health practitioners often have to deal with older patients with multiple chronic diseases (Rygh and Hjortdahl, 2012).

2.8.1 Patients and health care workers involvement in chronic disease management

The increase in chronic illness and co-morbidity has resulted in a shift in responsibility and self-care initiatives away from caregivers to the patient (Vaidee, 2012). The traditional health care system, which focuses on the provision of acute healthcare, has been designed to identify and treat individuals and discharge them back into the community. However, the associated risk factors for chronic diseases, coupled with the health care needs and social circumstances of people living with chronic diseases over a lifetime, make the management of chronic conditions more complex than that for acute problems (Osborne et al., 2007; Vaidee, 2012).

There is a lack of continuity in the management of chronic patients as their encounters with health care providers may be irregular or on going, occasional or intensive and may involve one primary care provider or an array of specialist practitioners (Beran and Yudkin, 2006, Osborne et al., 2007). Most chronic patients manage their health and, therefore, the encounter with health care providers will form the basis for information exchange in a form of health education, guiding decision-making and motivation to adhere to treatment (Beran and Yudkin, 2006, Haidet et al., 2006).

Limited data about patients' perspectives on active participation suggest, not only variability in the extent to which patients wish to participate, but also barriers to participation and the need for physicians to adopt new paradigms with respect to patient participation (Haidet et al., 2006). Therefore, chronic

disease management has to be integrated into many comprehensive disease management programmes. Because patients with a chronic disease make continuous self-management decisions, it is believed that informed patients improve their decisions by collaborating with their health-care providers (Lorig et al., 2005).

Health professionals are increasingly realising that the management of chronic conditions is increasingly in the direct control of patients (Lindsay et al., 2011). However, there are a number of patient-related barriers to the control of chronic diseases, such as hypertension, by optimising blood pressure (BP) control (Jolles et al., 2013). The barriers include, amongst others, patient-related issues such as socioeconomic status, coupled with cultural beliefs and practices, that conflict with hypertension treatment goals. Barriers, such as health literacy, which results in lack of patient knowledge causing patients to have difficulties to treat an asymptomatic condition, contribute to poor management of chronic diseases (Jolles et al., 2013).

In the community there should be ongoing support for people living with chronic diseases and they should be encouraged to play an active role in the management of their conditions (Jordan et al., 2008). Numerous educational programmes for chronic disease self-management have been developed to support patients and enhance the management of their health (Jordan et al., 2008). Effective self-management support has outcomes which are patient-, clinician- and policy-focused. With respect to diagnosis, the patient receives user-friendly information about any new or on-going requirements for the management of their condition. The objective of these educational programmes is to provide patients with information and skills that enhance their ability to manage their condition. This aids in better communication with health professionals by identifying relevant information to improve treatment adherence (Jordan et al., 2008).

The first point of contact for people living with chronic diseases is the primary health care professional, which provides an opportunity for information exchange and successful self-management practices, the cornerstone of chronic disease management (Kennedy et al., 2005). However, there are challenges which prevent primary health care providers from implementing chronic disease management strategies. These challenges include, amongst others, lack of resources and education programmes in the community to enhance local community self-management support services (Kennedy et al., 2005). In order to enhance patient participation, it is essential to couple self-management programs, with information which is current and of high quality, with health care professional's encouragement regarding the effectiveness and sustainability of support services (Kennedy et al., 2005).

A significant contribution in combating the burden of NCDs can be achieved through provision of competent, well-educated health care workers, who will have the continuing support of professional development programmes. At a primary health care level, health care workers, particularly nurses, should have competencies which are relevant to disease prevention and management. These competencies include, amongst others, how to conduct health education and how to manage resources, which will enable them to work effectively (Hughes et al., 2012).

2.8.2 Community health workers involvement in chronic disease management

The effective management and prevention of chronic diseases involves the utilisation of well-trained community health workers (CHWs), coupled with the availability of well-established treatment guidelines (Farzadfar et al., 2012). CHWs are broadly defined as any health care worker who performs health care delivery functions as part of an intervention. This cadre of health workers is also known as lay health advisors, community health representatives, patient navigators or outreach workers, as they do not have a formal paraprofessional or professional designation but they have a good relationship with members of the community they serve (Brownstein et al., 2007).

As CHWs are based in the community, they play a major role in provision of appropriate health education, counselling and social support that is more culturally relevant to the local community. (Brownstein et al., 2007). CHWs provide contributions which are invaluable in improving the quality of health care in the community as they can be the main drivers toward building healthier communities and improved health status of the population (Brownstein et al., 2005). Utilising CHWs to deliver treatment may lead to positive outcomes because they are trusted, have insight into the particular needs of and resources within the community and may increase the cultural tailoring and relevancy of the intervention (Cummings et al., 2013).

CHWs are trusted (Cummings et al., 2013) and South Africa has a rich history of CHW projects (van Ginneken et al., 2010). CHWs have delivered successful health interventions, which have promoted and encouraged positive healthy behaviors among communities (Brownstein et al., 2005). Therefore, to sustain health interventions, CHWs need to continuously be informed of the progress of the programme, which can be achieved by effective and respectful communication. This will foster team building and mentoring of CHWs by other staff members (Wilson et al., 1998; Brownstein et al., 2005).

To maintain the effectiveness of CHWs programmes, there should be continuous matching of the skills with appropriate tasks (Wilson et al., 1998), coupled with continuous capacity building in the form of credible training and evaluation (Brownstein et al., 2005). This can be achieved by providing flexible work schedules that involve goal setting and leadership opportunities for CHWs (Wilson et al., 1998). Government should address the challenges of providing stable levels of funding in order to advance the field of CHWs. Several African countries have trained community health workers to deliver health care services at community level and who are integrated in the health system (Atun et al., 2013).

2.8.3 Traditional health practitioner's involvement in chronic disease management

Many countries have two parallel health care systems, a traditional health system and a health care system that is based on Western medicine, so-called, allopathic medicine (Stekelenburg et al., 2005). African traditional healers have been called by different names, including herbalists, native doctors, native healers, traditional doctors, medicine men and witch doctors (Offiong, 2014). Most of the African population receive health care services from traditional healers as, culturally, they believe that “healing” is far more than the curing of disease or illness (Offiong, 2014). These health services are more accessible and affordable to the poor communities and are culturally acceptable in many rural areas (Lorig et al., 2005, Stekelenburg et al., 2005). Traditional health practitioners (THPs) provide an important link between the rural people of Africa and primary health care (Nelms and Gorski 2006). Therefore, co-operation with THPs could contribute to improving access to health care (Stekelenburg et al., 2005).

In SSA more than 80% of people utilise the services of traditional healers (Green, 1997; Stekelenburg et al., 2005) and approximately 60% of the South African rural population seeks health care and treatment from traditional healers, before visiting conventional primary health care services (Steyn and Levitt, 2006). This is mainly because traditional healing is believed to examine ill health from a holistic point of view, which includes social, psychological, spiritual and physical perspectives (Ndhlalambi, 2014). In many rural communities the traditional healers hold very important social and cultural positions (Stekelenburg et al., 2005). Traditional medicines are typically (although not restricted to) herbal, mineral, or animal products obtained locally or from healers. Healers include herbalists (spiritual or nonspiritual), fetish priests, bonesetters and circumcisers (Lorig et al., 2005; Stekelenburg et al., 2005).

2.9 Intervention Strategies for Improving Management of Chronic Disease

Active participation, which involves the patient, the family and the community, is the best approach to chronic disease management (Beran and Yudkin, 2006; Nuño et al., 2012). Effective interventions to

limit the progression of the diseases or to mitigate the risk of complications should be developed (Kengne et al., 2013). The prevention of morbidity and mortality due to chronic diseases can be achieved through the implementation of the cost-effective interventions, which are feasible in low- or middle income countries (Gaziano et al., 2007; Beaglehole et al., 2008). These interventions can be delivered as a comprehensive package in primary health care settings (Beaglehole et al., 2008). Academics, together with researchers in collaboration with community partners, should adapt and apply evidence-based chronic disease prevention interventions (O'Connor et al., 2011). This should be done using four intervention strategies, namely:

- Organisational interventions;
- Community mobilisation;
- Health education; and,
- Social marketing or media.

Good planning of intervention programmes offers a better chance of success and many researchers recommend preliminary identification of determinants of the targeted behaviour in a given population to increase the intervention's potential for success (Beaulieu and Godin, 2012). A population-wide intervention using posters, leaflets and hand-outs that are designed specifically in local languages are considered part of a good intervention strategy to be implemented to target abnormal lifestyles and risk factors (Raine et al., 2013). This also includes organised street plays focusing on the problem of chronic diseases, including reduction of risk factors, such as the use of tobacco products, excessive alcohol consumption, poor dietary intake and physical inactivity (Raine et al., 2013).

2.9.1 Organisational interventions to control chronic diseases

Most interventions in chronic disease management are undertaken by the patient rather than by health care workers, such as nurses and, therefore, such interventions should be tailored to an individual's strengths and challenges encountered in managing his/her care (Hudon et al., 2012). In this type of organisational intervention, the nurse should also believe in the patient's capacity to self-manage him/her condition (Hudon et al., 2012). The introduction of scheduled follow-up visits for all patients with a chronic disorder plays a major role in the design of the primary health care services. This includes a multidisciplinary team approach to ensure that the health workers' roles and responsibilities are reformed (Beaglehole et al., 2008). Sustainability of PHC services to support the patients' needs over a long period of time will aid in implementation of interventions in low- and middle-income countries (Beaglehole et al., 2008).

Organisational or structural interventions are crucial for the management of chronic diseases. In addition, a combination of pharmacological and psychosocial interventions, with regular monitoring and promotion of adherence to treatment, is required (Beaglehole et al., 2008). Successful management of chronic conditions requires behavioural and lifestyle adjustments to minimise functional limitations and disability (Siantz and Aranda, 2014). Health interventions which are designed to be implemented at population level to address the underlying social, economic and environmental conditions serve as the basis for policies or programmes that can influence the change of health risk distribution (Siantz and Aranda, 2014). Thus, there is a need for interventions which will improve the capacity of community members to plan future interventions, which will be built on existing strategies (Siantz and Aranda, 2014)

Community-based interventions offer three distinct advantages when addressing health problems with community, environmental and social conditions (Siantz and Aranda, 2014; Institute of Medicine 2012), namely:

- The interventions are not dependent on a health care system but are all inclusive, as they will be implemented at a population level;
- The interventions can influence individuals at all levels; and
- Finally, some lifestyle and behavioural risk factors are shaped by conditions not under an individual's control.

The needs and preferences of people living with chronic diseases should be taken into account when developing disease control plans because people are, in many ways, their own primary carers (Beaglehole et al., 2008). This could be accomplished by organisational interventions guided by an appropriate theoretical framework that fits the health problem (Leidy et al., 2014). There are several commonly used theories of health behaviour, which include the following: Health Belief Model (HBM), Social Cognitive Theory (SCT), Theory of Reasoned Action and Planned Behaviour and the Trans-theoretical Model (TTM) (Sutton, 2001; Noar et al., 2008; Noar and Mehrotra, 2011).

The HBM assumes that health behaviour is predicted by one's belief or the perception of acquiring a disease and the approaches available to decrease the likelihood of disease occurrence (Noar and Mehrotra, 2011). The SCT explains how individuals acquire and maintain specific behavioural patterns through observation (Sutton, 2001). The Theory of Reasoned Action and Planned Behaviour proposes that a person's behaviour is ultimately determined by their intent to perform the behaviour, where intention is a function of attitudes and beliefs concerning the behaviour, the distinguishing norms, and

perceived control behaviours (Sutton, 2001, Noar and Mehrotra, 2011). Finally, the TTM which posits that stages of change conceptualises a series of steps individuals move through in order to reach a specified behaviour change. This model describes behaviour change as a process in which intrinsic rewards or incentives are built to maintain positive health outcomes (Sutton, 2001; Noar et al., 2008).

2.9.2 Community mobilisation as an intervention to control chronic diseases

Primary health care services that foster proper relationships within a community will influence unexploited resources and this will promote health among people living with chronic diseases and support facilitative environments (Beaglehole et al., 2008). Active community involvement in the care of chronic patients is a way of counterbalancing shortcomings in formal care (Nuño et al., 2012) and is key to the success of collaborative health services, which will empower and build partnerships with communities (Atun et al., 2013). A strategy to improve the prevention of NCDs should include community programmes which are carefully planned, well implemented and regularly monitored (Kengne et al., 2013).

Interventions that can influence proximal to distal environments and that can contribute to reducing risk factors, such as poor diet, physical inactivity and weight-control behaviours, are relevant population approaches to prevent obesity in the community. In this, the communities play a pivotal role as mediators and filters between proximal and distal influences, which are evident in all the ecological models of individual behaviours (Kumanyika, 2010). Health promotion, which will strengthen disease prevention, is built around the relationships between different stakeholders in the community (West, 2014). Researchers, in collaboration with community partners, are adapting and applying evidence-based chronic disease prevention interventions, using four intervention strategies, namely: structural interventions, community mobilisation, health education and the use of social marketing/media. This is done in four settings: neighbourhoods, schools, workplaces and health centres; in order to reach individuals where they live, work, learn and receive care (West, 2014).

Partnerships between CDM teams, the primary health care system and communities are intended to avoid duplication and to optimise services through a coordinated approach to service planning, taking population needs, primary care/community priorities and capacity into consideration (Morrin et al., 2013). This public health approach, which is greatly shaped by engagement of community members at various levels and the partnership, can be established in the form of community outreach, community mobilisation or community organising (West, 2014). Population screening for cardiovascular disease risk factors is beneficial, provided that there is appropriate follow-up and action aimed at people identified as

at risk (Guibert et al., 2009). According to various studies, approximately 22% to 74% of individuals who were screened and identified with high cholesterol levels complied with a recommendation to visit a health care facility for further management of their condition (Guibert et al., 2009).

2.9.3 Health promotion as a community intervention to control chronic diseases

Health education, coupled with media campaigns, has played a noticeable role in many programmes which are based at community level (O'Connor et al., 2011). A health system should be oriented towards health promotion, prevention and delivery of cost effective interventions through a primary health care system-approach to successfully address comprehensive issues associated with NCDs (Mendis and Chestnov, 2013). Community interventions based on health promotion at the primary health care level are more successful in contributing to a reduction of risk factors and an improvement of clinical outcomes (Beaglehole et al., 2008). Information with respect to people's knowledge and beliefs of chronic diseases and their sources of this knowledge is useful in planning appropriate content to be included in educational materials (Mendis and Chestnov, 2013). This will help in targeting the appropriate people, institutions or places for implementing educational programmes (Cravey et al., 2001; Mendis and Chestnov, 2013).

Prevention and treatment of obesity involves, amongst other things, interventions aimed at improving dietary quality, which could be achieved through health promotion (Beaulieu and Godin, 2012). School-based interventions are used to improve knowledge, attitudes and behaviour related to physical activity (Mendis and Chestnov, 2013). There are also workplace health promotion programmes and community initiatives aimed at the promotion of healthy behaviour, including increased physical activity (Mendis and Chestnov, 2013). It is widely recognised that a programme of regular exercise can improve health, with increasing attention given to the effect of physical activity levels on health outcomes, particularly in people with chronic disease (Aboud and Singla, 2012). Behavioural change is required by many of the Millennium Development Goals (MDGs) and is a critical part of the solution to poor health, malnutrition and mortality (Aboud and Singla, 2012).

A comprehensive approach to improve patient adherence to treatment should focus on understanding the major reasons why patients stop their treatment (Wetzels et al., 2006). For example, it is critical to select the optimal intervention by, firstly, differentiating between intentional and unintentional treatment non-adherence. Additionally, it would be necessary to have a concise patient self-report questionnaire to enable the targeting of specific interventions to address adherence problems (Wetzels et al., 2006). Substantial efforts should be made to quantify the change and relate these changes to changes in

outcome variables, if capacity building has to be achieved (Millar et al., 2013). Health education is an important tool in response to health behaviour change theories and it can offer useful health enhancement strategies and encourage voluntary and informed behaviour change (Kinzie, 2005). Health promoters should select a theory best suited to guide education which will result in a particular health behaviour change and then determine how to translate theory into practice and identify specific instructional strategies to be employed (Kinzie, 2005).

2.9.4 Social marketing or media as an intervention to control chronic diseases

The social marketing or media should be undertaken in four settings, including in neighbourhoods, schools, workplaces and health centres (O'Connor et al., 2011). This will help reach individuals where they live, work, learn and receive care (O'Connor et al., 2011). There are social marketing interventions which are effective in reducing the use of tobacco products, excessive or harmful alcohol consumption and promotion of physical activity (Aboud and Singla, 2012; Siantz and Aranda, 2014). These interventions include national regulations of tobacco and alcohol tax increases; robust dissemination of information about the health risks of smoking, restrictions on smoking in public places and workplaces and comprehensive bans on advertising and the promotion of smoking (Anderson et al., 2009, Aboud and Singla, 2012; Hudon et al., 2012). The strict regulation of availability of alcoholic beverages is one of the interventions used to reduce the harmful use of alcohol (Hudon et al., 2012).

Media campaigns are being used to promote physical activity (Siantz and Aranda, 2014). These include having public policies to encourage physical activity across sectors, including the transport, education, youth affairs, sport and urban design sectors (Anderson et al., 2009; WHO, 2009; Cecchini et al., 2010). Since the turn of the century, newer approaches using technologies, like e-mail and the internet, have been used increasingly to disseminate public health information (Bock et al., 2014). Community-based physical activity interventions are effective when employing face-to-face interaction in small groups, mail or telephone contact and community-wide campaigns (Bock et al., 2014).

2.10 Strategies to Achieve Integrated Chronic Care Model Development

Interventions which involve multiple-strategies are more effective than single-strategy interventions (Newell et al., 1999) and, to achieve integrated care for chronic diseases, a comprehensive approach should be taken, focusing on chronic disease prevention, care and management strategies (Samb et al., 2010). Therefore, an appropriate and sufficiently well trained workforce in health care is essential for the effective implementation of any health care programme (Newell et al., 1999). The interventions to

prevent morbidity and mortality due to chronic diseases should meet at least four of the following conditions (Samb et al., 2010):

- i. the intervention must target social behaviours or risk factors that have been causally associated with chronic diseases;
- ii. there should be a degree of confidence that the intervention will lead to favorable changes in behaviors or risk factors;
- iii. evidence should show that the intervention is cost effective in the settings in which it is implemented;
- iv. there should be evidence that the scaling up of the intervention is fiscally feasible in resource-constrained countries.

Addressing well-established chronic disease risk factors requires multi-stakeholder initiatives that address the complex societal and behavioural factors driving the chronic disease epidemic (O'Connor et al., 2011). The initiatives should take both a top-down and bottom-up, evidence-based approach in a way that community members can be involved (O'Connor et al., 2011). The effect of existing intervention strategies needs to be better understood and the necessary adaptations need to be made and implemented in the community to prevent chronic diseases (O'Connor et al., 2011). This should be done with a focus on scientific evidence on the effectiveness and cost-effectiveness of the intervention in the country where the interventions will be implemented (O'Connor et al., 2011).

The two major gaps which must be closed to successfully achieve proper control of chronic diseases are the gap between effective interventions in research studies and what clinicians do in practice; and the gap between what clinicians in their offices recommend to patients and what patients do at home and in their communities (Hill et al., 2011). To successfully close these gaps, an implementation of health care practices and systems that guarantee continuity of care, as well as the integration of technology to support health care workers, decision-making and patients' self-management, are required (Hill et al., 2011). Interventions and strategies to improve chronic disease management in primary health care settings should be accompanied by sound public health policies, mainly through regulation of possible risk factors to communities, such as tobacco control and reduced salt intake (Beaglehole et al., 2008). In conclusion, effective intervention strategies for implementation and adaptation within and across cultural contexts that facilitate change should be appropriately identified to prevent and control chronic diseases (O'Connor et al., 2011).

2.11 Deficiencies of the Health Care System

Primary health care (PHC), as the foundation of any health system (Bhattacharyya et al., 2011), is generally defined as the essential delivery of health care services (Declaration of Alma-Ata). This is based on applied, scientifically comprehensive and socially acceptable methods and expertise, which should be generally accessible to community members at a reasonable cost to the community (Declaration of Alma-Ata, 1978; Kremer et al., 2002). Primary health care clinics play important roles, such as delivering basic curative services to those for whom private providers are out of geographical or monetary reach, and the coordination of preventive health services (Fritzen, 2007).

The delivery of health care services in poorly resourced countries faces the challenge of a double disease burden, which comprises communicable and non-communicable diseases (Beran and Yudkin, 2006). Therefore, there is a need to invest in health systems and train health care workers to properly manage NCDs in such a way that an improvement in community's health can be observed and life expectancy increased (Beran and Yudkin, 2006). The burden of NCDs will certainly supersede that of infectious disease as the primary cause of death (Hughes et al., 2012) and, therefore, an appropriate approach to manage chronic diseases at primary health care level is needed (Tollman et al., 2008).

In South Africa there are substantial inequities in the health of the different race groups, between health care provision in the provinces and also within provinces, while the country's Constitution binds the State to work towards the progressive recognition of the right to health for all the country's citizens (Coovadia et al., 2009). An increase of public health sector services becomes inevitably grossly inefficient and costly as there were deficiencies borne by the health system due to a human resource shortage and infrastructure inadequacies - including equipment purchased with poor funding (Kautzky and Tollman, 2012). Other factors that cause the South African health system function poorly include long queues in health facilities, lack of care continuity and drug stock-outs, which contribute to a lack of preventive health care (Goudge et al., 2009, Bertram et al., 2012). Most of the people living with chronic diseases have multiple conditions and, therefore, an integrated approach to health care delivery is important in order to correct the deficiencies in the current health system with respect to the management of NCDs (Partnership for Solutions: Johns Hopkins University, 2004). The transformation of the health care system from a reactive one to a mainly proactive one, with the focus on keeping people living with chronic diseases as healthy as possible, will aid in overcoming the deficiencies (Nuttal, 1997).

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The methodologies employed in the execution of this study are outlined below, including the methods that were utilised to develop the questionnaires. The process followed to train the field workers is also explained here, as is the process followed to conduct the focus group discussion (FGDs), interviews and the quality circles. Data management, analysis and how data quality was ensured are also described, including the process of how trustworthiness, reliability and validity of the data were achieved. Limitations encountered during the execution of the study and the processes to minimise potential bias are also described.

3.2 The study area

The study was conducted in the Dikgale Health and Demographic Surveillance System (HDSS) centre (Fig.2). This is a rural area situated in the Capricorn District of the Limpopo Province, which is located approximately 50 km northeast of the Province's capital city, Polokwane (Kanjala et al., 2010). Dikgale HDSS consists of 15 villages with poor infrastructure, situated close to one another, with a total population of approximately 36 000 (Alberts et al., 2015).

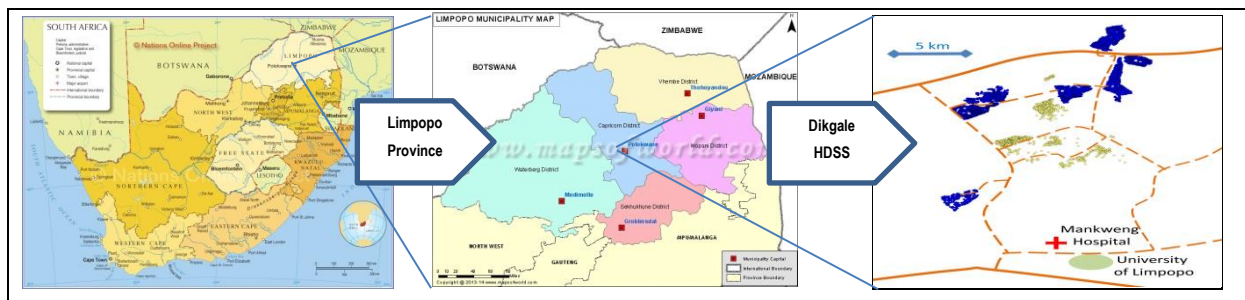


Figure 2 Maps of South Africa and the Limpopo Province showing the Dikgale HDSS in the Greater Polokwane Municipality located in the Capricorn District.

The three health facilities in the study area are primary health care (PHC) clinics, which provide basic health care to this rural area. The services provided by these facilities include, amongst others, comprehensive integrated primary health care (PHC) services, using a one-stop approach, for at least 8 hours a day, five days a week. The community access to the clinics is measured by the proportion of people living within 5km of a clinic and all the clinics in the study area receive supportive monitoring visits at least once a month from district managers in order to support personnel, monitor the quality of

service and identify needs and priorities. At least one member of staff has completed a recognized PHC course. There are no doctors or other specialised professionals available during the day.

3.3 Study design

The research methodology for the current study was guided by the research question, which was tailored to understand the burden of chronic disease risk factors, learn about perceptions, experiences, barriers and challenges of chronic disease patients, nurses, CHWs and THPs regarding chronic disease management. Therefore, these brought the idea of mixed methods (Creswell et al., 2004; Tashakkori and Creswell, 2007) with an aim on integrating quantitative and qualitative data collection and analysis in a single study to develop an intervention program in a form of a model to improve management of chronic disease management in a rural area. The use of these mixed method methodology included the principle of making a decision on the priority or weight given to the quantitative and qualitative data collection and analysis in the study, the sequence of the data collection and analysis, and the stage/stages in the research process at which the quantitative and qualitative data are connected and the results are integrated (Ivankova et al., 2006). When used in combination, both quantitative and qualitative data yield a more complete analysis, and they complement each other as this brings the understanding of the strengths and weaknesses of quantitative and qualitative research methodologies.

Multiple data was collected using different strategies, approaches, and methods (Johnson and Onwuegbuzie, 2004) as illustrated in Table 1. The quantitative techniques included a cross-sectional study design using WHO STEPwise approach to surveillance of NCD risk factors (WHO STEPS) (Bonita et al., 2013), and qualitative techniques included focus group discussions (FGDs) (Massey, 2011), semi-structured interviews (Gugiu et al., 2007), and quality circles (Forster 2000, Hosseinabadi et al., 2013). The present study was developmental in nature because the first method was used sequentially to help inform the second and third methods. This was done in the form of sequential triangulation because the model or interventions were developed as in phases, with results from the Phase 1 to Phase 3 essential for planning the model development.

Table 1: Research process, techniques and tools used

Phase	Process	Study type	Tools
Phase 1	Determining the prevalence of chronic disease risk factors	Quantitative	STEPS Survey
Phase 2	Describing the perceptions and perspectives of chronic disease patients, nurses, community health workers and traditional practitioners on chronic diseases and their risk factors.	Qualitative	FGDs and Semi-structured interviews
	Describing problems and challenges encountered by chronic disease patients, nurses, community health workers and traditional practitioners in the management of chronic diseases	Qualitative	FGDs and Semi-structured interviews
	Determining the perceptions and perspective of district and provincial chronic disease managers on chronic disease management	Qualitative	Semi-structured interviews
Phase 3	Developing an evidence-based integrated chronic non-communicable disease management model	Qualitative	Quality circles

3.4 Study population

The study population for WHO STEPwise approach to surveillance of NCD risk factors (WHO STEPS) comprised of persons aged 15 years and above residing in the Dikgale HDSS. As the prevalence of most chronic diseases risk factors tend to increase with age and vary by gender, we aimed to assess the estimates for specific age groups for each gender. The study population for the qualitative part of this study included the chronic disease patients who were diagnosed and treated in these clinics; health care providers whom in this study we refer to a person who helps in identifying or preventing or treating illness or disability at a primary health care level and in this case we refer to nurses, community health workers (CHWs) and traditional health practitioners (THPs) as all these provide health services to the health care customers within the catchment area of the Dikgale HDSS were also included as participants in the qualitative part of the study.

3.5 Sampling

3.5.1 Quantitative study

A total of 2 981 participants were randomly selected from the Dikgale HDSS database to take part in the STEPwise approach to chronic disease risk factor surveillance (STEPS). A total of 1 407 participants (878 women and 525 men) were available to complete the WHO STEPwise questionnaire. The main reasons for not participating included participants not being at home after repeated visits (majority work in Polokwane or on surrounding farms and return home on weekends or late in evenings), refusal, death and migration out of the study area. Only 817 participants were available to donate a fasting blood sample as the others left for work early in the morning.

3.5.2 Qualitative study

The purposive sampling method (Petty et al., 2012) was used for qualitative research as this involves selection of participants based on an important characteristic under study, in this case knowledge and experience of chronic diseases. Chronic disease patients had to be diagnosed with either diabetes mellitus or hypertension to participate in the study, as these are the most prevalent chronic diseases in the study area. For sampling of nurses in the clinics, a convenient sampling (Marshall, 1996) method was used, following the purposive sampling method, as this was the least rigorous technique, involving the selection of the most accessible nurses, taking into consideration service delivery in the clinics. This method ensured that we obtained a representative number of nurses to participate in our study. Again, a convenient sampling method was used following the purposive strategy for community health workers and traditional healers.

3.6 Ethical considerations for the study

Ethical approval to conduct the study was obtained from the Medunsa Research Ethics Committee (MREC), University of Limpopo. The reference number allocated to this study by the research ethics committee was: MREC/HS/05/2013: PG. Institutional or departmental approval to conduct the study in health facilities was granted by the Provincial Research Committee, which serves as a review board for the Department of Health in the Limpopo Province. As the protection of human rights is a mandate in health care research (Dresser, 1998), this research was guided by the principles of respect for people, beneficence and justice. The participants were given respect in the form of recognition of participants' rights, including the right to be informed about the study, the right to freely decide whether to participate in a study and the right to withdraw from the study at any time without penalty, using informed consent. A University of Limpopo consent form was used, together with the participant information leaflet written in the language most predominantly spoken in the area, Sepedi. The principal investigator, together with field workers, undertook to maintain confidentiality of the participants and of the collected data. To increase the level of confidentiality, we used the codes on data collection tools (e.g., completed questionnaire), instead of recording participants' identifiable information.

3.7 Study sample for qualitative study

The sample for the qualitative part of the study was divided into chronic disease patients, nurses, chronic disease programme managers, community health workers and traditional health practitioners.

3.7.1 Chronic patients

Approximately 8 to 12 patients who were diagnosed with either diabetes mellitus or hypertension per clinic were selected to participate in a focus group discussion. Gender balance in selection of respondents was adhered to where possible but majority of the patients were female. In total three focus group discussions were conducted for chronic patients.

3.7.2 Nurses and managers for chronic disease programme

Due to shortage of nurses in the rural clinics in the Limpopo Province, 6 to 10 nurses per clinic were selected to participate in a focus group discussion and in total three focus group discussions were held for nurses. It was not possible to select participants with due consideration given to gender balance as the majority of the nurses are female. One operational or clinic manager per clinic was also requested to participate in the completion of a semi-structured questionnaire and interviews were conducted with three managers.

3.7.3 Community health workers

A total of 8 to 12 community health workers (Brownstein et al., 2007) per clinic were selected to participate in a focus group discussion; three focus group discussions were held for CHWs. Gender balance in selection of respondents was adhered to where possible, but majority of the CHWs were female. In total three focus group discussions were conducted for CHWs. One home-based care manager per clinic was also requested to take part in the completion of a semi-structured questionnaire and interviews were conducted with three managers.

3.7.4 Traditional health practitioners

A meeting was held with the Dikgale Traditional Authority to explain the purpose of our study. Members of this Authority were presented with evidence of the ethical approval for the study received from University of Limpopo, together with the approval to conduct the study received from the Limpopo Department of Health - both the Provincial and the District offices. Traditional authority representatives then announced to the community that traditional health practitioners, irrespective of their affiliation and practice, should meet at the Traditional Authority offices. A meeting was held with a group of traditional healers, who were then grouped according to the health facility catchment area. Unfortunately only two groups were formed, representing the Dikgale clinic and the Sebayeng clinic catchment areas. Only one traditional healer was present from the catchment area of the Seobi Dikgale clinic and, thus, it was not

possible to have a focus group discussion this area. We had two focus group discussion groups for traditional healers, which included a mixture of registered and non-registered THPs as healers from all of these categories do help with health issues of members of the community. Gender balance in selection of respondents was adhered to where possible.

3.7.5 Quality circles

A multi-disciplinary team comprising members representing all areas of management, disease control and prevention was formed to discuss current practices and to explore evidence-based practices (Boaden and Dale 1993) to improve chronic disease management in the study area. The census sampling method was adopted to select participants in this team and all participants who were eligible were included in the study. Inclusion criteria included working as a clinic manager in the study area, having a bachelor's degree in nursing or an associate degree, having conducted extensive research in the field of chronic diseases, being an executive manager in Department of Health of the Limpopo Province and being a chronic disease manager in the Limpopo Province. The exclusion criteria for participation in the study included those who did not meet the above-mentioned inclusion criteria and those who did not honour the invitation to the initial workshop. A total of 35 participants took part in the quality circles, during which several educational/presentational sessions were held to familiarise the participants with issues pertaining to group dynamics, problem-solving training, techniques of quality circles, role of quality circle members, and the procedures of the circles.

The representation of the team members comprised of the following disciplines:

- Clinic managers from primary health level;
- Chronic disease programme managers from the five districts of the Limpopo Province, including the Provincial Manager;
- Registrars' from the Polokwane/Mankweng hospital complex and the Head of Community Services;
- Staff and students from University of Limpopo Medical Science Department,
- Members of the Health Promotion Unit of the University of Limpopo;
- Members of Health Promotion from the Limpopo Department of Health;
- A staff member from Medical Research Council (MRC)/Wits-Agincourt Research Unit in the Mpumalanga Province;
- A representative from the Executive Management of Department of Health in the Limpopo Province;

- A representative from the Dikgale Traditional Authority;
- Expertise from Antwerp University in Belgium, representing the Unit International Health, Department of Primary and Interdisciplinary Care, Department of Sociology and Research Methodology; and,
- Expertise from Umeå University, Sweden.

Prior to the commencement of the quality circles there was no official or voluntary activity among these team members relating to quality improvement in the management of chronic diseases in rural areas of the Limpopo Province.

3.8 Data collection

A total of four social science methods of data collection were employed to ensure data relating to the study objectives and research questions were collected. Each method targeted different sources of information and had implications for different aspects of the study unit of analysis.

3.8.1 Development and testing of data collection instruments

The WHO STEPwise approach to Surveillance (STEPS) is a standardised survey methodology (Nawi et al., 2009) that has been developed by the WHO. The questionnaire was translated into the local language, Sepedi, from English. The questionnaire was modified with the aim of designing a local risk factor surveillance tool or instrument. The research instruments were piloted in a setting different to the study setting, but with similar cultural practices to the study area.

3.8.2 Characteristics of the data collection instruments

The WHO STEPwise approach to Surveillance (STEPS) is a data collection tool which has been developed by the World Health Organization (WHO). Interview guides for focus group discussions and semi-structured interviews were developed and consisted of questions, which were open-ended in nature, on the following main topics:

- Interventions/programmes in place to manage chronic diseases;
- Concerns from chronic disease patients and nurses regarding chronic diseases;
- Role of health district in the provision of essential healthcare;
- Community awareness of chronic diseases and participation in health service delivery;

- Readiness (willingness and ability/capacity) of the communities to engage in health service delivery;
- Community effectiveness in the involvement of chronic disease management.

3.8.3 Data collection methods, approach and collection process

The data collection processes are summarised below and, in the order of sequence, include: STEPwise survey; focus group discussions; semi-structured interviews and quality circles. Field workers were trained to become conversant with the STEPS data collection tool and registered nurses were used to draw blood samples from the participants. In each village, the community leader was informed of the purpose of the study and the field workers then approached the randomly selected participants, from a list of all potential participants, to inform them about the aims of the study and to obtain written informed consent for their participation.

3.8.3.1 STEPwise survey

Quantitative data was collected using the STEPS instrument, which covered three different levels of "steps" of risk factor assessment (Nawi et al., 2009) illustrated in Figure 3. These steps are:

- Step 1: Questionnaire;
- Step 2: Physical measurements;
- Step 3: Biochemical measurements.

The survey was conducted between June 2011 and March 2012 using Step 1, the questionnaire-based (interview) survey, to collect information about the socio-demographic status of the participants, their use of tobacco products, their alcohol use, their diet and their physical activity practices. Step 2 involved taking physical measurements of blood pressure, pulse, height, weight, waist circumference and hip circumference. Step 3 focused on the collection of fasting blood samples.

Information on behavioural risk factors was collected through face-to-face interviews conducted by field workers, who also captured the participants' physical measurements, following the recommended STEPwise protocols (WHO, 2003, WHO, 2011). OMRON M6 and M5-I Digital Automatic Blood Pressure Monitors were used to measure resting blood pressure. Blood pressure was measured three times and the average of the last two measurements used (Pickering, 2005, WHO, 2007). Height and weight were measured once using a stadiometer and digital balance to the nearest 0.5 centimetre and to the nearest 0.1 kg, respectively. Participants were measured without shoes and wearing only light clothing. Waist circumference was measured once using a constant tension tape and recorded to the nearest 0.1 cm.

BMI was calculated as weight (kg)/height(m)² and participants with a BMI of 25.0–29.9 kg(m)² were classified as overweight, while those with a BMI \geq 30.0 kg(m)² were classified as abdominal obesity (Dalton et al., 2003). Men with a waist circumference \geq 104 cm and women with a waist circumference \geq 88 cm were classified as obese (Dalton et al., 2003). A participant was classified as being hypertensive if their average systolic BP was 140mmHg or higher, or if their average diastolic BP was 90mmHg or higher, or if they were on anti-hypertensive treatment (Whitworth, 2003).

For biochemical parameters, the participants were asked to fast overnight before blood samples were collected in the morning. Registered nurses collected blood samples from the subjects using EDTA-containing tubes for plasma, sodium fluoride tubes for glucose determination and tubes without anticoagulants for serum. Fasting blood glucose, total cholesterol, high-density lipoprotein cholesterol (HDL-C) and triglycerides levels were measured using ILAB 300. The cut-off values used were as follows: high fasting blood glucose \geq 7mmol/l; total cholesterol \geq 5mmol/l; low HDL cholesterol $<$ 1.00 mmol/l for men and $<$ 1.30 mmol/l for women; triglycerides \geq 1.70 mmol/l; and, high waist circumference \geq 104 cm for men and $>$ 88 cm for women (Motala et al., 2011; Oldewage-Theron and Egal, 2013). Blood specimens from participants who were HIV positive were excluded for the measurement of biochemical parameters but HIV positive participants were allowed to complete the STEPS instrument.

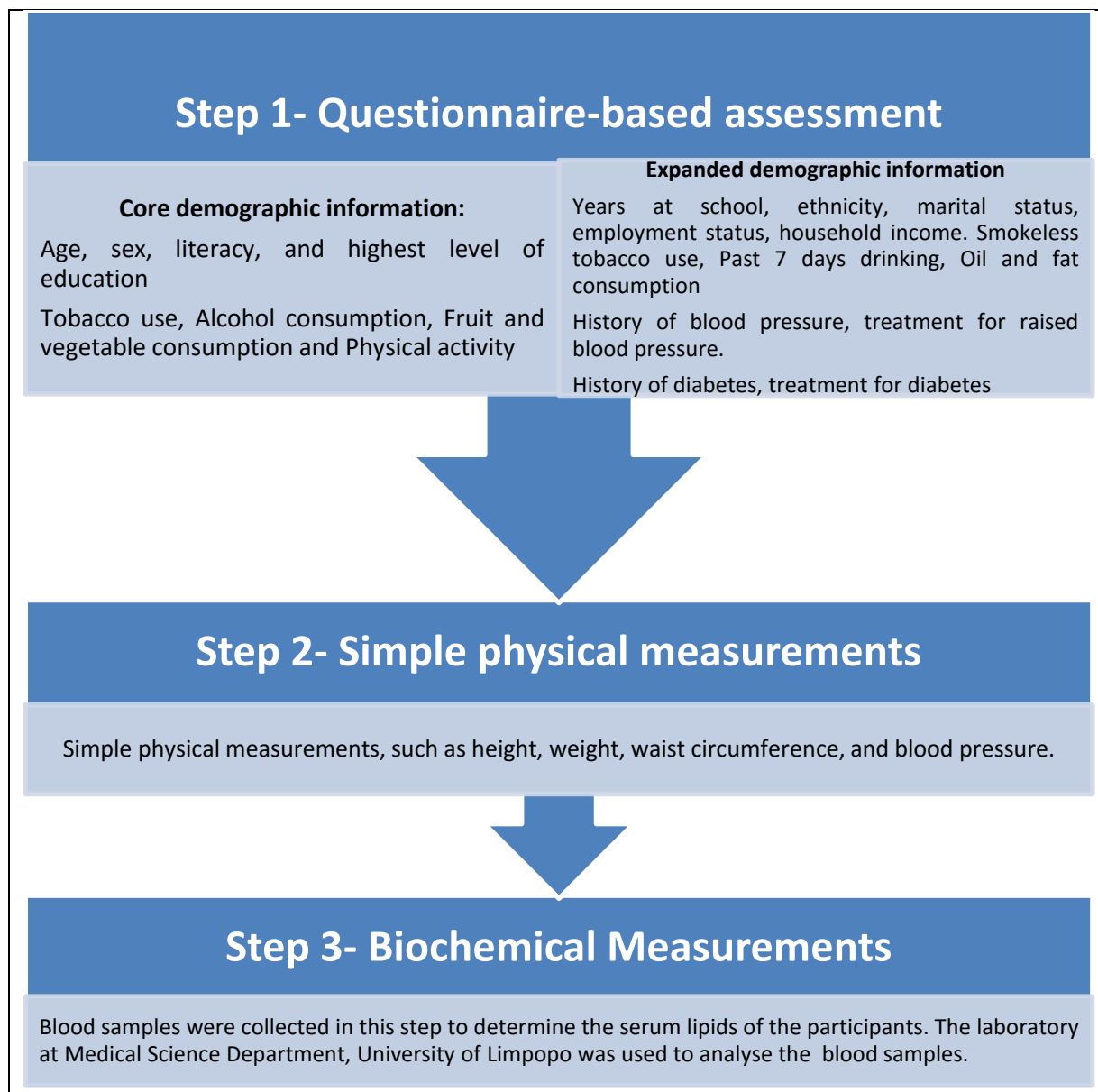


Figure 3: Data collection process using STEP instrument for WHO STEPwise approach to surveillance

3.8.3.2 Focus group discussions and semi-structured interviews

The focus group discussions (FGDs) and semi-structured interviews were conducted by the principal investigator, with an assistance of a moderator. The FGDs involving chronic patients and nurses, and semi-structured interviews involving clinic managers were conducted in the clinics. A private room was provided by the clinic in which to conduct the FGDs, while the semi-structured interviews were done in the managers' offices. The seating arrangement for the FGDs was planned in such a way that the participants sat in a circular fashion around the table, in order to have full view of each member of the group. The principal investigator and the moderator sat at the centre.

The FGDs were conducted before conducting the semi-structured interviews, including the interviews with officials at higher levels (District and Provincial Level). This was important because questions that were raised at the lower level (clinic, patients, CHWs and THPs) constituted part of the questions that were posed to persons at the management level. The data was generated through the use of audio tape, full transcripts and notes, which were captured by a moderator or an observer. An important issue of reaching saturation in qualitative data collection in our study was achieved by probing until the interviewer was no longer getting or seeing any new information from the participants.

3.8.3.3 Quality circles

A three-day workshop involving the quality circles, comprising of team members from different disciplines, was held. The workshop members met to discuss problems relating to the improvement of chronic disease management. This study was done using a bottom-up approach in order to use the information collected previously from the study area, from quantitative research using STEPwise survey and qualitative data as obtained from the participants, namely, people with chronic conditions, nurses, community health workers (CHWs) and traditional health practitioners (THPs), to discuss and propose interventions which could be developed for the management and control of chronic diseases, including their risk factors, in the study area.

On the second day of the workshop the participants were divided into break-out groups, forming three circles with an aim of developing intervention strategies for the improvement of chronic disease management that were feasible for implementation in the context of the rural area of Dikgale, within the available resources. Each group had a moderator, a scribe and a coordinator who coordinated with other circles. Group one focused at addressing interventions at the patient level and interventions at an organisational level; group two focused on addressing interventions at community level and at organisational level; while the third group focused on interventions at the health services and managerial level. Each group was composed of a clinic manager, a district manager, a provincial manager, staff from Public Health Medicine, students from the University of Limpopo and colleagues from other sectors.

The members of the circles convened for a day and brainstorming was undertaken to identify problems related to chronic disease management, including their causes. Discussions resulted in the prioritisation of the identified problems. Later, suggestions regarding possible solutions were discussed. The participants chose the best solutions considering various criteria, such as applicability, acceptability,

cost and effectiveness of the proposed interventions. Afterwards, the coordinators of the circles presented the solutions to the larger group. The principal investigator was present at all the gatherings held by the circles. The coordinator of each circle acted as both the leader and facilitator, who then delivered the final implementation decisions to the circles. A series of meetings with the executive management of the Department of Health in the Limpopo Province were held to discuss the proposed interventions.

3.9 Data analysis

Planning for data analysis was undertaken in the planning stages of a study and an analysis plan developed identifying the different software and methods to be used to analyse the quantitative and qualitative data. Firstly, we developed an effective analysis plan aimed at establishing clear analytic objectives. The approach in developing an analysis plan was undertaken after the data was collected, processed, and cleaned. At least some of the data were analysed at point of collection and the results were used in an iterative fashion to modify future data collection strategies. This meant that the data collection tools were modified in that questions which were not clear to the participants were altered in order to get a true reflection of the situation in the study area with respect to chronic disease management.

3.9.1 Quantitative data analysis

All gathered data was double checked by field supervisors for quality assurance purposes before being captured. All data on behavioral risk factors were captured in Epi Info software, the biochemical data was captured in Excel. The files were continuously checked and cleaned before used for data analysis. We used STATA statistical software version 12 for Windows (STATA Corporation, College Station, Texas) in all quantitative data analysis. Data were coded and presented according to WHO guidelines (WHO, 2007), for example, hours of physical activity of moderate and vigorous intensities were weighted by their metabolic equivalent task (MET) values provided in the WHO guidelines (moderate activity is assigned a MET of 4 and vigorous activity is assigned a MET of 8). A biostatistician from the Polokwane/Mankweng campus oversaw the cleaning and analyses of the data. The data were analysed by making comparisons between age groups. The following statistical techniques were employed in the data analysis:

Frequency distributions

Frequencies were used to display distributions of the variables as they provided a good overall picture of a large set of grouped data into different classes. This was used to determine the characteristics of the study sample and, subsequently, to estimate the prevalence of specific behavioral and biochemical risk factors, by age and by gender. The mean and median were also used.

Coding of variables

We used 1 for coding the event occurring (the focus of the analysis/study) and 0 for coding the absence of an event (the reference category) for the dependent variable. For independent variables we also used coding 1 and 0 as the category that is the focus of the study and for the category of reference, respectively.

T-test

The independent t-test was used for variables having two categories as it assesses whether the means of two groups are statistically significant. This test was performed at the 95% confidence level. The p-value of less than 0.05 in the study results implied that there was a statistically significant difference in means between the categories being investigated.

Categorical data

The grouping of variables to describe categories of individuals was used in the form of cross-tabulation, which explained the relationship between two or more categorical variables. Pearson chi-square was used to appraise the data for independence.

Logistic regression

In order to analyse the association of demographic, behavioral and biochemical risk factors within the framework of a multiplicative model with the more obvious effect measure of odds ratio with an associated confidence interval (Traissac et al., 1999), we carried out binary logistic regression analysis using a dependent variable (1 = yes, 0 = no) while other factors were independent variables. Our ultimate goal in using logistic regression was to determine the probability of a case belonging to the 1 category of dependent variable or the probability of event occurring (event occurring is always coded as 1) for a given set of predictors. To achieve a better fit of the model we chose another distribution in the exponential family and by estimating a dispersion parameter for the binomial distribution. This helped us to explain how much more prevalent one category is compared to another.

Independent variables

In this study, the independent variables were different for all models. For behavioural risk factors the independent variable for each model was age, gender, educational status, marital status, work status and income range. The independent variables for biochemical risk factors were age, gender, overweight/obesity, smoking, alcohol use, socioeconomic status, low fruit and vegetable intake and physical inactivity, respectively.

Dependent variables

The dependent variables for behavioural risk factors model were smoking, smokeless tobacco products, alcohol use, low fruit and vegetable intake and physical inactivity, respectively. The dependent variables for biochemical risk factors were hypertension, high fasting blood glucose (FBG), high total cholesterol (TC) levels, high total cholesterol HDL-C ratio (TC/HDL-C) and raised triglycerides (TG) respectively.

Odds ratios

Lastly we calculated odds and relative odds (odds ratios) as useful ways of using the information in cross tabulations where one dimension of the table was an outcome of interest (whether 2x2 tables or more complicated). This helped us to determine the odds of the probability of measured variables against exposure variables. An odds ratio or relative risk of 1 implied that the event was equally likely in both groups, while an odds ratio or relative risk greater than 1 implied that the event is more likely in the first group.

3.9.2 Qualitative data analysis

Qualitative data consisted of textual data, mainly transcripts from focus group discussions, observations and semi-structured interviews. Data was analysed using the qualitative software package INVIVO and Excel spreadsheets. All data was tape-recorded and detailed notes taken simultaneously, including verbal citations. Tape-recorded interviews were transcribed according to standard rules (MacLean et al., 2004) and translated into English (where necessary). Detailed minutes/notes were taken from all interviews or discussions and these notes were carefully transcribed soon afterwards.

The qualitative data was organised by questions to look across all respondents and their answers in order to identify consistencies and differences. All the data from each question were collated and, later, the connections and relationships between questions were explored. The qualitative data analysis for this study looked at how individuals or groups responded to each question or topic. This was done mostly using the open-ended questions.

The task of discovering themes or identifying themes was at the heart of the qualitative data analysis. The analysis focused on broad conceptual functions and effects of the developed themes. These themes captured important issues about the data in relation to the research question and represented some level of patterned response or meaning within the data set (Braun and Clarke, 2006). As the qualitative data analysis was a thoughtful enterprise, the thematic analysis (Braun and Clarke, 2006; Petty et al., 2012) was flexible, carried out inductively and responsive to the naturally emergent nature of the process. However, many factors were considered beforehand to ensure that our analysis was both efficient and meaningful.

The data was transcribed verbatim and the investigator, together with two experts, read and re-read transcripts to familiarise themselves with the content. Codes (labels) were developed and given to sentences, phrases, paragraphs or lines. These codes were compared across the whole data set to identify variations, similarities, patterns and relationships. The investigators wrote down several reflections and ideas related to sections of data to conceptualise these reflection and ideas then deepen the analysis (memo writing). This was followed by testing out and expanding on ideas by collecting further data (by theoretical sampling) that became more focused. The codes were grouped to create a smaller number of themes that distilled the key issues identified by the investigators. The relationships between themes were then identified to create a thematic map. The principal investigator coded all the transcripts. Checks of the transcript codes and information exchange were regularly conducted to ensure consistency. This process was not a linear sequential one, as it appears here; rather, analysis involved continual movement through these stages.

In summary, our analysis included six steps which are described as follows:

- i. Firstly, the data was transcribed verbatim and the researchers read and re-read transcripts to familiarise themselves with the content.
- ii. Secondly, general codes were generated in a systematic manner across the dataset, which highlighted interesting features of the data.
- iii. Thirdly, the codes were reviewed by three researchers, collating interpretations and grouping data into further themes.

- iv. Fourthly, a thematic map was developed using the coded data. Here the researchers considered the alignment of themes and sub-themes, making comparisons within and between categories.
- v. The fifth step was to further refine each theme and the story that the analysis “told”, clear definitions and names were derived.
- vi. Finally, as thematic analysis frequently went beyond organising and describing to interpret various aspects of the research topic, extracts were selected to relate the analysis back to the research questions and to the chronic disease management literature.

3.9.3 Quality circles

The development process of an integrated, evidence-based chronic disease management model was carried out using quality circles. This model development took into account the evidence-based and/or grounds in theoretical aspects as the basis for the discussion in the quality circles. The findings from the STEPwise survey, focus group discussions (people with chronic conditions, nurses, CHWs and THPs) and semi-structured interviews (managers for clinics, CHWs and chronic disease programme at district and provincial level) were used during quality circles. The quality circle was also based upon assessment of the needs, which were inclusive of consultation with key stakeholders and involved a multidisciplinary approach, where applicable, which considered the optimal and equitable utilisation of healthcare resources (Davidson and Elliott, 2001).

The strategic process of developing an evidence-based integrated chronic non-communicable disease management model in this study was elaborative (Davidson and Elliott, 2001). This was multifaceted and multidisciplinary, involving experts (Sackett et al., 2000, Cretin et al., 2004, Maloney, 2006) who met to discuss interventions to improve management of chronic diseases and presented their ideas to management, especially ideas relating to quality of output aimed at improving management of NCDs in a rural area. The quality circles proved to be a good approach to analysing the context of problems and their impact in the Dikgale HDSS. The process involved presentations of results on the prevalence of risk factors for NCDs in the study area and the findings from the focus group discussions, including the interviews with the managers on chronic disease management.

The interventions and the integration of services in this rural area of the Limpopo Province were planned. Finally, the entire group defined exactly what the problem was and the relationship between its component parts. They also verified the fact that the causes are indeed causes, ensuring that proposed solutions addressed real problems. Moderators and the research team developed a proposition, based on group discussions which were presented, discussed and adapted in the last part of the workshop, in preparation for presentation to the Provincial Department of Health in the Limpopo Province.

The research team understood the quality objectives and created a solution for the improvement of chronic disease management, in the form of a proposed model, which was discussed with the executive management of Department of Health in order to find better ways for its implementation. Meetings were held with the Department of Health and presentations were made to clinicians working in the public health facilities, clinics and hospitals, in the Limpopo Province.

3.10 Internal and external validity of the study

Internal and external validity in research are the two main principles for gauging the validity of research designs, examining causal propositions (Matt et al., 2010). Internal validity is the extent to which a study provides an unbiased estimate of the true value, while external validity occurs if the results apply to the population identified in the study question (Arora and Schriger, 2009). Establishing the internal and external validity of the study was undertaken by addressing the trustworthiness, reliability and validity of the data, including the minimisation of the potential bias in the study.

3.10.1 Trustworthiness of the qualitative data

Trustworthiness of qualitative data encompasses credibility/authenticity, transferability, conformability and dependability (Lincoln and Guba, 1985; Mays and Pope, 2000). These four criteria for trustworthiness represent parallels to the positivist's criteria of internal validity, external validity, objectivity and reliability respectively (Qazi, 2011). To ensure credibility/authenticity, participants were accurately identified and both inclusion and exclusion criteria were clearly described. Inclusion criteria for the quantitative and qualitative studies were set differently.

- For the quantitative study, the inclusion criteria included persons who were aged 15 years and above, permanently residing in the Dikgale HDSS.
- For the qualitative study, the inclusion criteria included patients who were diagnosed with any chronic disease, mainly diabetes mellitus and hypertension, receiving care at one of the clinics within the study area, the nurses who were working in or serving the Dikgale community, the

traditional health practitioners and community health care workers who were working in or serving the Dikgale community.

Exclusion criteria were also set differently for the quantitative and qualitative studies as follows:

- For the quantitative study, the exclusion criteria included persons who were aged less than 15 years or who were temporary migrant workers in the area. The blood samples for participants who were found to be HIV-infected or HIV-positive were excluded for biochemical analysis as HIV patients who are treated with antiretroviral medications (ARVs) develop undesirable changes in lipid and glucose metabolism that mimic the metabolic syndrome. Pregnant women were excluded to participate in the study because evidence reveals that central obesity as measured by waist-to-hip circumference ratio show huge difference between women and men (Alemseged et al., 2013). Therefore the results from pregnant women could affect the prevalence in women.
- For the qualitative study, the exclusion criteria for the study included nurses, traditional health practitioners and community health care workers who were not working in or serving the Dikgale community. Patients who were not diagnosed with any chronic disease were also not included in the study population.

The development of questions for the qualitative study undertaken in the current study was done in a consultative manner, in collaboration with key stakeholders and study supervisors. This ensured that the questions were aligned with the objectives of the study. This process also helped in ensuring that the questions were phrased in a way they were most likely to be honestly answered, responding directly to the study questions and producing data that will get used. The major technique for establishing conformability was to conduct an audit (Lincoln and Guba, 1985). A team of experts in qualitative research ascertained whether the findings were grounded in the collected data. In the current study, all the research records were kept for auditing purposes. The research process was logical, well documented and audited. Again, the findings of the study were confirmed by the literature and by inter-researcher consensus regarding the identified themes, categories and subcategories.

Finally, to ensure dependability, data was transcribed from one-to-one and focus group discussions and recorded interviews directly after collection. A systematic and reproducible data analysis process was followed to make sure that anyone who may use the same process will be able to closely replicate our results. This made it a scientific, verifiable process akin to quantitative analysis methods.

3.10.2 Reliability and validity of quantitative data

Reliability and validity is a major issue when it comes to research, indeed failure to assure the validity and/or reliability of the findings may cause the research to be questioned or, even worse, to be rejected as invalid (Trochim, 2012). Reliability refers to the consistency and/or repeatability of the measurement. In the current study, consistency related to the questionnaires being clear and well defined so as not to confuse the respondents. Repeatability in the current study meant that if the researchers obtain findings from a similar group they should be able to repeat the study and get exactly the same results as ours.

Validity refers to the degree to which the measurement procedure actually measures the concept that it intended to measure (Lafaille and Wildeboer, 1995). Validity in research can be obtained in several ways, including face validity, content validity, predictive validity and concurrent validity (Maxwell 1992, Lafaille and Wildeboer, 1995; Ramos et al., 2014). Content validity in the current study was undertaken by asking recognised experts in the field of study to give their expert opinion on the validity of the tool. Their responses were used to modify the research tools used. The tools were piloted, after the ethical approval and permission to conduct the study had been received.

3.10.3 The process to minimise potential bias in the current study

Bias is defined as any propensity which prevents fair consideration of a request. In research it occurs when systematic error is introduced into sampling or testing by selecting or encouraging one outcome or answer over others (Pannucci and Wilkins, 2010). Selection biases were minimised by recruiting participants from a similar work environment. This was also done in the recruitment of the chronic disease patients, where only patients diagnosed with a chronic disease were recruited to be part of the study. Volunteer or referral bias were also minimised because people who volunteer to participate in a study (or who are referred to it) are often different from non-volunteers/non-referrals. This bias usually, but not always, favours the treatment group, as volunteers tend to be more motivated and concerned about their health. Non-respondent bias was difficult to minimise as participants were not forced to take part in the study. Attention bias was minimised by providing detailed information about the study to the participants because people who are part of a study should be aware of their involvement and, as a result of the attention received, will give more favorable responses or perform better than people who are unaware of the study's intent.

CHAPTER 4: RESULTS

The results of the current study are presented below in three phases based on the methods used in data collection as follows:

- **Phase I:**
 - The prevalence and predictors of chronic Non-Communicable Disease risk factors among adults in the Dikgale HDSS in the Limpopo Province of South Africa.

- **Phase II:**
 - The perceptions and perspectives of chronic disease patients and health care providers on chronic diseases management in the Dikgale HDSS: A qualitative study.
 - Addressing non-communicable diseases through community health workers and traditional healers in the Dikgale HDSS: A qualitative study.
 - Perceived barriers to improving management of chronic non-communicable diseases by managers of health facilities, specifically district and provincial chronic disease programme managers in Dikgale in Limpopo Province, South Africa

- **Phase III:**
 - Development of an integrated evidence-based management model for chronic non-communicable diseases and their risk factors, in a rural area of Limpopo Province, South Africa.

Phase I

4.1 The prevalence and determinants of chronic non-communicable disease risk factors amongst adults in the Dikgale Health Demographic and Surveillance System (HDSS) Site, Limpopo Province of South Africa.

Data in this phase has been published in the PloS one Journal. 2016 Feb 16;11(2):e0147926

4.1.1 Introduction

Non-communicable diseases (NCDs) are amongst the leading causes of death in the world as they have high mortality rates (WHO, 2010). Almost all countries are experiencing an increase in the NCDs which affects all age groups, both poor and rich people, and men and women (Beaglehole et al., 2011). Currently NCDs represent 43% of the global burden of disease which shows an emerging epidemic as NCDs are predicted to rise to 60% and 70% of all deaths in 2020 (Manuc and Lungu, 2006, Alberts et al., 2005). Evidence shows that the burden of NCDs in South Africa has increased over the past 15 years resulting in an estimated 37% of all-cause mortality and 16% of disability-adjusted life years (Puoane et al., 2012; Bradshaw, 2001). It has been reported that the mortality due to NCDs is similar among all provinces in South Africa even though the causes are different (Murray and Lopez, 1997).

The available data in the scientific world reveal that nearly 80% of NCD deaths occur in low- and middle-income countries and albeit the swift evolution of NCDs from high income countries, most of the impacts caused by mortality related to NCDs are preventable through innovative interventions which are cost-effective and achievable (WHO, 2010). Most NCDs share common risk factors, which are often categorized as behavioural or biological (Hoy et al., 2013). Tobacco use, excessive alcohol consumption, an unhealthy diet, and physical inactivity are the behavioural risk factors which contribute to the development of non-communicable diseases (Hoy et al., 2013; Nunter and Reddy 2013; Cerqueira et al., 2011). The low- and middle-income countries have the highest prevalence of these risk factors and people of low socio-economic status are mostly affected (WHO, 2010).

An insight into the extent of the burden of risk factors for chronic non-communicable diseases in rural communities in Limpopo Province of South Africa is crucial for effective advocacy and action. It is indispensable to have surveillance of the major modifiable NCD risk factors in the population mainly for planning, implementation and evaluation of health programmes using good policies (Alikhani et al.,

2009, Msyamboza et al., 2001). Therefore, the aim of this study was to determine the prevalence of risk factors for non-communicable diseases and to identify their demographic and behavioural determinants in Dikgale Health and Demographic Surveillance System (HDSS) centre. The aim of this phase of the study was to determine the prevalence and determinants of chronic non-communicable disease (NCD) risk factors in a rural community Limpopo Province, South Africa.

4.1.2 Data management and analysis

This survey was conducted using the WHO "STEPwise approach to surveillance of non-communicable diseases" (STEPS) methodology. Participants were residents of the Dikgale HDSS site and standardized international protocols were used to measure behavioural risk factors (smoking, alcohol consumption, fruit and vegetable intake, physical activity), physical characteristics (weight, height, waist and hip circumferences, blood pressure – BP). Fasting blood glucose, triglyceride, cholesterol and HDL-C were determined in 732 participants. Data were analysed using STATA 12 for windows.

The participant's demographic information, such as age, sex, and educational achievement, were extracted from the Dikgale HDSS database. The WHO STEPwise approach to Surveillance (STEPS) for NCD risk factors (Nawi NG et al., 2009) was used to collect information of behavioural risk factors through face-to-face interviews and physical measurements were conducted following the recommended STEPwise protocols (WHO, 2011, Pickering et al., 2005) illustrated in Figure 1. The OMRON M6 and M5-I Digital Automatic Blood Pressure Monitors were used to measure resting blood pressure. Blood pressure was measured three times and the average of the last two readings used (Whitworth, 2003, WHO, 2007).

Criteria for the diagnosis of hypertension were those proposed by World Health Organization (WHO)/International Society of Hypertension using the average systolic BP of 140mmHg or higher, or if the average diastolic BP was 90mmHg or higher, or if participants were on anti-hypertensive treatment (Whitworth, 2003; Dalton et al., 2003; WHO, 2007). Height and weight were measured once using a stadiometer and digital balance. The readings were recorded to the nearest 0.5 centimetre and to the nearest 0.1 kg, respectively. Participants were measured without shoes and wearing only light clothing. Fasting blood glucose and total cholesterol were measured using ILAB 300 and cut off values used were as follows: High fasting Blood Glucose $\geq 7\text{mmol/l}$, Total Cholesterol $\geq 5\text{mmol/l}$, Low HDL Cholesterol $<1.00\text{ mmol/l}$ for men and $<1.30\text{ mmol/l}$ for women, Triglycerides $\geq 1.70\text{ mmol/l}$ and TCHOL/HDL-C ratio >5.3 . Waist circumference was measured once using a constant tension tape and recorded to the nearest 0.1 cm (High Waist Circumference $>102\text{ cm}$ for men and $>88\text{ cm}$ for women) (Dalton et al., 2003; Thorogood et al., 2007).

4.1.3 Statistical methods

STATA statistical software (STATA Corporation, College Station, Texas) was utilized for all analyses and categorical variables were presented as percentages whilst continuous variable were expressed as mean \pm SD. The coding of data was done in line with WHO guidelines (WHO, 2007). Comparison of categorical variables was performed using Chi-Square and a level of 0.05 was considered significant. We report 95% confidence intervals (95% CIs) on all proportions. Univariate logistic regression was used to develop multivariate logistic regression model to quantify the determinants of behavioural and biomedical risk factors (Traissac et al., 1999).

4.1.4 Results:

4.1.4.1 Socio-demographic factors

Mean ages of men and women were 41.29 ± 21.46 years and 45.74 ± 20.39 years respectively. Sixty two percent of the participants were females and most of the participants were never married (55%) while 58% had low education. Literacy among men and women was 39.6% and 43.3% respectively while the employment rate among men and women was 32.4% and 26.8% respectively. Obesity was more prevalent in females than males and overall Body Mass Index was significantly different between men and women (Table 2). The definitions of variables used in the results are explained in Appendix F.

Table 2: Characteristics of study participants by gender

	Females (n= 878)		Males (n= 525)		P-value
	Mean	\pm SD	Mean	\pm SD	
Age (years)	45.7	20.3	41.3	21.5	<0.001
Waist (cm)	87.6	14.4	85.5	17.1	0.63
SBP (mmHg)	125.5	24.3	123.8	22.9	0.26
DBP (mmHg)	80.8	12.7	81.9	13.3	0.17
BMI (kg/m ²)	n	%	N	%	
Normal 18.5 – 24.9	309	39.5	308	65.5	<0.001
Overweight 25 – 29.9	225	28.7	115	24.5	
Obese \geq 30	249	31.8	47	10.4	
Low education	496	56.7	317	60.4	<0.001
Not working	379	43.3	208	39.6	
Marital status					
Never married	437	50.1	327	62.5	<0.001
Married	327	37.5	172	32.9	
Divorced	18	2.1	17	3.3	
Widowed	90	10.3	7	1.3	

BMI—body mass index; SBP—systolic blood pressure; DBP—diastolic blood pressure

4.1.4.2 Prevalence of behavioural risk factors

Smoking

The overall prevalence of tobacco smoking (current smokers) was 13.7% and significantly higher in males 29.2% than in females 4.5% ($p<0.001$). Among the current smokers 81.3% were daily smokers (90.3% in males compared to 46.2% in females ($p<0.001$)) (Table 2). The use of smokeless tobacco products was 10.9% in the total population. More female participants (15.7%) used smokeless tobacco products than males (2.4 %) ($p<0.001$) (Table 3).

Table 3: Prevalence of smoking stratified by sex

Smoking	Both sexes	Males (n=528)	Females (n=876)	P-value for trend (males vs females)
	% (95% CI)	% (95% CI)	% (95% CI)	
Current smokers	13.7 (11.9 – 15.5)	29.2 (25.3 – 33.1)	4.5 (3.1 – 5.8)	<0.001
Daily smokers	81.3 (75.8 – 86.9)	90.3 (85.5 – 95.0)	46.2 (30.2 – 62.1)	<0.001
Smokeless tobacco products	10.9 (9.2 – 12.6)	2.4 (0.9 – 3.8)	15.7 (13.2 – 18.3)	<0.001
Smokeless tobacco daily	92.4 (87.5 – 97.2)	90.9 (72.9 – 108.9)	92.5 (87.5 – 97.6)	0.33

The mean age of starting to smoke was 25.3 ± 18.4 years. In the total population, the prevalence of smoking (current smokers) was significantly higher in older males (from 13.0% in age group 15–25 years to 58.3% in age group 45 - 54 years) ($p<0.001$) as compared to females. The prevalence of the use of smokeless tobacco products was significantly higher among older people in both sexes ($p<0.001$). In females use of smokeless tobacco products increased significantly from 1.1% in age group 15 – 25 years to 26.6% in age group 65 years and above ($p<0.001$) (Table 4).

Table 4: Prevalence of smoking stratified by sex and age group

Risk factor	Females (n=878)						P-value
	15 - 24 years % (95% CI)	25 - 34 years % (95% CI)	35 - 44 years % (95% CI)	45 - 54 years % (95% CI)	55 - 64 years % (95% CI)	≥65 years % (95% CI)	
Smoking							
Current smokers	2.5 (0.3 - 4.7)	4.9 (1.1 - 8.8)	4.0 (0.1 - 7.9)	2.8 (0.08 - 5.6)	5.6 (1.5 - 9.6)	6.9 (3.3 - 10.6)	0.06
Daily smokers	2.0 (0.01 - 3.9)	1.6 (-0.6 - 3.9)	1.0 (-0.9 - 2.9)	2.8 (0.1 - 5.6)	2.4 (-2.9 - 5.0)	2.1 (0.0 - 4.2)	0.65
Smokeless tobacco products	1.1 (-0.4 - 2.7)	4.5 (0.6 - 8.3)	11.9 (5.3 - 18.6)	22.6 (15.6 - 29.7)	26.2 (18.4 - 34.1)	26.6 (19.9 - 33.2)	<0.001
Risk factor	Males (n=525)						P-value
	15 - 24 years % (95% CI)	25 - 34 years % (95% CI)	35 - 44 years % (95% CI)	45 - 54 years % (95% CI)	55 - 64 years % (95% CI)	≥65 years % (95% CI)	
Smoking							
Current smokers	13.0 (8.2 - 17.9)	25.9 (16.1 - 35.9)	50.0 (33.4 - 66.6)	58.3 (44.2 - 72.5)	41.0 (30.0 - 52.0)	29.4 (20.5 - 38.3)	<0.001
Daily smokers	12.5 (7.7 - 17.3)	23.4 (13.8 - 32.9)	50.0 (33.4 - 66.6)	50.0 (35.7 - 64.3)	37.2 (26.4 - 47.9)	25.5 (16.9 - 34.0)	<0.001
Smokeless tobacco products	0.0	0.0	0.0	2.5 (-0.4 - 7.4)	4.3 (-0.5 - 9.1)	7.3 (2.0 - 12.5)	<0.001

Alcohol consumption

The prevalence of alcohol consumption (consumed alcoholic drinks in last 12 months) was 16.3% in the total population and males had a significantly higher prevalence than females 28.9% vs 8.6% ($p<0.001$) (Table 5).

Table 5: Prevalence of alcohol consumption stratified by gender

Alcohol consumption	Both sexes	Males (n=528)	Females (n=876)	P-value for trend (males vs females)
	% (95% CI)	% (95% CI)	% (95% CI)	
Consume last 12 months	16.3 (14.3 – 18.2)	28.9 (25.1 – 32.9)	8.6 (6.8 – 10.5)	<0.001
Alcohol in 30days	84.4 (78.9 – 89.9)	88.5 (82.5 – 94.4)	75.9 (64.3 – 87.5)	0.036

The prevalence of alcohol consumption (consumed alcoholic drinks in last 12 months) in males increased from 15.8% in age group 15 – 25 years to 37.2% in age group 55 – 64 years ($p<0.001$) but a decline of 2.9% in age group 65 years and above was noticed ($p<0.001$) (Table 6).

Table 6: Prevalence of alcohol consumption stratified by gender and age group

Risk factor	Females (n=878)						P-value
	15 - 24 years % (95% CI)	25 - 34 years % (95% CI)	35 - 44 years % (95% CI)	45 - 54 years % (95% CI)	55 - 64 years % (95% CI)	≥65 years % (95% CI)	
Alcohol consumption							
Ever consumed alcohol	3.0 (0.6 - 5.4)	12.2 (6.4 - 18.0)	6.1 (1.3 - 10.8)	10.7 (5.6 - 15.9)	14.9 (8.7 - 21.2)	13.9 (8.9 - 18.9)	0.001
Consume last 12 months	3.0 (0.6 - 5.4)	12.2 (6.4 - 18.0)	3.0 (-0.3 - 6.4)	9.2 (4.4 - 13.9)	12.6 (6.8 - 18.4)	12.2 (7.5 - 16.9)	0.001
Alcohol in 30 days	50.0 (-7.9 - 107.9)	64.3 (37.6 - 90.9)	100	71.4 (34.4 - 108.4)	83.3 (65.4 - 101.2)	87.5 (70.4 - 104.6)	0.005
Risk factor	Males (n=525)						P-value
	15 - 24 years % (95% CI)	25 - 34 years % (95% CI)	35 - 44 years % (95% CI)	45 - 54 years % (95% CI)	55 - 64 years % (95% CI)	≥65 years % (95% CI)	
Alcohol consumption							
Ever consumed alcohol	16.9 (11.5 - 22.4)	36.4 (25.5 - 47.2)	41.7 (25.3 - 58.0)	52.1 (37.8 - 66.4)	44.9 (33.7 - 56.0)	41.2 ((31.6 - 50.8)	<0.001
Consume last 12 months	15.8 (10.5 - 21.1)	32.5 (21.9 - 43.0)	33.3 (17.7 - 48.9)	43.8 (29.5 - 57.9)	37.2 (26.4 - 47.9)	34.3 (25.0 - 43.6)	<0.001
Alcohol in 30 days	83.3 (65.4 - 101.2)	80.0 (61.8 - 98.2)	100	91.7 (75.2 - 108.2)	88.0 (74.9 - 101.1)	93.5 (84.7 - 102.4)	0.101

Low fruit and vegetable intake

The prevalence of low fruit and vegetable intake (less than 5 servings of fruits and vegetables which is equivalent to at least 400g of fruits and vegetables per day) was 88.6% for both sexes and there was no significant difference between males and females ($p=0.91$) (Table 4.6). The prevalence of low fruit and vegetable intake was significantly lower in older males 80.4% in age group 65 years and above

compared to 93.3% in the age group 15 – 24 years ($p<0.001$). Among females there was no trend in the prevalence of low fruit and vegetable intake with age, $p=0.08$ (Table 7).

Table 7: Prevalence of low fruit and vegetable intake and physical inactivity stratified by gender

Risk factors	Both sexes	Males (n=528)	Females (n=876)	P-value for trend (males vs females)
	% (95% CI)	% (95% CI)	% (95% CI)	
Fruit and vegetable				
<5 servings/day	88.6 (87.0 – 90.4)	88.8 (86.1 – 91.5)	88.6 (86.5 – 90.7)	0.91
Physical activity				
Low (<600 MET-min)	66.5 (63.9 – 68.9)	40.7 (36.5 – 44.9)	70.8 (67.8 – 73.8)	<0.001

Low physical activity

The prevalence of low physical activity which is (MET-minute/week <600MET in a form of work, travel to and from places, recreational activities) was 65.5% in total population. Females had a significantly higher prevalence of physical inactivity 70.8% as compared to 40.7% for males, $p<0.001$ (Table 4.6). The prevalence of low physical activity increased significantly with age in females from 58.8% in age group 15–25 years to 78.7% in age group 55 - 64 years, $p<0.001$. A similar trend was seen in males (Table 8).

Table 8: Prevalence of low fruit and vegetable intake and physical inactivity stratified by gender and age group

Risk factor	Females (n=878)						P-value
	15 - 24 years % (95% CI)	25 - 34 years % (95% CI)	35 - 44 years % (95% CI)	45 - 54 years % (95% CI)	55 - 64 years % (95% CI)	≥65 years % (95% CI)	
Low fruit and vegetable							
<5 servings/day	91.5 (87.6 - 95.4)	86.9 (81.0 - 92.4)	92.9 (87.8 - 98.0)	88.0 (82.7 - 93.4)	85.8 (79.7 - 91.9)	86.7 (81.8 - 91.6)	0.08
Physical activity							
Low (<600 MET-min)	58.8 (51.9 - 65.7)	69.9 (61.8 - 78.1)	74.7 (66.1 - 83.4)	71.8 (64.4 - 79.3)	78.7 (71.6 - 85.9)	75.5 (69.4 - 81.7)	<0.001
Risk factor	Males (n=525)						P-value
	15 - 24 years % (95% CI)	25 - 34 years % (95% CI)	35 - 44 years % (95% CI)	45 - 54 years % (95% CI)	55 - 64 years % (95% CI)	≥65 years % (95% CI)	
Low fruit and vegetable							
<5 servings/day	93.5 (89.9 - 97.1)	93.5 (87.9 - 99.1)	88.9 (788.5 - 99.3)	87.5 (78.0 - 96.9)	85.9 (78.1 - 93.7)	80.4 (72.6 - 88.2)	0.001
Physical activity							
Low (<600 MET-min)	51.6 (44.4 - 58.9)	59.7 (48.7 - 70.8)	52.8 (36.2 - 69.3)	52.1 (37.8 - 66.4)	62.8 (52.0 - 73.6)	75.5 (67.1 - 83.9)	<0.001

4.1.4.3 Prevalence of hypertension, anthropometric and biochemical risk factors

Hypertension

The overall prevalence of hypertension was found to be 38.9% in the total population and there was no significant difference between males and females, $p=0.27$. The prevalence of hypertension increased significantly with age in females (from 29.4 % in age group 15–25 years to 49.5% in age group 65 years and above, $p<0.001$). A similar trend was observed in males (from 32.6% in the 15–25 year age group to 49.5% in age group 65 years and above, $p=0.003$) (Table 4.8).

Overweight and Obesity

The overall prevalence of overweight was 27.1% in the total population and a higher prevalence of overweight was observed in older females ($p<0.001$) (Table 4). The prevalence of obesity in females was higher (27.8%) compared to males (10.6%) ($p<0.001$) and in females obesity was highest in the age group 45 – 64 years. The prevalence of obesity in females showed an increasing trend from 13.6% in age group 15 – 25 years to 41.9% in age group 55 – 64 years. ($p<0.001$) (Table 4.8).

High waist circumference

The prevalence of high waist circumference was found to be 34.6% in the total population. Females had a significantly higher prevalence (49.8%) compared to males (7.8%) $p<0.001$. There was no significant trend in the prevalence of high waist circumference with age (Table 4.8).

High fasting blood glucose

The prevalence of high fasting blood glucose which was equal to or above 7.0 mmol/L in the study participants was 12.5% in total population. The prevalence of high fasting blood glucose was significantly higher in older participants and increased from 2.8% in age group 15 - 25 years to 18.8% in age group ≥ 65 years in females $p=0.017$ and from 1.5% in age group 15 – 25 years years to 19.6% in age group ≥ 63 years in males $p=0.003$ (Table 9). If using glucose level equal or above 11.1mmol/L or being on treatment for control of blood glucose, the prevalence of diabetes among the study participants was 4%.

Table 9: Prevalence of physical risk factors for Chronic Non-Communicable Diseases by gender and age

Risk factor	Females (n=878)						P-value
	15 - 24 years % (95% CI)	25 - 34 years % (95% CI)	35 - 44 years % (95% CI)	45 - 54 years % (95% CI)	55 - 64 years % (95% CI)	≥65 years % (95% CI)	
Hypertension (BP>140/90mmHg)	29.4 (23.1 - 35.8)	31.1 (22.9 - 39.4)	27.6 (18.6 - 36.5)	42.9 (34.6 - 51.1)	45.6 (36.8 - 54.4)	49.5 (42.3 - 56.6)	<0.001
Overweight (BMI kg.m ² ≥25 to ≤29.9)	28.8 (22.1 - 35.5)	28.2 (19.7 - 36.6)	25.3 (15.9 - 34.7)	32.1 (24.1 - 40.0)	23.2 (15.3 - 31.1)	31.9 (24.8 - 39.1)	<0.001
Obesity (BMI kg.m ² ≥30)	13.6 (8.5 - 18.6)	28.2 (19.7 - 36.6)	37.3 (26.9 - 47.8)	40.3 (31.9 - 48.6)	41.9 (32.8 - 51.2)	37.3 (29.9 - 44.7)	<0.001
High waist circumference (≥102 men and ≥88 women)	55.7 (48.3 - 63.2)	56.2 (46.6 - 65.7)	60.0 (49.5 - 70.5)	60.2 (51.6 - 68.7)	58.4 ((49.3 - 67.5)	52.4 (44.8 - 60.1)	0.74
Risk factor	Males (n=525)						P-value
	15 - 24 years % (95% CI)	25 - 34 years % (95% CI)	35 - 44 years % (95% CI)	45 - 54 years % (95% CI)	55 - 64 years % (95% CI)	≥65 years % (95% CI)	
Hypertension (BP>140/90mmHg)	32.6 (25.7 - 39.5)	28.8 (18.3 - 39.2)	36.1 (20.2 - 52.1)	35.4 (21.7 - 49.1)	47.4 (36.0 - 58.7)	49.5 (39.7 - 59.3)	0.003
Overweight (BMI kg.m ² ≥25 to ≤29.9)	20.4 (14.2 - 26.5)	17.5 (7.9 - 26.9)	28.1 (12.3 - 43.9)	26.2 (12.7 - 39.7)	28.6 (17.9 - 39.3)	32.3 (22.7 - 41.8)	0.51
Obesity (BMI kg.m ² ≥30)	10.2 (5.6 - 14.8)	17.5 (7.9 - 26.9)	3.1 (-3.0 - 9.3)	9.5 (0.5 - 18.5)	11.4 (3.9 - 18.9)	6.5 (1.4 - 11.5)	0.51
High waist circumference (≥102 men and ≥88 women)	31.3 (24.2 - 38.4)	29.2 (18.1 - 40.4)	28.1 (12.3 - 43.9)	38.6 (24.0 - 53.2)	30.9 (19.8 - 41.9)	30.1 (20.7 - 39.5)	0.76

Data are percentages, unless otherwise indicated. * BP ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg, Overweight (BMI kg.m² ≥25 to ≤29.9), Obesity (BMI kg.m² ≥30) Waist circumference (≥ 102 men and ≥ 92 women)

Raised triglycerides levels

The overall prevalence of raised triglycerides levels was 25.4%. The prevalence of raised triglycerides levels was significantly higher in older participants of both sexes. Among females the prevalence was 7.0% in age group 15 – 25 years and 39.6% in age group 65 years and above ($p<0.001$). Similar increasing trend was observed in males (11.1% in age group 15 – 25 years to 40.8% in age group 65 years and above) ($p=0.004$) (Table 9).

High cholesterol levels and total cholesterol/HDL-cholesterol ratio

The prevalence of high total cholesterol (TC) levels was 32.6% in total population. Older females showed a higher prevalence of high total cholesterol (TC) levels as compared to younger female participants (20.0% in age group 15 – 25 years to 48.4% in age group 65 years and above, $p<0.001$). A similar increasing trend was observed in males from 15.6% in age group 15 – 25 years to 48.2% in age group 65 years and above, $p<0.001$ (Table 10). But our results also show a high prevalence of high total cholesterol (TC) levels in males aged 25 – 34 years. The overall prevalence of high Total Cholesterol/HDL-cholesterol ratio was 10.6% with no significant difference between males and females, ($p=0.28$). There was a higher prevalence of high Total Cholesterol/HDL-cholesterol ratio in older males and females (4.3% in 15–25 age group to 22.6% in age group 65 years and above and from 14.8% in age group 25 – 34years to 28.6% in age group 65 years and above in females and males respectively, $p<0.001$ (Table 10).

Table 10: Prevalence of biochemical risk factors for Chronic Non-Communicable Diseases by gender stratified by age groups

Risk factor	Females						P-value
	15 - 24 years % (95% CI)	25 - 34 years % (95% CI)	35 - 44 years % (95% CI)	45 - 54 years % (95% CI)	55 - 64 years % (95% CI)	≥65 years % (95% CI)	
High Fasting Blood Glucose (≥7.0 mmol/l)	2.8 (-11.1 - 6.7)	1.9 (-1.9 - 5.7)	6.8 (-0.7 - 14.4)	9.1 (3.0 - 15.1)	15.7 (7.1 - 24.3)	18.8 (10.9 - 26.6)	0.017
Raised Triglycerides Levels (≥1.7 mmol/l)	7.0 (1.0 - 13.1)	13.7 (4.2 - 23.3)	18.6 (6.8 - 30.4)	27.1 (17.5 - 36.6)	25.7 (15.4 - 36.1)	39.6 - 29.7 - 49.4)	<0.001
High Cholesterol Levels (≥5.0 mmol/l)	20.0 (10.5 - 29.5)	17.3 (6.9 - 27.7)	22.7 (10.2 - 35.3)	32.6 (22.6 - 42.5)	47.1 (35.3 - 58.9)	48.4 (38.3 - 58.6)	<0.001
TC/HDL-C Ratio (>5.0)	4.3 (-0.5 - 9.1)	7.8 (0.3 - 15.3)	6.9 (-0.8 - 14.7)	12.9 (5.7 - 20.1)	17.1 (8.2 - 26.1)	22.6 (14.0 - 31.1)	<0.001
Risk factor	Males						P-value
	15 - 24 years % (95% CI)	25 - 34 years % (95% CI)	35 - 44 years % (95% CI)	45 - 54 years % (95% CI)	55 - 64 years % (95% CI)	≥65 years % (95% CI)	
High Fasting Blood Glucose (≥7.0 mmol/l)	1.5 (-1.5 - 5.6)	6.9 (-2.5 - 16.3)		4.3 (-4.2 - 12.9)	12.2 (2.0 - 22.4)	19.6 (9.1 - 30.2)	0.003
Raised Triglycerides Levels (≥1.7 mmol/l)	11.1 (3.2 - 18.9)	37.9 (19.9 - 56.0)	21.4 (-0.9 - 43.9)	21.7 (4.4 - 39.1)	29.3 (15.1 - 43.4)	40.77 (27.4 - 54.0)	0.004
High Cholesterol Levels (≥5.0 mmol/l)	15.6 (6.6 - 24.6)	44.4 (25.2 - 63.6)	7.1 (-6.9 - 21.2)	21.7 (4.4 - 39.1)	14.6 (3.6 - 25.6)	48.2 (34.9 - 61.5)	<0.001
TC/HDL-C Ratio (>5.0)		14.8 (1.1 - 28.5)	15.4 (-5.1 - 35.9)	4.5 (-4.4 - 13.5)	9.7 (0.5 - 19.0)	28.6 (16.6 - 40.6)	<0.001

4.1.4.4 Determinants of behavioral risk factors (tobacco use, alcohol consumption, low fruit and vegetable intake and low physical activity)

Older people were 3.3 times more likely to be smokers ($p<0.001$), 5.3 times more likely to use smokeless tobacco products ($p<0.001$), 2.4 times more likely to consume alcohol ($p<0.005$) and 1.1 times more likely to have low fruit and vegetable intake ($p<0.005$) (Table 4.10). Males were 10.6 times more likely to be smokers ($p<0.001$), 0.1 less likely to use smokeless tobacco products ($p<0.001$), 4.9 times more likely to consume alcohol ($p<0.001$) and 0.6 times less likely to be physically inactive ($p<0.001$) (Table 11). People with low education were found to be 2 times more likely to use smokeless tobacco products ($p<0.05$) and 0.6 times less likely to consume alcohol ($p<0.05$). People who were never married were 2.5 times more likely to be smokers ($p<0.001$) than married people, divorced people were 5.8 times more likely to be smokers than married people ($p<0.001$) and widowed people were 1.9 times more likely to be smokers. Marital status was not significantly associated with the use of smokeless tobacco products, alcohol consumption and intake of low fruit and vegetable. People in the low income category were 1.4 times more likely to consume alcohol than people in the high income category ($p=0<0.05$) (Table 11).

Table 11: Multivariate logistic regression to determine predictors of behavioral risk factors for NCD

Variables	Smoking	Smokeless tobacco products	Alcohol consumption	Low fruit and vegetable intake	Physical inactivity
	Hosmer-Lemeshow= 0.41	Hosmer-Lemeshow= 0.34	Hosmer-Lemeshow= 0.45	Hosmer-Lemeshow= -	Hosmer-Lemeshow= 0.24
	Sensitivity= 24.34%	Sensitivity= 0.0%	Sensitivity= 0.0%	Sensitivity= 0.0%	Sensitivity= 0%
	Specificity= 97.75%	Specificity= 100%	Specificity= 100%	Specificity= 100%	Specificity= 100%
Age					
15 – 39 years	Reference (1)	Reference (1)	Reference (1)	Reference (1)	Reference (1)
≥40 years	3.33 (1.99 – 5.55)***	5.31 (2.45 – 11.49)***	2.35 (1.39 – 3.98)**	1.14 (0.69 – 1.87)	0.87 (0.63 – 1.22)
Gender					
Female	Reference (1)	Reference (1)	Reference (1)		Reference (1)
Male	10.63 (7.00 – 16.13)***	0.14 (0.07 – 0.27)***	4.89 (3.38 – 7.07)***	a	0.55 (1.22 – 1.97)***
Educational status					
High	Reference (1)	Reference (1)	Reference (1)	Reference (1)	Reference (1)
Low	0.91 (0.61 – 1.36)	2.14 (1.25 – 3.69)*	0.56 (0.36 – 0.87)*	0.86 (0.57 – 1.29)	1.08 (0.83 – 1.42)
Marital status					
Married	Reference (1)	Reference (1)	Reference (1)	Reference (1)	Reference (1)
Never married	2.52 (1.54 – 4.12)***	0.66 (0.39 – 1.05)	1.56 (0.97 – 2.49)	0.65 (0.41 – 1.03)	1.52 (1.11 – 2.10)*
Divorced	5.78 (2.43 – 13.76)***	2.14 (0.87 – 5.28)	2.15 (0.92 – 5.03)	1.21 (0.49 – 3.03)	1.06 (0.49 – 2.28)
Widowed	1.97 (0.87 – 4.48)	1.08 (0.62 – 1.90)	0.66 (0.29 – 1.49)	1.07 (0.58 – 1.97)	0.74 (0.42 – 1.29)
Work status					
Working	Reference (1)	Reference (1)	Reference (1)		Reference (1)
Not working	1.35 (0.91 – 2.01)	1.47 (1.02 – 2.14)*	1.17 (0.78 – 1.76)	a	0.98 (0.74 – 1.31)
Income					
High income			Reference (1)		
Low income	a	a	1.36 (1.08 – 1.71)*	a	a

Values are reported as odds ratios (95%CI); * significant at $p<0.05$; **significant at $p<0.005$; ***significant at $p<0.001$
a= Not significant in univariate model then dropped

4.1.4.5 Determinants of biomedical risk factors (Hypertension, High fasting blood glucose, High Cholesterol, Raised triglycerides)

The older people were 4.7 times more likely to be hypertensive than young ones ($p<0.001$), 1.8 times more likely to have high fasting blood glucose ($p<0.05$), 1.7 times more likely to have high cholesterol levels ($p<0.005$), 2.1 times more likely to have a high total cholesterol HDL-C ratio ($p<0.05$) and 2.2 times more likely to have raised triglycerides ($p<0.001$) (Table 12). People who were overweight or obese were found to be 1.7 times more likely to be hypertensive. Smokers were found to be 1.4 times more likely to be hypertensive ($p=0.189$), 0.5 times less likely to have high cholesterol levels ($p<0.05$) and 0.3 times less likely to have high total cholesterol HDL-C ratio ($p<0.05$). People who consumed alcohol were 1.6 times more likely to be hypertensive ($p<0.05$), and 0.6 times less likely to have raised triglyceride ($p<0.05$). People who had low fruit and vegetable intake were found to be 1.8 times more likely to have high fasting blood glucose ($p<0.05$) (Table 12).

Table 12: Multivariate logistic regression to determine predictors of biochemical risk factors for NCD

Variables	Models				
	Hypertension	High fasting blood glucose	High cholesterol levels	TC/HDL- Cholesterol ratio	Raised triglyceride
	Hosmer-Lemeshow= 0.04 Sensitivity= 62.54% Specificity= 65.85%	Hosmer-Lemeshow= 0.07 Sensitivity= 0.0% Specificity= 100%	Hosmer-Lemeshow= - Sensitivity= 0.0% Specificity= 100%	Hosmer-Lemeshow= 0.36 Sensitivity= 0.0% Specificity= 100%	Hosmer-Lemeshow= 0.63 Sensitivity= 73.26% Specificity= 53.22%
Age					
15 – 39 years	Reference (1)	Reference (1)	Reference (1)	Reference (1)	Reference (1)
≥40 years	4.7 (3.2 – 6.9)***	1.8 (1.1 – 3.0)*	1.7 (1.2 – 2.4)**	2.1 (1.2 – 3.6)*	2.2 (1.5 – 3.2)***
Overweight/Obesity					
No	Reference (1)	a	a	a	a
Yes	1.7 (1.2 – 2.3)**				
Smoking					
No	Reference (1)	a	Reference (1)	Reference (1)	a
Yes	1.4 (0.8 – 2.4)		0.5 (0.3 – 0.8)*	0.3 (0.1 – 0.5)*	
Alcohol consumption					
No	Reference (1)	a	Reference (1)	Reference (1)	Reference (1)
Yes	1.6 (1.1 – 2.5)**		0.8 (0.5 – 1.2)	0.5 (0.2 – 1.2)	0.6 (0.4 – 0.9)*
Low fruit and vegetable intake					
No	a	Reference (1)	a	a	a
Yes		1.8 (1.0 – 3.2)*			

Values are reported as odds ratios (95%CI); * significant at $p<0.05$; **significant at $p<0.005$; ***significant at $p<0.001$
Hypertension = BP >140/90 mmHg, High fasting blood glucose= ≥ 7.0 mmol/l, High cholesterol levels= ≥ 5.0 mmol/l, TC/HDL- Cholesterol ratio= >5.0 ,
Raised triglyceride= ≥ 1.7 mmol/l, High waist circumference= ≥ 102 men and ≥ 88 women, Overweight/Obesity= BMI $\text{kg.m}^2 \geq 25$ to ≤ 29.9 / BMI $\text{kg.m}^2 \geq 30$
a= Not significant in univariate model then dropped

4.1.5 Discussion

Our study reveals that epidemiological transition is occurring in a rural area of the Limpopo Province of South Africa. The present study reported the prevalence of cigarette/pipe smoking to be 13% of the total population, which is similar to another rural area of South Africa (14%) (Thorogood et al., 2007) but lower than the reported national prevalence in 1996 of 31% (Reddy et al., 1996). The reason for the difference with the national prevalence may be that the SADHS included urban areas, where smoking is known to be more common (Reddy et al., 1996).

Our study demonstrated that risk factors for chronic non-communicable diseases are major public health problems, with a high percentage of men using tobacco and alcohol. The study findings reflect the cultural practice wherein the prevalence of smoking and alcohol consumption was higher in men than in women (29% vs 4.5% for smoking and 28.9% vs 8.6% for alcohol consumption). This was lower than the prevalence reported from a study incorporating South African adults in all 9 provinces of South Africa, aged 18 years and older (38% and 21%) (Reddy et al., 1996) and is also lower than the results of

a study conducted by Alberts et al., in the same study area (57.2% and 35.4%) (Alberts et al., 2005). The prevalence of smoking was almost similar to that found by another study from a rural area in the Mpumalanga Province in 2007 (Thorogood et al., 2007). It is important to note that the Alberts *et al.*, study used participants of aged above 30 years. If we were to consider participants aged above 30 years in our study we would obtain a similar prevalence rate of 16%. It is a well-known phenomenon that the prevalence of smoking increases with age. In a study conducted in Vietnam by Pham et al., the prevalence of smoking was found to be higher in men than in females, which concurs with the findings from our study (Pham et al., 2009). The high prevalence of smoking among men also supports the findings of several surveys elsewhere (Ng et al., 2006) and raises concerns about the environmental tobacco exposure and the influence of paternal smoking on youths.

The present study shows that smoking is associated with increasing age, male gender, people who were never married, are divorced and are widowed. This concurs with other studies conducted in rural HDSSs in Asia (Ashraf et al., 2009; Hamrah et al., 2013). The median age at initiation of smoking was 19 years, which is consistent with the study conducted by Sugathan et al., in Kerala, India on the “Behavioural risk factors for non-communicable disease among adults” (Sugathan et al., 2008). In our study, the risk factors for smokeless tobacco products use were found to increase with age, amongst males, those with low education, widowers, the jobless and those with low income. This is consistent with a study conducted by Kadke et al., of 2012 in a South Asian population (Kadke et al., 2012). High use of smokeless tobacco products in rural communities is mainly due to social acceptance and a belief regarding palliative role of these products for minor ailments, such as toothache (Kadke et al., 2012).

Our study findings also showed a strong association of alcohol consumption and increasing age, gender and low education, which is concurrent with other studies (Bich et al., 2009; Kaur et al., 2011). A high consumption of fruits and vegetables reduces the risk of heart disease and high BP, as well as some forms of tumour (Kanungsukkasen et al., 2009). The prevalence of inadequate fruit and vegetable consumption, defined as less than five servings a day, was high, as found in other studies (Kanungsukkasen et al., 2009; Karl and Phaswana-Mafunya, 2012). This has also been found in a study undertaken in South Africa in 2009, showing that 80% of adults aged ≥ 15 years eat less fruit and vegetable than recommended (Hall et al., 2009). We saw no gender difference here, which is a characteristic of rural areas with low income (Lazzeri et al., 2013). An Italian study reported a low percentage of adolescents eating fruit and vegetable daily (Lazzeri et al., 2013). Our study findings show that gender was not associated with low intake of fruit and vegetable, while other studies conducted in other INDEPTH HDSS sites showed gender differences (Kanungsukkasen et al., 2009).

Physical activity is widely recognised as a means of primary prevention of chronic diseases, as well as facilitating a patient's treatment and rehabilitation. Moreover, physical activity has beneficial effects on an individual's health and well-being (Anand et al., 2007). Our study shows that females are more physically inactive than are men, which concurs with studies conducted in 9 rural HDSSs in 5 Asian countries, namely, Bangladesh, India, Vietnam, Indonesia and Thailand (Mehan et al., 2006; Ng et al., 2009). This also concurs with findings from the World Health Survey 2003 in which women were more physically inactive than men in South Africa (Gulhold et al., 2008). Overall, about 15% of men and 20% of women from the study conducted in 51 countries, including South Africa, (most of which are developing countries) were found to be at risk for chronic diseases due to physical inactivity (Gulhold et al., 2008) and in South Africa 48% of adult men and 63% of adult women were categorised as inactive (Gulhold et al., 2008). The percentage of physically inactive adults in the world is high (Anand et al., 2007), despite evidence which clearly shows that physical activity is essential to improve health and quality of life (Hansen et al., 2012). Physical inactivity is recognised as an independent coronary artery disease risk factor and is one of six major cardiovascular risk factors. Being physically active significantly reduces the risk of obesity (Hansen et al., 2012).

There may be a degree of under-reporting of physical activity behavior in rural communities when self-reporting methods are used (Hansen et al., 2012; Cook et al., 2012). Therefore, the use of objective measures of physical activity, in addition to, or in place of, subjective or self-report measures of physical activity, should be promoted in physical activity epidemiology research (Hansen et al., 2012). A study by Cook et al., reported that rural African women walk in excess of 10 000 steps per day, as a result of involvement in subsistence or lifestyle activities, such as housework, yard work and walking for transport (Cook et al., 2012).

Our study shows a hypertension prevalence of 38.0% with no gender difference. The prevalence of hypertension in our study was higher than the findings of the 2005 Alberts et al., study, which found that approximately 25% of participants had hypertension (Alberts et al., 2005). Our study findings are contrary to the findings of a study conducted in Vietnam by Pham (Pham et al., 2009) which reported that more men than women had hypertension.

Contrary to the findings of a study conducted in Kerala, India (Thankappan et al., 2010), our study showed no gender difference in the prevalence of hypertension. Other studies of rural communities in Asia also report high and increasing rates of hypertension (Singh et al., 2000; Minh et al., 2005; Bhasin

et al., 2013). Obesity is a growing health problem globally and the WHO emphasises the importance of monitoring the prevalence of overweight and obesity in different populations. We observed a high prevalence of overweight and obesity among females in our study, which is consistent with another study in India (Kaur et al., 2011). Furthermore, obesity and overweight are high in the age groups 15-34 years, that is in adolescents and young people, which has been found elsewhere in South Africa (Goedecke et al., 2006). A similar trend was observed in northern India (Thankappan et al., 2010) and in a rural area near NCT Delhi (Bhasin et al., 2013). We observed an increase in overweight with increasing age in our study, which was found to decline in both males and females after 44 years in a study by Kaur et al., (Kaur et al., 2011).

Obesity was found to be associated with hypertension in our study, which is concordant with findings elsewhere in South Africa and in India (Minh et al., 2005; Bradshaw et al., 2012). High BMI than normal is a risk factor for diabetes and it has been shown that changes in BMI at the population level foreshadow changes in diabetes prevalence (Al-Nsour et al., 2012). Women in our study showed a greater prevalence of overweight and obesity, which is similar to another study (Al-Nsour et al., 2012). Nevertheless, the high prevalence of overweight and obesity among the people of this rural population is disturbing. These findings are supported by Zhou et al., 2012, who found that, in South Africa, overweight and obesity are prevalent amongst almost all population and age groups, especially in the rural areas (Zhou et al., 2012).

The prevalence of high fasting blood glucose generally increased with age in all groups, indicating the prevalence of diabetes, with FBG at a level of more than 7 mmol/l, in 12.5% of total population. This is consistent with a study conducted by Bradshaw et al., in South Africa (Hunter and Reddy, 2013) and a study conducted in a U.S.A population by Cowie et al., (Cowie et al., 2006) in which the prevalence of high fasting blood glucose generally increased with age in all groups. This high fasting blood glucose among the study participants might not be a reflection of the true prevalence of diabetes, because fasting might not have been adhered to, as required; and it was difficult to measure adherence. High fasting blood glucose was associated with older age, low education, and unemployment in our study.

Males had a lower prevalence of high cholesterol levels when compared to females in our study, which is higher than the results obtained in a study conducted by Al-Nuaim in Saudi Arabia (Al-Nuaim et al., 1996). The prevalence of high cholesterol in our female study participants increased with age, reaching a peak of 43.2% in age group 65 years and above, which is consistent with the study by Al-Nuaim (Al-Nuaim et al., 1996). In our study, high cholesterol levels were significantly associated with older age,

low education; people who were never married and unemployed people. High total cholesterol and low high-density lipoprotein (HDL) cholesterol are major risk factors for coronary heart disease, including heart attacks (Venkitachalam et al., 2012). Elevated serum cholesterol is a modifiable risk factor which is associated with an estimated 4.4 million deaths each year and accounts for a considerable proportion of ischemic strokes and heart disease worldwide (Venkitachalam et al., 2012). Therapeutic lifestyle changes (reduced dietary intake of saturated fats and cholesterol, weight control and increased physical activity) form the core of all cholesterol-lowering initiatives (Venkitachalam et al., 2012).

In the present study there was a steady increase of total-to-HDL cholesterol ratio with age in both males and females which concurs with a study conducted in the same area in 2005 by Alberts et al., (Alberts et al., 2005). Hypertriglyceridemia was prevalent in approximately 24.8% of the entire sample population, as compared to the findings from studies conducted in Angola (10.6%) and Nigeria (15.0%) and the prevalence found in the third National Survey on Health and Nutrition (NHANES III) in African-American men and women (21.0 and 14.0%, respectively) (Carroll et al., 2012). In our study, prevalence was similar between men and women. More females had a high waist circumference than males which, is consistent with other studies (Carroll et al., 2012; Motala et al., 2012).

Limitations of the study

In terms of representativeness of our results, our study findings need to be interpreted cautiously, as the Dikgale HDSS is developed as a sub district level surveillance system in a rural setting of Capricorn District of the Limpopo Province of South Africa. The survey is cross-sectional and was not conducted throughout the year. Some variables were self-reported, which may have resulted in self-report bias and we did not compute measures of agreement between self-reported conditions and those obtained from actual measurements. Again, some of the behaviours that vary seasonally (e.g., dietary intake) may not be representative and cause and effect cannot be determined for associations between BMI and selected health conditions. Participants were requested not to eat anything the previous evening before they come to participate in the study the following morning. However, it was difficult to measure adherence to this request, which is seen as a limitation and a challenge to validity of the serum lipids and glucose results.

It is not possible, therefore, to extrapolate our findings to a larger population at provincial or country level. However, findings in our study are in line with most of the findings from other sub-national or national surveys from other parts of the world. Low response rate was mainly due to participants being

absent from home after repeated visits, some participants having moved out of the community, others refused to participate or were sick or deceased.

4.1.6 Conclusion

The present study shows that the prevalence of non-communicable disease risk factors, such as smoking, alcohol consumption, low fruit and vegetable consumption, physical inactivity, hypertension, overweight and high waist circumference are high. Due to the epidemiological transition which is occurring in this rural area, a recommendation for health interventions that are aimed at controlling risk factors at population level should be planned and implemented by the provincial government, in order to slow the progress of the coming non-communicable disease epidemic. In conclusion, our findings highlight the importance of reaching out to poor rural communities with messages regarding the effects of diet, smoking and alcohol consumption on their general health.

Implications of the study

This study in the Dikgale HDSS provides baseline data on risk factors for NCDs and these epidemiological data will be of value if used by health policy makers in developing interventions aimed at chronic disease risk factor prevention and control (Al-Nuaim et al., 1996; Cowie et al., 2006) in the Limpopo Province. This study suggests that chronic NCDs are common amongst adults in rural areas; therefore, we propose that primary health care services increasingly accommodate screening and treatment for chronic NCDs and awareness of NCD risk factors amongst rural populations.

Phase II:

4.2 The perceptions and perspectives of chronic disease patients and health care providers on chronic diseases management

Data in this phase has been published in the BMC Health Science Research Journal, (2015) 15:143

4.2.1 Introduction

The global health care system is troubled by the increasing chronic disease burden (Nolte et al., 2007; Liddy et al., 2013). Chronic disease management (CDM) helps people to keep as healthy as possible through the prevention and early detection of complications, and management of these chronic diseases. CDM is a public health care approach emphasizing and encouraging individuals living with chronic diseases to maintain their independence by managing their health conditions and therefore maintain functional capacity (Willison et al., 2007). This is important for the concerned public health officials as maintaining a healthy quality of life on individual level also creates stability and equality among society members as a whole. With the growing elderly population in South Africa and changing life styles, chronic diseases have become a primary factor provoking a rise in medical costs and decreased quality of life (Kim et al., 2013).

Organizational or structural interventions are crucial for chronic disease management as the management of chronic diseases is distinct from health care for acute problems (Beaglehole et al., 2008). Thus, there is a need to refocus and strengthen the primary health care as chronic diseases need opportunistic case finding for assessment of risk factors, early detection of disease and identification of high risk status (Beaglehole et al., 2008). Successful management of chronic conditions requires behavioural and lifestyle adjustments to minimize functional limitations and disability (Siantz and Aranda, 2014). As chronic patients are in many ways their own primary carers, their needs and preferences must be taken into account in the development of management plans (Leidy et al., 2014). This may be accomplished by organizational interventions guided by an appropriate theoretical framework fitting the health problem of interest to change behaviour (Leidy et al., 2014).

The encounters between health care providers and chronically ill patients may be variously sporadic or on-going, occasional or intensive, and may involve one primary care provider or an array of specialist practitioners. This variability results in a threat to continuity of care which is essential in chronic care (Throne et al., 2004; Osborne et al., 2007). The vast majority of CDM is typically conducted by the

patient in his or her personal environment. Therefore, encounters between patients and their health care providers become a critical intersection for information exchange, decision-making and motivation (Throne et al., 2004). The ability of the health care professional to engage in effective communication may consequently make a profound difference in whether the encounter supports or discourages decisions and subsequent actions that will optimize the patient's ability to live as well as possible with that particular disease (Throne et al., 2004).

Limited data about patients' perspectives of active participation suggest variability in the extent to which patients wish to participate, barriers to their participation and the need for physicians to adopt new paradigms with respect to patient participation (Haidet et al., 2006). Patient empowerment, patient involvement and shared decision making are frequently used concepts as patients are increasingly encouraged to take up an active role in knowing and managing their own health, by expressing their concerns, preferences and participating in medical decisions (Bastiaens et al., 2007). It is believed that informed patients improve their decisions by collaborating with their health-care providers (Lorig et al., 2005). This results in increased patient's involvement leading to a positive effect on the health outcomes (Bastiaens et al., 2007). Increasing patient involvement in health care innovation has become a national priority and yet in practice, most interventions are still designed without the input of the patients they are intended to benefit. This gap between principle and practice may be due to a lack of knowledge and creates difficulties to operationalize the collaboration between health system leaders, researchers and patients (Kangovi et al., 2014). Thus, the research question for this study was two-fold. First, how do individuals with distinct chronic diseases experience their encounters with professional health care providers (HCP) and what are their expectations and suggestions? And secondly, how do HCP perceive the current CDM and what are their expectations and suggestions for the future CDM? Hence, the objective of our study was to describe chronic patients' and HCPs (nurses) perspectives on CDM in a rural community Limpopo Province, South Africa.

4.2.2 Methods

Qualitative research design was used aiming to develop a comprehensive understanding of how patients and nurses perceive and experience the current organisation and daily practice of the care for chronic conditions in a rural area in South Africa. This was done to research the reality of chronic disease management from the perspective of the nurses and patients in the rural area of Dikgale. In this approach the past experience of the participants (nurses and patients) was respected, construction of knowledge was interactive, inductive, and collaborative, and questions were valued (Ozkal et al., 2009).

A constructivist approach allows themes of importance to emerge as they are constructed by participants.

Sampling

Purposive sampling method was used as this involves selection of participants based on an important characteristic under study such as chronic patients diagnosed with diabetes mellitus and hypertension, as these are the most prevalent chronic diseases in the study area and are, in principle handled at the clinics. The nurses had experience with CDM in the region and were working in the clinics within the study area. We selected participants with the assistance of clinic nurses and clinic manager after we defined participants for our focus groups (Lauvergeon et al., 2012; Boateng, 2012). The primary data for this study were drawn from audiotape-recorded interviews with six focus group discussions (FGDs) (Kitzinger, 1995) (three for chronic patients and three for HCPs). Approximately 8 to 12 patients diagnosed with either diabetes mellitus or hypertension were selected to form a FGD per participating clinic. Gender balance in selection of respondents was adhered to where possible but majority of the participants were females (most nurses in these rural clinics are females and for patients most men were not available during the conduct of the study. This might be due to the fact that more males were working). Dikgale HDSS has a large proportion of population working as migrant workers, either on long- or short-term bases. These migrant workers work in nearby town as labourers in commercial agriculture or as domestic workers, or tourist areas, with some away on an extended basis in the mining sector (Kanjala et al., 2010). Three FGDs were conducted for chronic patients in total. Due to shortage of nurses in the rural clinics in Limpopo Province, 6 to 10 nurses were selected to form a FGD per participating health facility. Thus, in total three FGDs were done for nurses. As the majority of the nurses are females, it was not possible to keep a gender balance.

Data collection

A semi-structured interview guide was developed and pilot-tested for nurses and patients. The interview guide for nurses consisted of open-ended questions on the following topics:

- Interventions/programmes in place to manage chronic diseases
- Concerns from chronic disease patients and nurses regarding chronic disease management
- Role of health district in the provision of essential healthcare
- Community awareness of chronic diseases
- Community participation in health service delivery
- Readiness (willingness and ability/capacity) of the communities to engage in health service delivery

- Community effectiveness in the involvement on chronic disease prevention and management.

The interview guide for chronic patients consisted of open-ended questions on the following themes and each had subsequent questions:

- Beliefs on non-communicable diseases and their risk factors
- Health seeking behaviors
- Experiences with the current health care system

4.2.3 Data management and analysis

Because of the exploratory nature of the study, we applied an inductive thematic analysis method (Braun and Clarke, 2006; Petty et al., 2012). Sentences, phrases, paragraphs or lines were linked with codes; codes were then compared across the whole data set to identify variations, similarities, patterns and relationships. Reflections and ideas were written related to sections of data to abstract from the data and deepen analysis (memo writing). Codes were grouped to create a smaller number of themes that distilled the key issues identified and relationships between themes are then identified to create an explanatory diagram. This was initially done separately for nurses and patients. In a final step, themes were grouped for the whole dataset.

The principal investigator (ME) coded all transcripts. Checks of transcripts codes and information exchange with the last authors (BH and FJ) were regularly conducted so as to ensure consistency.

4.2.4 Results

The study population included front line primary health care nurses working at the three clinics and chronic disease patients who were diagnosed and treated in these clinics. The gender distribution of nurses who formed part of the FGDs was dominated by females in all the participating clinics. The experience of nurses for delivery of health related services who participated in the FGDs ranged from one year to more than ten years of service. The majority of the nurses (29%) were having work experience of between 4–6 years and 10 years and above.

Table 13 gives an overview of the main themes and subthemes for nurses and patients separately. The result section below is organised around themes summarising both patients and nurses views: organisation of health services collaboration with traditional health practitioners, traditional authority supporting health service delivery, functioning of the clinic committees, utilisation of community health workers, needs for knowledge and training regarding chronic conditions and resources needed for CDM.

Table 13: Schema as a guide for readers

Patients	
Needs in relation to knowledge and education	<p>Knowledge on causes, symptoms and treatment of chronic diseases</p> <p>Information via several channels (TV, radio, clinics, schools, traditional healers)</p>
Needs related to health care organization	<p>Availability of medication at clinics</p> <p>Decrease waiting time Health Care Providers (HCP) to come in time)</p> <p>Provide support to manage condition close-by in the community (role for community health workers)</p>
Mixed perceptions on relation with health care providers and home based carers	<p>Positive experiences with nurses and home based carers as they give information on disease and treatment</p> <p>A number of patients lack respect for home base carers since they view them as not well trained</p>
Opportunities patients see in the community	<p>Train and involve traditional healers/leaders and home based carers on chronic disease management</p> <p>Empower the community by information campaigns</p> <p>Involve community through functional clinic committees</p>
Nurses	
Role of clinics and nurses	<p>Disseminate health information in the community</p> <p>Organize semi-annual review of patients by doctors</p> <p>Organize weekly dedicated days for chronic conditions by nurses</p>
Collaboration with other health care providers	<p>There is a good collaboration with home based carers who refer patients to clinics and participate in follow up</p> <p>Minimal collaboration with traditional healers and health authority (no meetings, very few referrals from THP) in clinics</p> <p>Interdisciplinary meetings with nurses, home based care and traditional healers in one facility</p>
Barriers for good chronic disease management	<p>Limited availability of medication, functional equipment and transport for nurses</p> <p>Shortage of nurses and other health professions</p> <p>Lack of training for nurses and home based carers on chronic diseases</p> <p>Lack of facilities for physical activity</p>

4.2.4.1 Organization of health services and roles of nurses in relation to chronic disease management

Our study findings revealed patients are first seen, diagnosed and managed at the clinics before they are referred to the doctors and social workers for further management of any complications at the hospital (secondary health care level) which is situated 15 kilometres from the study area.

Quotations

“(...) the system we normally use is referral system wherein we refer patients to the doctor or social worker for medical management”.

(FGD: Nurses).

The nurses in the clinics contribute to the management of chronic diseases by providing patients with medications, disseminating health information during consultations and to the community. This is mainly done through health talks in the morning, door to door campaigns and home visits.

Quotations

“(...) we encourage our patients to comply with treatment given to them” “(...) we give health education in the morning to all patients and treatment”

(FGD: Nurses).

There are also doctors from hospital who visit the clinics periodically to review the progress of the patients on the medications given to them.

Quotations

“(...) there are doctors from the hospital who come to see our patients on a fortnight basis”. “(...) for chronic diseases we have organised patients to come to the clinic on dedicated days only when the doctor is visiting the clinic”.

(FGD: Nurses).

Our study findings showed that the nurses in health facilities as they are providing basic preventive, promotive and curative care they do not get proper support supervision from managers in the province and district including the local area under its jurisdiction.

Quotations

“(...) I think their (District and Province) role is to support the officers or clinic personnel to see if whether there is enough medications, to see that there are enough instruments

or equipment's, to see that the community is well managed in all the spheres by well-trained officers, but they are not doing all these."

(FGD: Nurses).

"(...) no support except when they come to look for problems that are caused by nurses. This is a fault finding mission" "(...) there is no monitoring and evaluation from the district health team as they only come when there are problems in the clinic more especially when there is a patient who died after visiting the clinic or died while in the clinic"

(FGD: Nurses).

4.2.4.2 Collaboration with traditional health practitioners

It was found that traditional health practitioners do not refer patients to the clinics unless the patients are showing signs of complications.

Quotations

"(...) sometimes the traditional healers don't really refer patients to us in the clinic because we don't know them but with people who know them they will tell that that patient was brought here by the traditional healer. This mostly happens when patients are at a complicated stage. We therefore realise that traditional healers refer patients when they stuck not knowing what to do."

(FGD: Nurses).

Patients carry hope that their conditions will heal with help from traditional healers. Nurses literally states that traditional healers need to be educated as they also give patients medications and nurses do call for formal referral.

Quotations

"(...) patients are then given concoctions which make them to vomit and have diarrhoea, later when the patients are dehydrated the traditional healers will bring them to the clinic to get a drip and once they are rehydrated the traditional healer will tell the patients to stop taking medication which they have received from the clinic then focus on what they will give them. This is a challenge to us because patients default from treatment with the hope that they will be healed by what traditional healers are giving them. We therefore need to have a session with the traditional healers to educate them

on what needs to be done for them to can properly refer patients to us at an early stage.”

(FGD: Nurses).

“(…) some of the traditional healers they don't integrate with health services because they do their own things and some patients when they come to the clinic they reveal that they have been using the traditional medicines instead of the medication from the clinic.”

(FGD: Nurses).

Our findings also showed that there is a challenge with regard to nurses working with traditional healers as they mainly do not refer patients to the clinics and there is no integration of health services.

Quotations

“(…) there are no meetings held with traditional healers which is a challenge because we are unable to integrate them in our services.” “(…) lack of communication between us and the traditional healers is a challenge.” “(…) to wrap this up, there is no interaction at all between traditional healers and us in the clinic.”

(FGD: Nurses).

4.2.4.3 Functionality of the clinic committees

Our data showed some aspects of the organisation of health services. The clinics have clinic committees in which community members represent the community and participate in the decision on health service related issues. Unfortunately, the clinic committees are not functional and this affects the provision of effective direction, meaningful support, monitoring and evaluation and strategic interventions.

Quotations

“(…) our clinic committee is not functional so sometimes it is difficult to make suggestions to the nurses as we are afraid that might affect our relationship with them. “(…) it would be nice if the clinic committee is functional then we raise concerns and suggestions to them such that they can bring them to the clinic.”

(FGD: Chronic patients).

“(...) community members are not part of decision making in provision of health services because currently there is no clinic functional clinic committee.” “(...) our communities are not involved in health service delivery because the clinic committee is non-functional and their concerns sometimes are not reaching the clinic.”

(FGD: Nurses).

Patients are supposed to use the suggestion box provided in the clinics to raise their concerns or challenges with regard to provision of health services in the clinics. However, most patients are not using the suggestion box.

Quotations

“(...) yes it is true the suggestion box is there but we are not using it as we are not sure how will nurses react after reading our suggestions or concerns.” “(...) myself I don't make use of the suggestion box because I'm afraid I might be victimized by nurses as there is a lot which they are not doing right. So it's best for me to just come here and take medication then I go home without making suggestions to improve health services.”

(FGD: Chronic patients).

“(...) patients and community members are encouraged to take part in health service delivery by writing their views, challenges and problems which they might need us to know and improve on them.” “(...) we have suggestion box in our clinic but very few patients' use them as most of the elderly people are unable to read or write.”

(FGD: Nurses).

4.2.4.4 Utilization of community health workers

Our findings revealed that organization of health services has community health workers known as home based carers to support chronic patients on the compliance and management of their conditions in the community.

Quotations

“(...) home based carers are integrated with our services as they help us by checking or monitoring patients in their households for compliance on medication and also bring the names of patients who might need additional help from the clinic.”

(FGD: Nurses).

“(…) home based carers help us in the clinic by tracing the patients in the community.”
“(…) the home based carers as they are in the community they also assist in referring patients to the clinic and therefore integrating their services with clinic services.”

(FGD: Nurses).

Accounts from the patients indicate that there are patients who do not have trust in home based carers as they perceive them as people who are not educated to provide health services.

Quotations

“(…) the problem is that some of us here we don't accept Home Based Carers in our households as we think they are not educated.”

(FGD: Chronic patients).

4.2.4.5 Support from the traditional authority in health service delivery

There also seemed a minimal involvement from the traditional authority on health service delivery in the study area. The patients would like to see the traditional authority getting involved in mobilising the community to utilize health services.

Quotations

“(…) our traditional leader should be involved to mobilise people to come to the clinic for testing as the community members respects him.”“(…) even our traditional leader should be able to know what the health problems in the community are and be able to help those who cannot read to know better about preventing diseases.”

(FGD: Chronic patients).

In terms of organization of health services, support groups are organised to support chronic patients on the compliance and management of their conditions in the community. However, not in every clinic patients are willing to engage themselves in these groups. This might be caused by a lack of support from the traditional authority.

Quotations

“(…) the community members and the patients have an opportunity to be part of the support groups we have in the clinic for them to talk about their conditions and link with other patients with similar conditions to form adherence programmes.”

(FGD: Nurses).

“(...) we only have support groups which some patients are engaged in to discuss service delivery.” “(...) the participation of the community members sometimes is not that good because when we call them for support groups very few come to attend.”

(FGD: Nurses).

4.2.4.6 Need for knowledge and training in early detection, prevention and control of chronic conditions

Although it is important to ensure that health care providers and patients are aware of available self-management support, sustainability of these programs and services is founded on patients' capacity to participate. There is consistent lack of knowledge from patients on the risk factors of chronic diseases and their signs and symptoms. This affects the awareness, prevention and management of chronic diseases.

Quotations

“(...) we need to be taught about the type of food we have to eat in order to control our health conditions”. “(...) I don't know what caused me to have high blood”. “(...) knowledge is power so we need information in our communities.” “(...) we have to be taught all these here at the clinic but the nurses don't have time to tell us about these diseases.”

(FGD: Chronic patients).

From the FGDs some patients demonstrated to be able to guide other community members on what to do in order to prevent the onset of chronic diseases. But they also see an important role for the home based carers to distribute health information in the community.

Quotations

“(...) as I discovered that eating lot of salt, sugar and fat caused problems for me, I can advise the people in the community to reduce on those such that they don't end up like me”.

(FGD: Chronic patients).

“(...) more information is what we need to manage our conditions.....Yes I agree if we can get health education even in the community we will be able to manage our health problems.” “(...) if the home based carers can be given more information also about the management of these conditions it will help us not to frequently come to the clinic.”

(FGD: Chronic patients).

Despite nurses' role and skills development stimulating a shift away from the acute care model, we observed that nurses had lack of training in chronic disease management. The nurses attended more trainings on HIV, TB, Child Health but little on diabetes, hypertension, mental health or cardiovascular diseases.

Quotations

"(...) with regard to chronic disease management there has never been a training or workshop which I have attended". "(...) I had never attended any training in relation to chronic disease management". "(...)I would like to tell them they should consider to train the people who are involved in patient care not only the professional nurses but even the subordinates should be trained. I would like to see them financing the trainings and us having proper equipment's in the clinic including the cars to visit the patients on the community".

(FGD: Nurses).

Quotations

"(...) talking for myself, from 2011 I never attended any training or workshop in relation to chronic disease management'... "(...) the same to all of us, we never attended any training or workshop on chronic disease management since the year 2010". "(...) we only attend trainings on Human Immunodeficiency Virus (HIV) and Tuberculosis (TB)". "(...) me too I never attended any training in relation to chronic disease management except the HIV trainings"... "(...) most of the trainings are on HIV Counseling and Testing (HCT) and Prevention of Mother to Child Transmission (PMTCT)".

(FGD: Nurses).

Both chronic disease patients and health care providers have clear preferences and expectations on the needs to improve the care of patients with chronic illness. This covers a range of suggestions from the modalities to receive information, to what to be receive from either the clinics or from health care workers till how to support health services delivery.

Quotations

"(...) the right way for us to get information will be to distribute pamphlets with how to manage these diseases." (...) I think if they can have time to explain to us because

most of us we are unable to read this will help us to understand these diseases better and this should be done frequently.” (...) we also want to hear about health information at the traditional authority meetings. If nurses can request to visit the traditional authority it will help those who don't want to come to the clinic to understand health issues.”

(FGD: Chronic patients).

“(...) the nurses will be best suitable to give us information about how to manage our conditions because they are trained to do that.”

(FGD: Chronic patients).

“(...) I would like to hear a lot about these diseases on the radio because it is very rare for us to hear nurses or doctors talking about these diseases on the radio.”

(FGD: Chronic patients).

Need for more resources, intersectoral collaboration and support from district and or provincial level for chronic disease management

From the FGDs of chronic patients and nurses, it was found that resources for chronic disease management are lacking including shortage of medications and nurses. Most of the drugs were not available at health centre level. Thus, patients were referred to hospital where their medications weren't available either. This forced patients to use out-of-pocket. Though this is beyond the means of many poor households and leads to defaulters to treatment and relapses.

Quotations

“(...) if government can give health department enough money to buy medicines this will improve our lives as we will be having treatment every time we come to the clinic.” (...) I would like to see the situation of availability of medication improving in our clinic. I agree with her because we are now depending on these medications so they should make sure that medications are always available to save our lives.” (...) I would like to see delivery of medications improving as sometimes we spend months without having some of our medications and this might complicate our health conditions.”

(FGD: Chronic patients).

Quotations

“(...) I think the problem lies with shortage of treatment because chronic diseases needs proper medical maintenance with frequent supply of medication. We sometimes

have patients who relapse due to shortage of medications to keep their conditions well and some medications get out of stock for a long time. I can mention metformin was out of stock for a very long time and now we have a problem with adalat which is out of stock”

(FGD: Nurses).

We found community programmes efforts to support the health system in managing chronic illness and addressing the social determinants of health for prevention.

Quotations

“(...) we have programmes in place like school health services and the home based carers do provide health education to the communities.” “(...) there is Tiangmaatla Home Based Care and Foundation for Professional Development (FPD) which are involved in health activities in the community. The drop in centre assists in taking care of the orphanage children in the community.”

(FGD: Nurses).

“(...) the programmes are structured well like the door to door campaigns are very effective.” “(...) as the health care workers and the home based carers we are conducting door to door campaigns every three months.” “(...) we also have awareness campaigns frequently to educate the community members about health issues.” “(...) again we visit the local traditional leaders to give them information which they need to disseminate to the community members during funerals.”

(FGD: Nurses).

The nurses have a request to the Department of Health to improve availability of recreational facilities in the study area.

Quotations

“(...) I will raise an issue of the non-availability of physical activity or recreational facilities which we and the chronic disease patients can use to implement healthy lifestyle activities.” “(...) I would like to see government creating facilities and programmes for old age, youth, chronic diseases and even us health care workers we need some recreation facilities to go and refresh our minds.”

(FGD: Nurses).

Chronic disease patients were concerned about the infrastructures in the clinics and nurses had concerns about the shortage of personnel.

Quotations

“(...) me I’m not happy about the waiting area because it’s just an open place and it’s cold like we are in a fridge.” “(...) we stay outside without chairs or shelter and is very cold in the morning therefore we are not treated well in that regard.” “(...) I wish the government can improve our clinic and make it bigger as it is very small and sometimes we have to sit outside even in winter.”

(FGD: Chronic patients).

“(...) we are short staffed in our clinic and these cause patients to wait for a long time in the queues.” “(...) we have many chronic patients in our community so when they come to the clinic we need more health care workers to assist with the work load. You find that most of the patients spend almost the whole day in the clinic which is not good for chronic patients.”

(FGD: Nurses).

4.2.5 Discussion

Chronic conditions are an increasing burden for health care systems worldwide (Nolte et al., 2007, Liddy et al., 2013) and this has resulted in self-care initiatives and a shift in responsibility to the people living with chronic diseases (Vadiee, 2012). The classic health care system focuses much on the provision of acute healthcare as it has been designed to identify and treat individuals and discharge them back to the community. However, the associated risk factors for chronic diseases coupled with health care needs and social circumstances of people living with chronic diseases over a lifetime make the management of chronic conditions more complex (Osborne et al., 2007). The current study explored the experiences, challenges, barriers to and facilitators for chronic disease management from the patients' and health care workers perspective by using FGDs. Despite the different conditions of chronic patients and different positions of nurses in the healthcare system, all mentioned similar challenges with regard to lack of knowledge, shortage of medication and shortage of nurses in the clinics. This causes long waiting times for patients in a clinic. Health care workers report they lack knowledge and are poorly

trained on the management of chronic diseases. Participants link this with a lack of supervision by the district and provincial health managers together with poor dissemination of guidelines. Both patients and nurses mentioned the need to communicate with traditional healers and integrate their services in order to early detect and manage chronic diseases in the community better.

Our study findings are in accordance with other research findings in many countries where knowledge of the risk factors of chronic conditions and how to manage them is poor (Vadiee, 2012). The statement that knowledge was poor among health worker's corresponds with findings from a study by de-Graft et.al 2010. Poor knowledge of chronic diseases leads patients and their carers to attribute these diseases to witchcraft. It also initiates problematic treatment practices such as healer shopping within traditional healing systems (de-Graft et al., 2010). Our study findings add to the research knowledge on the interest that both nurses and patients have in improving their collaboration with traditional health practitioners (THPs) to address the burden of chronic diseases in this rural area.

From existing evidence, we know that encounters between health care providers and chronically ill patients may be variously sporadic or on-going, occasional or intensive, and may involve one primary care provider or an array of specialist practitioners (Thorne et al., 2004). Our study supports prior research documenting that chronic disease patients have a first contact with HCPs at PHC level (Jordan et al., 2008). These consultations provide the opportunity for information exchange and successful self-management practices to begin. However, our study documented that in real practice PHC professionals often do not have the resources such as quality equipment's and promotional materials to assist local community self-management support services such as education programs. Another important barrier for CDM in practice is the lack of continuous availability of medicines plays an essential part in the provision of health care for chronic conditions (Beran and Yudmin, 2006).

The statement that knowledge was poor among health workers corresponds with findings from a study by de-Graft et.al 2010. Poor knowledge of chronic diseases leads patients and their carers to attribute these diseases to witchcraft. It also initiates problematic treatment practices such as healer shopping within traditional healing systems (de-Graft et al., 2010). Our study clearly shows that HCP in the Dikgale HDSS are insufficiently trained both to educate the community on risk factors for chronic conditions as for managing them. This is in line with prior research (de-Graft et al., 2010).

Participants mentioned a lack of supervision of health care providers. This is an important issue to address since supervision is a process of helping health staff improve their work performance. All health facilities are supposed to receive supervision from the higher levels and maintain linkages with communities through Community Home Based Carers. Lack of supervision and poor dissemination of

guidelines has been found to be a contributing factor to lack of knowledge by health care worker in the clinics. Mayosi et.al, 2009, already stated that the main barrier in the implementation of the guidelines was the insufficient dissemination of the national guideline for the management and control of non-communicable diseases combined with the lack of monitoring and assessment (Moyosi et al., 2009).

Improving the health of people with chronic illness requires transforming a system that is essentially reactive – responding mainly when a person is sick – to one that is proactive and focused on keeping a person as healthy as possible (Wagner et al., 1996a). This requires not only determining what care is needed, but defining the roles and tasks for ensuring the patient gets care using structured, planned interactions with different health care providers. It also requires making follow-up a part of standard procedure, so patients are not left on their own once they leave the health care facilities (Wagner et al., 1996b; Calkins et al., 1999). Our study shows that the latter is not currently happening in the study area. Our results also illustrate that patients would like to receive more information on the management of their conditions and to prevent complications.

The study findings also indicated that there is poor referral of patients from traditional healers to the clinics and there is no integration of services. This concurs with findings from the study by Mngqundaniso and Peltzer in South Africa (Mngqundaniso and Peltzer, 2008) which found that nurses expressed a low regard for traditional healing and nurses practiced low rates of referrals to traditional healers. The referrals from traditional healers were done but mainly in the patient's interest and not as a last resort for chronic or terminal illness (Calkins et al., 1999). Although there are some concerns, the potential of involving traditional healers in chronic disease management deserves further consideration.

In summary, this study clearly shows that gaps exist between effective interventions in research studies and what clinicians do in practice, and between what clinicians in their offices recommend to patients and what patients do at home and in their communities. Results detail these gaps and provide handles to develop CDM interventions in the region. These interventions should be developed in such a way that they are oriented towards health promotion and prevention through a primary health care approach in order to effectively respond to the complex social, cultural and behavioural issues associated with NCDs. Therefore, further research will be conducted in the study area to evaluate the planned community intervention programme which is an important component of the strategy to help solve prevention of NCDs (Kegne et al., 2013). This will include a public health approach which is greatly shaped by community engagement on a variety of levels (Morrin et al., 2013; West, 2014) and thus bringing better relationships between community members and social groups, community health workers (CHWs), THPs and public health professionals which are core to health promotion and

prevention. One interesting finding of our study is the interest of nurses and patients in improving the collaboration between THP and public health professionals. Exploring knowledge and views of THP on chronic conditions and their role in this is another interesting path for further research.

Strengths of the study

The readiness of the health care system in rural South African areas to address chronic conditions had not been explored yet so this study filled a gap. The study results are being used to develop an intervention in the region to improve CDM so potentially contributing to the health of the people in the study area.

The interview guides for chronic patients were translated into local language (Sepedi) from English in order for the participants to clearly understand the meaning of the questions. The principal investigator (EM) coded all transcripts and at least one FGD of each group was coded independently by a second researcher (HB or JF) to support validity. Regular discussions (EM, HB, JF) on the emerging themes and codes were held and documented to support reliability.

Weaknesses of the study

Although we set out to recruit a purposeful sample, most patients who participated were female, potentially missing some of the specific attitudes and experiences of male chronic patients. This might be due to the fact that more males were working during the conduct of the study. Our study findings need to be interpreted cautiously as the Dikgale HDSS is developed as a sub district level surveillance system in a rural setting of Capricorn District of Limpopo Province in South Africa. Therefore, transferability to a larger population at Provincial or country level might be limited. However, findings in our study are in line with most of the findings from other sub-national or national surveys from other countries with a comparable health care system (Kruk et al., 2010).

Conclusions

There is a need to fully integrate non-communicable diseases into the re-engineering of Primary Health care in South Africa with the view to increasing community based prevention, screening, self-management, care (including rehabilitation and palliative care) and referral according to the WHO innovative model for chronic care (South African Declaration on Prevention and control of non-communicable diseases). As was seen in this study, there is currently insufficient provision of effective NCD services in primary health care at the Dikgale HDSS. The NCD and health services provided by the three health facilities mainly focused on diagnoses and treatments of diseases, whereas prevention

and health promotion were not sufficiently offered and delivered to the target populations. This undermines the development of effective and sustainable primary and secondary care interventions.

Therefore, the study findings will be used to tackle the current challenges, develop and implement interventions in a form of integrated chronic disease management model in primary health care and research to further improve chronic disease management.

Abbreviations

FPD: Foundation for Professional Development; HCP: Health Care Provider; HCT: HIV Counseling and Testing; HDSS: Dikgale Health and Demographic Surveillance Site; HIV: Human Immunodeficiency Virus; NCD: Non-communicable disease; PMTCT: Prevention of Mother to Child Transmission; TB: Tuberculosis.

4.3 Addressing non-communicable diseases through community health workers and traditional healers in Dikgale Health and Demographic Surveillance System Site: A qualitative study

4.3.1 Introduction

Chronic non-communicable diseases (NCDs) are an increasing burden on health care systems worldwide (Liddy et al., 2013) and account for approximately two-thirds of all deaths globally. They are among the leading causes of mortality worldwide (Brownstein et al., 2005). The quadruple burden of diseases in South Africa, together with unhealthy lifestyles and NCD risk factors, has serious consequences for the prevention and cost-effective management of chronic diseases (Steyn, 2006). Primary health care (PHC) systems, with trained community health workers (CHWs) and well established guidelines, can be effective in NCD-prevention and management (Farzadfar et al., 2012). CHWs provide culturally relevant and appropriate education, counselling and social support and may provide preventative clinical services, such as measuring blood pressure (BP) (Brownstein et al., 2007).

CHWs are broadly defined as any health worker who carries out functions related to health care delivery in a community (Brownstein et al., 2007) and are increasingly recognised as a crucial part of the health workforce globally (Tsolekile et al., 2014). They are trained as part of an intervention, but have no formal paraprofessional or professional designation. However, they do have a relationship with the community being served (Brownstein et al., 2007). CHWs are also known as lay health advisors, community health representatives, patient navigators and outreach workers. CHWs are also important advocates, often able to bridge cultural and social gaps between health/social services providers and the community members they seek to serve (Brownstein et al., 2007). They offer important contributions, having the potential to enhance the quality of care and to be the main drivers towards building healthier communities and raising the health status of the population (Brownstein et al., 2005). Because they are trusted by the community, CHWs are more able to follow-up on treatment adherence, which in theory, should lead to positive outcomes. Additionally, they have better insight into the particular needs and resources within the community and may increase cultural tailoring and relevancy of the intervention (Cummings et al., 2013). Lastly, CHWs have many motivations such as better remuneration and other future job opportunities, new knowledge on disease control and prevention and more pro-social enthusiasm, such as reducing suffering (Maes and Kalofonos, 2013).

South Africa has an abundant history of CHW projects which burgeoned during the repressive apartheid regime. Today, CHWs are increasingly advocated as a potential solution to overcoming current

shortfalls in human resources within health care in the many settings (van Ginneken et al., 2010). CHWs are trusted, respected members of the community. Their informal, but direct, involvement enhances the delivery of health related services (Brownstein et al., 2005). CHWs, with their effective and respectful communication, have delivered successful health interventions for many community-based agencies. They encourage the sharing of information, foster team building and mentor new CHWs. In addition, they are well informed about programme results, which enable them to assist in the acceptance of Western medical care (Wilson et al., 1998).

Productivity of CHWs (or any health worker) depends on a number of broad-based and interrelated inputs, such as capacity (knowledge, skills, and attitudes), motivation, organisational support or the “opportunity to do the job well” (resources, physical and social environment, working conditions) (Jaskiewicz and Tulenko, 2012). Matching skills of the CHWs with appropriate tasks, offering adequate initial and continuous training, providing flexible work schedules, encouraging goal setting and offering leadership opportunities are integral to effective programmes (Wilson et al., 1998). However, numerous CHW challenges and issues still need to be addressed if the field is to advance. These include improving stable funding and improving credibility through quality training and evaluation (Brownstein et al., 2005).

In many countries, two healthcare systems exist – a traditional health system and Western health care; also referred to as modern medicine (Stekelenburg et al., 2005). Traditional medicines, it is argued that are more accessible, affordable, more holistic and culturally acceptable (Sato, 2012). Since traditional health practitioners (THPs) were – and still are – so widespread, cooperation between systems would contribute to promoting and improving access to both forms of health care (Stekelenburg et al., 2005).

More than 80% of people in sub-Saharan Africa use the services of traditional health practitioners (THPs) (Stekelenburg et al., 2005, Green, 1997). In many communities, THPs hold very important social and cultural statuses (Stekelenburg et al., 2005). Traditional medicines are typically – although not restricted to – herbal, mineral or animal products obtained locally or from other healers. THPs include herbalists, both spiritual and nonspiritual; fetish priests; bonesetters and circumcisers (Stekelenburg et al., 2005, Sato, 2012). Thus, the integration and training of THPs into the formal health care system is essential (Beran, 2006).

It is assumed that failure to use modern health care is equivalent to not receiving any health care at all, but this is not necessarily true. Although traditional medicines are less effective than modern medicines,

they do have the potential to provide relief and sometimes cure. They are most commonly used by the poor and those who lack access to modern medicines (Sato, 2012). Income or the lack thereof, shapes the way in which individuals utilise different forms of care and at what stage certain providers are chosen. The rich have a higher probability of seeking care from modern providers and sooner rather than later. Generally, due to lower costs, the poor are more prone to using traditional care, at least in the earlier stages of illness (Sato, 2012).

The involvement of trained lay people, known as community health workers (CHWs), has gained momentum. This has come about in response to the many barriers to chronic disease management. Additionally, the use of CHWs leads to improved health outcomes in the community (Brownstein et al., 2007). CHWs can facilitate access to care, promote continuity of care and make access to health care more appropriate. Moreover, they facilitate the adoption of self-care skills for disease management and then enhance compliance to treatment regimens (Brownstein et al., 2007). The purpose of this study was to determine how a model involving community health workers and traditional healers can be actively pursued as a viable means of improving chronic disease management in rural areas.

4.3.2 Materials and methods

We undertook a qualitative interview study, using focus group discussions with community health workers and traditional health practitioners, mainly because most rural community members rely on lay health workers and the traditional healers (Petersen et al., 2014; Sips et al., 2014). The aim of the focus groups was to help us understand the experiences of the CHWs and THPs in relation to chronic disease management.

Practical definition

For the purposes of our study community health worker was defined as a lay health worker who provides functions related to health care delivery, who often has had no formal paraprofessional or professional designation but usually has had a relationship with the community being served (Beran and Yudkin, 2006; Petersen et al., 2014; Sips et al., 2014; Campell and Amin, 2014). The CHWs only had basic training on aspects of palliative care (Beran and Yudkin, 2006, Petersen et al., 2014, Sips et al., 2014, Campell and Amin, 2014) but they were supervised by professional health care providers from the clinics (Amin 2014). For the purposes of our study traditional health practitioners were defined in terms of the Traditional Health Practitioners Act, 2007 of South Africa (Davids et al., 2014) as any practitioner who performs any form of a function, activity, process or service based on a traditional philosophy that

includes the utilisation of traditional medicine or traditional practice to restore physical or mental health, including the diagnosis and prevention of diseases. The weakness of the study is that it relied on self-reported information from the participants. This may have resulted in self-report bias. In our study, essential health care (EHC) has been defined as a health programme which combines promotive, preventive and basic curative services. EHC aims to reduce vulnerability to infectious diseases, communicable diseases and non-communicable diseases and, therefore, improve disease management at community level (Wakerman et al., 2008, BRAC Health Programme). This includes increased screening for chronic non-communicable diseases as well as easier access to treatment, including monitoring of treatment adherence in rural communities (Moodley and Rambirch, 2007).

4.3.2.1 Sampling

The purposive sampling method was used to select participants, who were either CHWs or THPs. After defining the focus groups (Lauvergeon et al., 2012; Boateng, 2012) volunteer participants were recruited with the assistance of the managers of home-based care programmes and from the traditional authority. Primary data for this study were drawn from five audiotape-recorded focus group discussions (three for the CHWs and two for the THPs). Approximately 8 to 12 CHWs and THPs were selected to form a focus discussion group per participating clinic, with the assistance of the managers of home-based care programmes and the traditional authority respectively. Gender balance in selection of respondents was adhered to where possible.

4.3.2.2 Data collection

We aimed to develop a comprehensive description of how chronic disease management in a rural area can be strengthened by utilising community health workers in conjunction with traditional health practitioners. We performed this research from the perspective of CHWs and THPs within a constructivist point of view.

The study was carried out to research the reality of chronic disease management from the perspective of the CHWs and THPs in the rural area of Dikgale. In this approach, past and present experiences of the participants (CHWs and THPs) were respected. Construction of knowledge was interactive, inductive and collaborative and all questions/answers were valued (Ozkal et al., 2009). A constructivist approach allows important themes to emerge as they are constructed by participants. The interview followed a semi-structured guideline, consisting of open-ended prefatory questions concerning the following principal topics:

- Interventions/programmes in place;
- Concerns from CHWs and traditional healers;
- Role of CHWs and traditional healers in the provision of essential health care;
- Community participation in health service delivery in relation to chronic disease management.

4.3.2.3 Data management and analysis

Because of the exploratory nature of the study, qualitative methods were used to collect and analyse the data. Inductive data analysis was carried out using the thematic analysis method (Braun and Clarke, 2006, Petty et al., 2012) in which the transcripts were read several times to gain familiarity with the text as a whole. Codes (labels) were given to sentences, phrases, paragraphs or lines. These codes were then compared across the whole data set to identify variations, similarities, patterns and relationships.

Reflections and ideas were written relating to the various sections of data to extract deeper analysis (memo writing). Codes were grouped to create a smaller number of themes, distilling identified key issues and relationships between themes. This information was finally combined to create a thematic map. The principal investigator (ME) coded all transcripts. At least one focus group discussion per group was coded independently by a second researcher (HB or JF). Checks of transcript codes and information exchange with the last authors (BH and FJ) were regularly conducted to ensure consistency.

4.3.4 Results

The interview data yielded five themes for summarising aspects addressing chronic non-communicable diseases through community health workers and traditional health practitioners. These included perceived roles and services rendered, capacity building, beliefs and practices, collaboration among healthcare providers as well as barriers to chronic care involvement.

4.3.4.1 Organisation of community health workers and traditional health practitioners

In the study area, community health workers who participated in the focus group discussions represented several levels of experience. Some had only been on the job for less than a year, while others had been health care workers for more than ten years. However, approximately 32% of them had been on the job between 4 to 6 years Table 14.

Table 14: Community Health workers working experience

Years	Number	Percentage (%)
<1 year	2	6.5
1-3 years	6	19.4
4-6 years	10	32.3
7-9 years	7	22.6
≥10 years	6	19.4

Study findings revealed that the selection criteria for CHWs was not standardised. Respondents below outline this view clearly:

Quotations

“(...) I went first to school for old age home courses then I temporarily worked at a hospital for seven months and lastly I then joined a home-based care programme here at home”. “(...) I worked with health promoters from department of health then I was recommended to join the home based care programme” I worked with health promoters from department of health then I was recommended to join the home based care programme”.

(Focus group discussion: Community Health Workers).

“(...) When we were at the clinic then they told us that they need the volunteers who will not be paid to render community health services. The nurses came to the traditional authority to announce that and they informed us what we are expected to do in the community. At first the community members were not welcoming us but as times went on we were accepted as they we started to have more clients in our services”.

(Focus group discussion: Community Health Workers).

THPs from the Seobi Dikgale Clinic did not respond (only one responded which does not form a focus group discussion) to several invitations sent them and, therefore, they were excluded from the study. In both the other catchment areas – Dikgale and Sebayeng clinics – discussion group participants were primarily male. However, attending female traditional healers from each community represented 26% and 37% of the group’s composition respectively. Females had an overall representation of 37% as compared to males with 63% Table 15.

Table 15: Gender distribution of traditional healers participated in Focus Group Discussions per clinic catchment area

Catchment area	Males	Females
Dikgale Clinic	5	4
Sebayeng Clinic	7	3
Seobi Dikgale*	None	None
Total	12	7

* THPs from Seobi Dikgale Clinic did not respond to several invitations to take part in the study

4.3.4.2 Perceived roles and services rendered by community health workers in the communities

In general, positive views emerged in relation to the utilisation of community health workers. Practical examples were provided showing that achieving universal health coverage in the Dikgale HDSS was underway. Utilisation of community health workers is successfully bringing health services to these communities. Quotes from the respondents, below, clearly support this view. Community health workers are seen as frontline public health workers who have a close understanding of the district they serve:

Quotations

“(..) The role I play mostly is to make sure that our patients take and adhere to their medications. We make sure that they take their medications before they eat something.

“(..) We teach the patients for them to know that they should not take half doses on their medications saying they will take the others in next time. What the doctors and nurses has prescribed to them should be taken as per prescription”

(Focus group discussion: Community Health Workers).

“(..) We help our patients to get their medications properly and advise them what type of food they should eat including encouraging them to exercise according to their health needs. We are also able to arrange with the social workers to provide families which are unable to have food with food parcels”. “(..) We teach them on early health seeking behaviours such that in case they are sick or someone is sick the community they can be able to refer that person to the clinic in time”.

(Focus group discussion: Community Health Workers).

The CHWs in the Dikgale HDSS were organised into groups and were often found living in the community they serve. But there were others who were found working in communities furthest away from their villages, thus having challenges in terms of travelling to work. These respondents clearly enunciated this view:

Quotations

“(...) We are arranged in groups from areas or villages we are coming from”. “(...) As we are arranged per village, they have put us in such a way that each carer serves almost the same number of households as the others”. “(...) Our manager has arranged us in such a way that we serve approximately equal households even if it can be villages which are not the same in number or size”.

(Focus group discussion: Community Health Workers).

Quotations

“(...) We have been arranged to work in groups per villages”. “(...) We are sharing the villages which are served by Seobi Dikgale clinic, but some of us we are not working in the villages we are coming from and this is a challenge to us as we have transport problems to reach these villages”.

(Focus group discussion: Community Health Workers).

CHWs were found to spend much of their time traveling within the community. They were engaged in speaking to groups, visiting homes and health care facilities, distributing information and otherwise connecting with local people. This respondent outlines this view:

Quotations

“(...) We as home-based carers, as we do door to door campaigns in the community we are able to identify patients who needs medical help then we refer them to the clinic by using a formal referral letter such that when they arrive at the clinic they are not delayed”.

(Focus group discussion: Community Health Workers).

CHWs in the study area are believed to contribute to significant improvements in community members' access to and continuity of healthcare. Therefore, CHWs were found to assume multiple roles. These included patient and community education, patient counselling, monitoring patient health status, linking people with health facilities, and adherence to treatment for the control of diseases. Respondents had this to say:

Quotations

“(...) We are mainly involved in patient care at homes and educate the youth on health issues”. “(...) The role I play mostly is to make sure that our patients take and adhere to their medications. We make sure that they take their medications before they eat something”. “(...) We teach the patients for them to know that they should not take half doses on their medications saying they will take the others in next time. What the doctors and nurses has prescribed to them should be taken as per prescription”.

(Focus group discussion: Community Health Workers).

Quotations

“(...) We are able to refer patients to the clinic using referral letters but sometimes we forget to use the referral letters”. “(...) The nurses are able to refer patients to us for monitoring in the community”.

(Focus group discussion: Community Health Workers).

4.3.4.3 Capacity building for community health workers and traditional health practitioners

Our findings show training, educational requirements and experience varied across the CHW group indicating that this field lacks unified training standards. Most of the CHWs and THPs participating in the study were trained on HIV, TB and basic health services.

Quotations

“(...) Most of the trainings we have attended are on tuberculosis, ancillary healthcare, HIV/AIDS”. “(...) I have attended trainings on TB and HIV/AIDS, Breast feeding and nutrition”. “(...) I attended ancillary healthcare, nutrition, TB and HIV/AIDS courses”. “(...) TB, HIV/AIDS and monitoring of Child Road to Health Card for Immunization and Breast feeding were workshops which I have attended”.

(Focus group discussion: Community Health Workers).

Quotations

“(...) We had only one workshop on HIV. Since that workshop on HIV we never had any follow up on how are we implementing what we were taught during that workshop”. “(...) There are no in-service trainings and we are not trained to can be updated on the

new developments about disease control and management as there new diseases we hear about such as bird flu and swine flu in our community”.

(Focus group discussion: Traditional Health Practitioners).

For CHWs and THPs in the study area, it was generally found that little or no training was offered for chronic non-communicable disease management.

Quotations

“(...) We have attended a training which they taught us about HIV, TB and chronic diseases, but were not given certificates”. “(...) I have attended a training called 59 days in which we were taught about diseases in general and sugar diabetes was covered amongst them”.

(Focus group discussion: Community Health Workers).

Quotations

“(...) There has never been training on high blood pressure or diabetes which we attended”.

(Focus group discussion: Traditional Health Practitioners).

According to the study participants, there needs to be better utilisation of CHWs and THPs in the study area. Within the community, skills improvement training and career development were identified as major necessities.

Quotations

“(...) I can tell the government officials to capacitate us by trainings such that we can be able to help our communities”.

(Focus group discussion: Community Health Workers).

Quotations

“(...) We only met once as traditional healers in my village to discuss how can we be capacitated but nothing has happened since then”. “(...) As I have said before, we lack trainings to capacitate us on the management of patients in our communities. We would like to see government taking us to attend workshops or trainings to improve our knowledge on disease control”

(Focus group discussion: Traditional Health Practitioners)

4.3.4.4 Beliefs and practices of traditional health practitioners

In the study area, traditional health practitioners were found to believe they were able to treat some diseases Western healthcare cannot treat or manage.

Quotations

“(...) There is no such a thing as chronic disease and in our traditional practice sugar diabetes can be cured. Ehhh high blood (hypertension) can be cured including HIV before it gets to AIDS”. “(...) There are other disease conditions which the health facilities are unable to treat then we get an opportunity to help those who believe in us”.

(Focus group discussion: Traditional Health Practitioners)

Quotations

“(...) Our role as traditional healers is to make sure that we provide the best traditional health care to our community members and built trust in them”.

(Focus group discussion: Traditional Health Practitioners)

Traditional health practitioners also believe that unhealthy lifestyles contribute to the occurrence of chronic diseases.

Quotations

“(...) Lifestyle contributes to the increase in diabetes because our people don't have proper dietary foods”. “(...) In our communities, people have hypertension mainly because of the social problems which causes stress to them”.

(Focus group discussion: Traditional Health Practitioners)

4.3.4.5 Collaboration among nurses, community health workers and traditional health practitioners in health service delivery.

Our findings show that health service delivery to improve chronic disease management needs adjustment. Currently, there are both very good and very bad practices, practices linked to working relations and collaboration among nurses, CHWs and THPs.

Quotations

“(...) There is a good relation as when there is a patient from the clinic who should be traced in the community, the nurse’s call us to give us information about the patient and we then go and do the tracing together with some investigations”. “(...) The working relationship with the nurses here is quiet good, because sometimes when they have campaigns such as for child immunisation, they call us to assist them with social mobilisation and management of medical waste from the vaccination points”.

(Focus group discussion: Community Health Workers).

Quotations

“(...) As the traditional healers notice that they cannot manage some patients, they are able to refer them to the clinic and the clinic nurses later inform us that we should monitor progress of those patients such that they can be able to return to the clinic for follow ups”. “(...) There are other traditional healers who are cooperative and we encourage them to buy rapid tests to test HIV. Others they buy them and use them in their consulting places”.

(Focus group discussion: Community Health Workers).

Quotations

“(...) As traditional healers we have a problem of not been given a chance to help our people in collaboration with the health facilities as they don’t allow us to visit patients whom we have referred to the hospital”. “(...) There is no integration taking place as we are not recognised by our own government as healthcare providers”.

(Focus group discussion: Traditional Health Practitioners)

Traditional health practitioners stated that there was no formal referral system for them to direct patients to public health facilities. In addition, healthcare workers do not provide feedback regarding the progress of patients referred. This gap leads to poor collaboration between THPs, nurses and CHWs with respect to patient care. There is no doubt that some traditional health practitioners have demonstrated willingness to work closely with health care workers, but they are often challenged by the disrespect from nurses and doctors.

Quotations

“(...) We don’t have formal referral system as traditional healers to send patients to health facilities”. “(...) The unavailability of a proper referral system is a challenge to us, because we want to refer patients to health facilities and also get feedback or they refer back to us, but it is not possible for the nurses to refer back to us as they don’t trust us”. “(...) It is difficult to follow up on patients in hospital or clinic as we are not given access to see the patients once they are in their (nurses or doctors) care”. “(...) nurses don’t give us any feedback about the progress of the patients including what they have done. This makes it difficult for us as traditional healers to play any role in provision of health services”.

(Focus group discussion: Traditional Health Practitioners)

4.3.4.6 Barriers to involvement of chronic care by community health workers and traditional health practitioners

In the study area, there were numerous barriers found to contribute to poor health outcomes and poor implementation of health services by CHWs and THPs. One major obstacle at many clinics was the unavailability of medications.

Quotations

“(...) The unavailability of medications in the clinic poses a risk for community members not to participate in health service activities”. “(...) Shortage of medication is the major difficulty for the patients take part in health services”. “(...) Again shortage of medication in the clinic makes our life difficult, because we have to deal with patients who do not trust the health system anymore like when we refer them to the clinic they will tell us that they will not go as there are no medications”.

(Focus group discussion: Community Health Workers).

Patients defaulting from treatment were also found to be challenges to both CHWs and THPs in the study area. Therefore, they sometimes struggle to deal with patients to improve their health outcomes.

Quotations

“(...) I have a problem with TB patients who gives me an impossible time for taking medications which makes me not to be able to monitor them when they take their medication. For example, someone will say I take my medication at 22h00 in the evening, so it becomes impossible for me to visit that patient at that time on the night. This patient will end up defaulting and in his file there is DOT supporter so it will seem

as if we are not doing our work". "(...) The constrain we have is with regard to patients who default from treatment when they start to get better. More especially the hypertensive patients you find that they will tell us that today I don't want this treatment, because it makes me nauseous".

(Focus group discussion: Community Health Workers).

Quotations

"(...) The difficulties we face are with regard to patients who default from treatment from health facilities, then they want us to help them when their health conditions have deteriorated".

(Focus group discussion: Traditional Health Practitioners)

Quotations

"(...) The difficulties we have in our work is that some of the patients they don't want us to visit them. This is mainly caused by the stigma attached to HIV/AIDS in our community as we still have people who deny to be having HIV".

(Focus group discussion: Community Health Workers).

Lack of support from the district and/or provincial offices was also found to form barriers to the implementation of health services by CHWs and THPs.

Quotations

"(...) Government officials are far away from the communities and they don't understand the problems in the villages". "(...) Myself what I understand is that these government officials are sitting far away from the community and they don't understand the challenges we encounter with availability of medicines. I therefore recommend that there be a person who monitors availability of medicines in the clinics, because chronic patients' needs regular supply of medications".

(Focus group discussion: Community Health Workers).

Quotations

"(...) There is nothing much we are doing in our community as part of the health programmes as the government is distanced from us traditional healers". "(...) Sometimes when we visit the clinic we see people going around with big books

checking how nurses are doing their work, we wish the same can be done to us such that we can be encouraged to do our work and learn how to improve our services”.

(Focus group discussion: Traditional Health Practitioners)

In the case of traditional health practitioners, lack of formal structure also proved to be a barrier to the implementation of health services in the study area.

Quotations

“(…) There is no formal structure or organisation for traditional healers in our area which makes it difficult for us to work together as traditional healers”. “(…) We as traditional healers, operate independently and we are not integrated, that is why we are unable to approach government about our concerns”. “(…) Government should support us in making sure that we have a recognised structure which will represent us at all levels”. “(…) Our government is not supporting us in mobilising other traditional healers in the community. Because if we came, all of us here, the room was going to be full”.

(Focus group discussion: Traditional Health Practitioners)

From the health systems point of view, non-functionality of the clinic committees is a barrier to implementing health services as community views are not channelled to the relevant health management department.

Quotations

“(…) Our clinic committee is also not functional, which could have been a way for us to raise issues and concerns to government about health services”. “(…) The clinic committee is not even functional in our clinic which we could use to raise our concerns about health service delivery”.

(Focus group discussion: Traditional Health Practitioners)

The CHWs raised a concern about the irregular receipt of payments, which sometimes discourages them to render health services in the community.

Quotations

“(…) We get stipend, but is not enough even though is better than staying at home”. “(…) Yes we receive stipend but not every month, sometimes we spend four months without getting it”. “(…) Sometimes we don’t get this stipend and it [is] discouraging us

to continue the work, but we continue helping our people". "(...) We have our own personal needs so I would like to see us getting our stipend on a monthly basis".

(Focus group discussion: Community Health Workers).

4.3.4.7 Suggestions from community health workers and traditional health practitioners to improve chronic disease management

In the study, several suggestions were made by both the CHWs and THPs to improve health service delivery. These, amongst others, include a regular supply of chronic medications, an increase in human resources at the clinics, as well as collaboration with, and feedback from, the nurses.

Quotations

"(...) I will tell government that they should try to make sure that at the clinics there is always medication such that our community members can have courage to utilise their services. Secondly I will request that they make sure that our clinic has enough nurses and regular doctors to attend to the patients". "(...) My request would be to have a centre built for chronic patients to collect their medications there".

(Focus group discussion: Community Health Workers).

Quotations

"(...) We do want to take part in the decisions made about our community, but we are not invited to the meetings including the clinic committee meetings". "(...) We would like to see us getting feedback on the patients we are referring to the health facilities such that we can know what to improve in our patient care". "(...) If we can get feedback from the nurses about the progress of the patients we referred to them. we will be encouraged to refer patients again to health facilities"

(Focus group discussion: Traditional Health Practitioners)

In the study area, improved availability of mobile clinic services in underserved areas and increased mobile clinic services in areas which are already serviced, was also suggested by both CHWs and THPs.

Quotations

"(...) We have older people who walk long distance to the clinic, so I would suggest that mobile clinic reach these type of community members to render services or if they can provide transport to collect patients from the community". "(...) Also I will ask our

government to increase the mobile clinics in the communities in order to increase access to health services”.

(Focus group discussion: Community Health Workers).

4.3.5 Discussion

In many low- and middle-income countries (LMICs), community health workers (CHWs) are involved in the delivery of primary health care services to the community and constitute the first point of contact on health-related issues (Kok et al., 2015). Our study revealed that CHWs are often involved in health promotion activities, such as educating community members and emphasising treatment adherence. This was also found in another study, which reported CHWs offering specific training on principles of healthy eating and lifestyles in the community (O'Brien et al., 2009). In most developed countries a number of community-based health intervention projects have been successful, aimed at the promotion of risk-reducing lifestyle changes, mainly in the field of cardiovascular disease prevention (Nissinen et al., 2001). In developing countries, with the help of WHO Interhealth Programme, similar community-based interventions were implemented, aimed at the modification of the major risk factors for NCDs, mainly through health promotion (Nissinen et al., 2001). In many middle-income countries, CHWs became key members of the health team and provided health promotion and primary health care services (Perry et al., 2014). CHWs also had a role to play in the referral of patients to clinics for medical check-ups. This shows how CHWs serve as a bridge in a community between the community members and the health care system. This has also been reported in other studies (Brown et al., 2002; Angwenyi et al., 2013; Morgan et al., 2015).

This study discovered that the selection criteria used for choosing CHW candidates is not standardised. Some CHWs began working as health promoters; others simply volunteered; while others submitted their curriculum vitae to the clinics. Our findings contradict those of other studies in that there were selection criteria which included, amongst others, satisfying a list of desired personal qualities, such as interest in the subject material, willingness to learn, having compassion and having previous experience with the programmes's disease target, either as patients or survivors (Brown et al., 2002; Hafeez et al., 2011). In Pakistan, strictly defined selection criteria were used to employ CHWs (Hafeez et al., 2011). The South African model, mainly in rural areas of the Limpopo Province, it is suggested that selection of CHWs should also follow strict selection criteria, in order to ensure that relevant people are employed as CHWs.

As with other healthcare professionals, the effectiveness of CHWs largely depends on the training they receive and how well that training prepares them for their subsequent work (O'Brien et al., 2009). Our study findings showed that CHWs had wide variation in training, which is concurrent with other studies (Kash et al., 2007; Petersen et al., 2014). CHWs reported their training focused on general information about health and on specific information about conditions and diseases, mainly on HIV, TB and child health diseases. Our study revealed that very few CHWs had training on how to deal with hypertension and diabetes, whereas this was not the case in a study conducted in Brazil, where hypertension, AIDS and diabetes were included in training programmes (Ponto et al., 2012). In an urban township of South Africa, it was found that education sessions offered by CHWs varied and included matters pertaining to nutrition in the management of NCDs, as well as explaining risk factors, symptoms and prevention measures for diabetes and hypertension (Tsolekile et al., 2014). In our study this training was not provided to CHWs. There were no in-service training programmes for CHWs in our study. In a study conducted in Iran in-service training was provided at regular intervals, varying from monthly to twice a year, offered in the form of workshops, monthly meetings and refresher courses (Javanparast et al., 2012).

The current study also revealed the integration of CHWs into the health care system was through nurses from the clinics, who provided information in the form of updates to the CHWs, in order to improve their skills in the field and to achieve better health outcomes. This integration has been reported by several other studies in which many national governments made CHWs a cornerstone of the scaling-up of community health delivery (O'Brien et al., 2009; Pinto et al., 2012; Singh and Sachs, 2013). Findings from our study revealed the desired level of support and supervision of community health workers in routine care is generally poor. This has also been found in several other studies (O'Brien et al., 2009; Tulenko et al., 2013) identifying an urgent need for supervision and support of CHWs at programme implementation level. Facilitating coordination and ensuring synergy amongst multiple stakeholders and initiatives at the district and sub-district level is often unfocused. Therefore, in light of this limitation, support is needed to strengthen and improve the accountability of CHW programmes to district and community governance structures, overseeing health and development (Tulenko et al., 2013).

Some CHWs felt unappreciated and/or unaccepted by community members, including some nurses at the clinics, resulting in poor work engagement. This finding is similar to findings from other studies (Petersen et al., 2014). Our study also revealed that the low and inconsistent remuneration received by the CHWs was prevalent in all the CHWs, which has been documented in many other studies

conducted in South Africa (Peltzer and Davids, 2011; Black et al., 2011). This was identified as a demoralising situation for CHWs, negatively impacting their motivation to work, resulting in a negative impact on service provision and generally added to their stress.

CHWs in our study reported environmental challenges hindering their ability to deliver services to the community. These included lack of resources and long distances to reach patients in outlying communities. Similar findings were reported in study conducted in Brazil (Pinto et al., 2012). CHWs from our study reported lack of resources and hard-to-reach patients as critical challenges to their work. Some CHWs reported disease-related stigmas, such as HIV disclosure, to be affecting their work, as some patients do not want to be visited by CHWs. Similar community contextual factors were reported from a study conducted by Kok et al., which included socio-cultural factors, disease-related stigmas, gender roles, cultural norms, values, practices and beliefs (Kok et al., 2015).

The efforts to improve health care access in rural areas cannot ignore traditional health services (Abubakar et al., 2013). As our study findings show, there are still people using traditional health services in this rural area of the Limpopo Province. Traditional healers who participated in the study mentioned that they can cure most of the diseases, including chronic diseases such as diabetes and hypertension. These diseases are amongst the ones reported in a study conducted by Semanya and Potgieter in Limpopo Province wherein traditional healers said they can cure (Semanya and Potgieter, 2014).

The current study also revealed that traditional health practitioners have barriers preventing them from taking part in health service delivery in collaboration with the nurses. One such impediment is cultural insensitivity displayed by disrespectful nurses, which has also been reported in a study conducted in Ghana (Gessler et al., 1995). In a study conducted in Australia, it is reported that traditional healers work hand in hand with the mainstream health services, both in primary and tertiary health care (Oliver, 2013). These traditional healers are recognised by the mainstream medical doctors, and there is co-operation between them (Oliver, 2013), whereas in our study no co-operation with health care workers was reported by the THPs. This shows that there is no integration of health services with THPs in this rural area of the Dikgale HDSS.

In our study, THPs declared they protect their indigenous knowledge and, therefore, they are unable to share what they do to the patients with anyone else. Similar to the previously mentioned study in Ghana, THPs reported they get blamed if patients, after first visiting them, come to the hospital late in

the course of their sickness. In addition, hospital staff tends to blame intervention by traditional healers for the worsening the condition of patients and often accuse THPs of being responsible for many deaths (Gessler et al., 1995).

THPs in our study expressed both they and the nurses share the goal of improving health and imply they should work together. The challenge raised by almost all THPs interviewed in our study is the unavailability of a formal structure to represent them. The World Health Organization has reported there were traditional healer organisations in over 20 African countries (McMillen, 2004). This means that there is a need for establishing a formal structure which will represent the THPs in Dikgale HDSS working together with government.

Limitations of the study

Our study findings must be interpreted cautiously as the Dikgale HDSS is developed as a sub-district level surveillance system in a rural setting of Capricorn District in Limpopo Province, South Africa. It is not possible, therefore, to extrapolate our findings to a larger population at the provincial or country levels. However, results of our study are in line with most findings from other sub-national or national surveys from other parts of the world. The main weakness of this study is that it relied on self-reported information from the participants which may have resulted in self-report bias. Another limitation is that THPs from Seobi Dikgale Clinic did not respond (only one attended) to several invitations and therefore they were excluded to take part in the study.

Contribution of the study and implications for healthcare

This study determined that provision of healthcare services should be strengthened and shifted to integrated management of chronic non-communicable diseases in rural areas. Therefore, it would be appropriate for both CHWs and THPS to be capacitated and utilised to fill the gap in implementing interventions to promote behavioral change for better control of all chronic NCDs. Further research can be conducted in the study area looking into planned community intervention programmes which are important components of a strategy for NCDs prevention (Kengne et al., 2013). This can include a public health approach which is greatly shaped by community engagement on a variety of levels (Morrin et al., 2013; West, 2014). Thus, better relationships among community members, social groups, community health workers, traditional health practitioners and public health professionals should be fostered. Unification of all these groups is core to health promotion and prevention.

Conclusion

In conclusion, integrated approaches in rural Limpopo Province could create immediate synergies in service delivery by involving all healthcare providers such as nurses, CHWs and THPs. Suitable training and capacity building should form a significant part of structural integration by making sure suitable training is given to all healthcare providers. With proper training they will be better able to deliver appropriate services to healthcare system including management of NCDs.

Lastly there is a need to establish a link with traditional healers and integrate their services into the regular healthcare system. Without a doubt, they can offer significant benefit in the early detection of health problems in the community. Structured referral and follow-up between formal and informal care – in both directions – can aid early detection and improve management of chronic diseases. However, several conditions need to be fulfilled in order to achieve this goal including more training for THPs and CHWs and the creation of a formal structure for THPs.

In conclusion, findings of the current study strongly support the integration of CHWs and THPs. These integrated approaches could/would create immediate synergies in healthcare service delivery by addressing the changing profiles of diseases (Steyn, 2006). Traditional healers and community health workers play a vital role in the health of the majority of people in rural South Africa. It is for these reasons collaboration among public health facilities/primary healthcare facilities, CHWs and THPs would be most beneficial to the improvement of prevention and management of chronic diseases (Kok et al., 2006).

4.4 Barriers and facilitators for improving management of chronic non-communicable diseases at primary healthcare level in rural area of Limpopo Province, South Africa.

4.4.1 Introduction

The priority for most countries is to develop a health care system that is responsive to the challenges of prevention, control and treatment of chronic non-communicable diseases (NCDs) (Atun et al., 2013). A major public health threat to population health is the increasing prevalence of NCDs, which cause 60% of all deaths and which require an integrated, multidisciplinary package of well-coordinated care that includes prevention, monitoring and maintenance treatment (Tsiachristas et al., 2011). Provision of primary health care services that are accessible, equitable and responsive to the needs of target communities is affected by the increasing burden of NCDs globally (Aikins et al., 2014). Overcoming the

barriers that relate to the health care provider, the health care system and the patient, including sociocultural issues, will help in controlling chronic NCDs at population level, which involves several steps (Baumann and Dang, 2012; Khatib et al., 2014).

The acute care model has long been in place in the primary care settings, in which, in itself, is an obstruction to the improvement of chronic disease management and prevention (DeJesus et al., 2010). Over the past two decades the development of clinical guidelines has increased as implementation of these guidelines seek to improve the quality of health care by reducing harmful management practices and improving the cost-effectiveness of health care (Brusamento et al., 2012). The use of evidence-based guidelines, including the development of strategies and protocols for integrating the use of best practice guidelines into clinical practice, is one of the initiatives implemented at primary care level to support chronic disease management (CDM) (Lee et al., 2015). Health care teams should have the expertise to provide appropriate clinical and behavioral management as required by effective chronic disease management (Knai et al., 2012). To this end the National Department of Health in South Africa has published guidelines to be used in the management and control of non-communicable diseases. However, the major barrier in the implementation of these guidelines has been insufficient dissemination of information about the guidelines and lack of monitoring (Mayosi et al., 2009).

In South Africa, the programme managers at provincial level are working largely in isolation, which prevents them from engaging with the health-service managers, resulting in insufficient multisectoral coordination with fewer efforts towards a concerted programme of action with respect to non-communicable diseases (Mayosi et al., 2009). Therefore, an important part of achieving a high-quality, high-value, patient-centered health care system is care coordination (Schultz and McDonald, 2014) as health care and health services undergo transformation. A significant barrier to optimal self-care, especially primary care, is access to health care services and resources (Lee et al., 2015). Human resource management has been identified as being an overriding factor in care quality (Griffiths et al., 2011).

Therefore, understanding the barriers to improving management of chronic non-communicable diseases is essential to encourage evaluation of chronic disease management programmes and, in turn, generate evidence-based decision-making in chronic care at the primary care level. The overall aim of the study was to explore factors affecting the management of chronic non-communicable diseases at the primary health care level in a rural area of the Limpopo Province. This part of the thesis aims to contribute a

better understanding of barriers to and facilitators of chronic disease management in rural area of the Limpopo Province.

4.4.2 Methods

This was a qualitative study conducted using semi-structured interviews with managers of the three clinics in the Dikgale HDSS (Kanjala et al., 2010), managers at district and provincial level involved in coordinating chronic disease programmes and managers of the CHW programme. A semi-structured data collection method was opted for in this study, mainly because we did not want to steer the participant's answers in a particular direction in order to obtain inductive data. The interview questions were developed in association with a "critical reference group" (Elo et al., 2014), which included the chronic patients, nurses, CHWs and the THPs. Our semi-structured interview involved the use of prepared questioning, guided by identified themes, in a consistent and systematic manner, interposed with probes designed to elicit more elaborate responses (Qu and Dumay, 2011). This helped to develop an understanding of the ways in which managers make sense of, and create meanings about, how chronic disease prevention, management and control could be improved.

4.4.2.1 Sampling

The study was conducted in the Limpopo Province, with the focus on the Dikgale HDSS [16], the Capricorn District Office and the Provincial Office. The provision and organisation of health services in the Dikgale HDSS are discussed in an earlier study by Maimela et al (Maimela et al., 2015). The health care system in the Limpopo Province is structurally composed of the Provincial Department of Health, which is responsible for health care service delivery under the political leadership of a Member of Executive Council (MEC) (Coovadia et al., 2009) and the health districts (McIntyre, 2012). The health districts have limited management authority and they are largely responsible for supporting and coordinating provision of primary health care and district hospital services (McIntyre, 2012). The purposive sampling method was used, as this method involves selection of participants based on an important characteristic under study (Maimela et al., 2015), such as being a manager of a clinic, a manager responsible for the CHW programme or a manager responsible for the chronic disease programme at district and provincial level.

4.4.2.2 Data collection

A semi-structured interview guide, based on the findings from a study conducted by Maimela et al (Maimela et al., 2015), was developed and piloted. A face-to-face interviewing strategy was used because we wanted to get a depth of meaning and gain insight into, and an understanding of, the research topic. The primary data for this study were drawn from audiotape-recorded interviews. The interview guide for managers of clinics and of the CHW programme consisted of open-ended questions on the following topics:

- Community knowledge about chronic disease management;
- Treatment-seeking behaviour;
- Mode of acquisition of primary health care services;
- Management of chronic diseases;
- Collaboration of primary health care with traditional healers and private health care practitioners;
- Collaboration of community health care workers with primary health care workers and traditional healers including private health care practitioners.

The interview guide for managers of district and provincial chronic disease programme consisted of open-ended questions on the following topics:

- Interventions/programmes in place to manage chronic diseases;
- Interventions/programmes in place for chronic disease management;
- Community awareness of health problems;
- Community participation in health service delivery;
- Medical structures and their functionality;
- Readiness of community to participate in health care delivery;
- Health workers, community health care workers and traditional health practitioners concerns.

The situational analysis of the resource availability for chronic disease management in the three clinics was undertaken using a questionnaire which covered aspects concerning the availability and functionality of resources to aid in the management of chronic diseases.

4.4.2.3 Data management and analysis

Data analysis was carried out inductively using the thematic analysis method (Braun and Clarke, 2006; Petty et al., 2012; Maimela et al., 2015) in which the transcripts were read several times to gain familiarity with the text as a whole. Codes (labels) were given to sentences, phrases and paragraphs or

lines. Codes were then compared across the whole data set to identify variations, similarities, patterns and relationships (Maimela et al., 2015). Reflections and ideas related to sections of data were written down in order to abstract from the data and deepen analysis (memo writing). Codes were grouped to create a smaller number of themes, distilling the key issues identified. Relationships between themes were then identified to create a thematic map (Braub and Clarke 2006). The principal investigator (ME) coded all transcripts and at least one focus group discussions per group was coded independently by a second researcher (HB or JF). Checks of transcript codes and information exchanges with the last authors (BH and FJ) were regularly conducted so as to ensure consistency.

4.4.3. Results

The interview data yielded six themes which summarised the barriers to, and facilitators of, chronic disease management, namely:

- Organisation of health services at district and provincial levels;
- Lack of training and capacity building;
- Availability of delivery system design;
- Implementation of policies and guidelines for chronic disease management;
- Availability of resources for chronic disease management;
- Strengthening collaboration to improve management of chronic diseases.

4.4.3.1 Organisation of health services at district and provincial levels

The findings from our study show that provision of health care services in the study area are coordinated at different levels by different managers, and this makes it easy for decision making in the provision of health services.

Quotations

“(…) The health services in the district are coordinated under the leadership of the District Executive Manager (DEM), who reports to the Head of Health at Provincial level, who, in turn, reports to the MEC for Health.”

(Semi-structured Interview: Provincial programme manager)

The study findings revealed that the provincial office is mainly responsible for monitoring policy implementation.

Quotations

“(...) The role of the provincial office is to develop policies and those policies needs to ensure that those programmes from National Department of Health or international agreements are put in practical form in our health facilities and also to coordinate eeeehhh monitoring the conformity so that we find that in each and every health facility they practice as much as more than 80% of primary health care package in making sure that the main target for chronic conditions they are detected

(Semi-structured Interview: Provincial programme manager)

The provincial office is responsible for provision of resources to implement health programs and coordination with other stakeholders. The respondents below clearly underscore this:

“(...) Eeeehhh the provincial health management team, provide transport for teams which will be conducting awareness campaigns in the communities”.

(Semi-structured Interview: Provincial programme manager).

Quotations

“(...) As provincial office, we also coordinate with local municipalities in making sure that chronic conditions are part and parcel of their health programmes”.

(Semi-structured Interview: Provincial programme manager).

Again the results from the current study show that the district is responsible for supporting and coordinating the provision of primary health care services in the community.

Quotations

“(...) District health management team is engaged in mobilising community members to engage in delivery of chronic disease management activities by using the support groups as they give them health education to manage their health”.

(Semi-structured Interview: District programme manager)

The district and provincial programme managers of the chronic disease programme mentioned that there is coordinated district and provincial support to the clinics, in a form of monitoring implementation of guidelines, coordinating role players for meetings and collaboration with different stakeholders to improve chronic disease management.

Quotations

Quotations

"(...) The role of the district is to coordinate health programmes following the national guidelines. We also engage other units or programmes which have impact on chronic disease management to utilize their resources in a coordinated manner to support the clinics."

(Semi-structured Interview: District programme manager).

"(...) We have meetings in each sub district monthly to discuss challenges and plans to improve the programme".

(Semi-structured Interview: District programme manager).

4.4.3.2 Lack of training for health care providers and lack of support from higher levels

The findings from the interviews with managers revealed a disagreement with nurses and CHWs responses on lack of training in the Dikgale HDSS.

Quotations

"(...) It is not true that there is lack of trainings for nurses on chronic diseases. The reason why I say is not true, is that the people go to workshops even like here in the provincial office, they go to workshops and instead of coming back to give feedback they don't do that. People hold information to themselves, after they withheld that information, others when they leave the health facilities, they don't even hand over the reports to the next one".

(Semi-structured Interview: Provincial programme manager).

Quotations

"(...) Is not true that there is lack of trainings for home-based carers on chronic diseases as I have indicated we have a register of all the trained home-based carers in the districts on the early detection of chronic conditions. Number two follow ups at the clinic, three communications between clinic and the home-based carers as and when the need arises, the fourth one is availability of medication, the only place you find that these people are organised in making sure that they take medications is here in town in old age homes as well as in established areas wherein they move with their own

transport collecting medication for those who can't collect their medications at Rethabile Health Center”.

(Semi-structured Interview: Provincial programme manager).

Quotations

“(…) Here I will say it is 50% true that there is lack of trainings for traditional healers because when I was still in the Traditional Healers coordinating team, I conducted workshops with the traditional healers. The biggest problem with traditional healers is that they withhold the information received and don't give to other people, such that they be the only people to be recognised by the department”.

(Semi-structured Interview: Provincial programme manager).

Our study findings show that there is lack of supervision by the district and provincial programme managers, which was mentioned by the clinic managers.

Quotations

“(…) It's a fact that there is lack of supervision from the district and provincial offices”.

(Semi-structured Interview: Clinic manager).

The findings from interviews with managers show that, in the clinics and communities, there is a delivery system, involving a surveillance system and community mobilisation, designed to contribute to the improvement of access to health care services and continuity of care in the community.

Quotations

“(…) there is a surveillance system for chronic diseases, because we capture information from all health facilities in District Health Information System (DHIS) that we are using as a department”

(Semi-structured Interview: Provincial programme manager).

Quotations

“(…) we've got the chronic management register at the clinics which we use to monitor the chronic patients. This register helps to view patients at a glance and we can be able to see that this month the patient came and the blood pressure was this, the blood glucose was this, weight and everything. The challenge is that there are no electronic personal records (PHR) as these chronic management registers are paper-based. ”

(Semi-structured Interview: District programme manager).

Quotations

"(...) Every month we are doing door to door campaigns, distributing condoms to the local shops and taverns together with health information received from the clinic. We also put our contact details at the shops such that if there is anyone who needs our help they know how to contact us".

(Semi-structured Interview: Manager for CHWs programme).

Quotations

"(...) We use door to door campaigns and leaflets. We sometimes attend the community meetings wherein we request to give people health information". " (...) We use schools to disseminate information. We also use door to door, traditional authority meetings and even during funerals we get a chance to distribute information to the people".

(Semi-structured Interview: Manager for CHWs programme).

Quotations

"(...) Health information is communicated to communities through community radio stations, health promotion unit and going to schools for school health services. We also have information booklets but the challenge is very few are available in the local languages as most are in English. Maybe we need to raise this up with the provincial office to request pamphlets in local languages".

(Semi-structured Interview: Manager for CHWs programme).

The use of health information systems to increase availability of information to public health and clinical setting providers has been found to be lacking in the health facilities.

Quotations

"(...) each and every health facility must have the capacity to analyse its own data so that our colleagues can respond accordingly in line with what they have written, have perused, collected and collated so that they can give proper direction. Because if you've got valuable information and you don't want to interrogate it there is no way as a nation that we are going to grow. Eeehhh because you will be seeing so many patients with hypertension, as long as you will be giving the medication, you give statistics without actually you as an individual taking any initiative to address those problems."

(Semi-structured Interview: Provincial programme manager).

A summary of the barriers to current chronic disease management shows that there is lack of training for community members and that there is non-functional equipment in the clinics.

Quotations

"(...) No training offered to community members on risk factors for chronic diseases except the support groups which we have but they are not trained". "(...) The community problems might be contributing to the occurrence of these diseases. Our people are not taking care of themselves and they more ignorant about health issues".

(Semi-structured Interview: District programme manager).

4.4.3.3 Implementation of policies and guidelines for chronic disease management

The current study reveals that the guidelines are available in the clinics but that the nurses do not read them, or use them to guide their day-to-day practice.

Quotations

"(...) The role of the district is to coordinate these programmes following the national guidelines. We also engage other units or programmes which have impact on chronic disease management to resolve the challenges in their programmes".

(Semi-structured Interview: District programme manager).

Quotations

"(...) Is not true that updates on guidelines are not there. Guidelines are there. If you check in the clinics the guidelines are there they are lying on top of one another. Nurses don't want to read them".

(Semi-structured Interview: Provincial programme manager).

Implementation of the policies and programme guidelines to influence behaviors was found to be a challenging issue, because community members and nurses lack information on the control of risk factors for chronic NCDs.

Quotations

"(...) Community views are not channelled to influence policies because eehhh, before you participate you must have the knowledge of what is happening. Like for instance when I have indicated that eeehhh this chronic conditions most of them they are self-

made, eeehhh how am I going to influence the decision that will be channelled in ensuring that people get that information whereas I'm the active participant of that behavior. So I'm obese, being obese how then am I going to advice somebody to lose weight.

(Semi-structured Interview: Provincial programme manager).

Quotations

"(...) Is the same here nothing on feedback is been taken back to the community in terms of chronic disease policies".

(Semi-structured Interview: District programme manager).

4.4.3.4 Availability of resources for chronic disease management

Our findings also show that there are minimal resources which have been committed to a comprehensive approach towards chronic disease prevention and management in the study area.

Quotations

"(...) Truly speaking we don't have quality equipment's in our clinics". " (...) The state of the medical equipment's for chronic disease management is very poor".

(Semi-structured Interview: Provincial programme manager).

Quotations

" (...) It's a fact that there is shortage of medication for chronic disease patients, but we have a district pharmacist who also assist in resolving some of these challenges".

(Semi-structured Interview: District programme manager).

Quotations

" (...) The challenge we have mostly is on the blood glucose, we sometimes ran out of the materials like strips".

(Semi-structured Interview: Clinic manager).

Quotations

" (...) Here equipments are not available. Medical equipments are not available and here we are dealing with life and death. How can you take this tool which has a two-memory

gadget which is meant for industrial then you put it in a clinic which sees more than 300 patients a day. This thing has got a memory gadget of two, that's why it is written at the back that it can monitor your blood pressure in the morning and in the afternoon".

(Semi-structured Interview: Provincial programme manager).

Quotations

"(...) If eeeehhh I will give an example, if you go to health facility you find that your medication is not complete, definitely sure you lose confidence in visiting that facility again, then you go to another health facility".

(Semi-structured Interview: District programme manager).

Quotations

"(...) The main difficulty is shortage of medication in our clinic and this demoralises our people to come to the clinic".

(Semi-structured Interview: Manager for CHWs programme).

Our study showed that the implementation of health care services and interventions is hampered by inadequate human resource capacity at service delivery outlets and inadequate supervision, including lack of supportive supervision. These are some of the major factors that hamper the effective implementation of the chronic disease management in the study area.

Quotations

"(...) Availability of medical staff is a problem my friend, and not sufficient as in the province we are standing at 58%, of which the bulk part of it belong to district hospitals and the tertiary institution. Primary Health Care is run about 40%, and definitely is not enough."

(Semi-structured Interview: Provincial programme manager).

Quotations

"(...) We are unable to have nurses visiting patients in the households for educational outreach and taking of vital signs, as we don't have enough nurses. In the olden days the German used to give nurses bicycles to visit the communities so these days we don't have such."

(Semi-structured Interview: District programme manager).

Quotations

"(...) On the other hand, there is a doctor who comes to see these patients on a weekly basis. Patients are seen every six months for review of treatment, if the patient is well managed the doctor will recommend another six month review. We are fortunate in these clinics the treatment is dispensed by pharmacists from the hospital they come on the day of the chronics."

(Semi-structured Interview: Clinic manager).

The provincial managers suggested that the approach taken to tackle chronic diseases in the Province should emulate the process used for tackling the HIV epidemic.

Quotations

"(...) Very simple, the attention and the noise that has been given to HIV and AIDS must be given to chronic diseases and be allocated enough budget, mind you as I'm speaking now mortality rate for chronic conditions is higher than those of HIV and AIDS".

(Semi-structured Interview: Provincial programme manager).

4.4.3.5 Strengthening collaboration to improve management of chronic diseases

Our findings show that, in order to achieve an integration of chronic disease prevention and management, there should be collaboration between different health care providers and integration of services which involves linking individual and population-level approaches. This was found to be linked to integrating services and sharing planning to coordinate efforts and resources.

Quotations

"(...) We haven't moved up to the level of communities being involved in health service delivery now, eeehhh because our intension was to create ambassadors for chronic conditions in the province, so we were restricted by financial constraints and we haven't done much on that. In fact nothing has been done on that".

(Semi-structured Interview: Provincial programme manager).

Quotations

"(...) It is also important to note that we are busy implementing a long term chronic model where now we have selected sites. We have put in centres of excellence, where now in health facilities we put a baseline for each and every person who enters a health

facility, we screen for those conditions from the age of 13 years so that we might be able to detect as early as possible and making sure that we prevent at the early age and we encourage as the department and as a programme, every Friday we've got eeeehhh what we call moving for Friday. Moving from here to Peter Mokaba stadium and come back, every Friday at least to encourage everyone from the provincial office to be physically active".

(Semi-structured Interview: Provincial programme manager).

Integration of programmes established to deliver comprehensive health care services to patients was found to be lacking, as most programmes were operating in isolation.

Quotations

"(...) it is critical to make sure that every programme in the clinics incorporates chronic disease management as part of the programme monitoring and evaluation in primary health care package. In this package, maternal health is also inclusive, mental health also, and all 27 programmes of primary health care to make sure that they are integrated at PHC level. We mustn't see patient as an individual, but as a holistic approach".

(Semi-structured Interview: Provincial programme manager).

We also found that there are key initiatives established to improve the relationships between stakeholders and partners in the community, enabling them to be proactive and improve chronic disease prevention and management.

Quotations

"(...) The main partners are the taxi industry, the churches, the traditional healers, and eeeehhh faith healers."

(Semi-structured Interview: Provincial programme manager).

Quotations

"(...) We taught the taxi industry managers about the advantages of frequent health screening in order for to encourage them that their drivers must have their baseline information. This will assist taxi drivers who are suffering from chronic conditions to

always adhere to their treatment with an aim to improve chronic disease management and this may impact in the reduction of the fatal accidents we have on the roads”.

(Semi-structured Interview: Provincial programme manager).

Our study revealed that there is no integration of services provided by traditional health practitioners and other health care providers such as nurses and community health care workers (CHWs). There is also mistrust of traditional health practitioner’s services by the nurses and CHWs.

Quotations

“(…) nurses don’t give us any feedback about the progress of the patients including what they have done. This makes it difficult for us as traditional healers to play any role in provision of health services.” “(…) We are always not engaged in health service provision more especially when the health department are conducting campaigns but we see the home based carers taking part in such activities.”

(Focus group discussion: Traditional Health Practitioners)

Quotations

“(…) My friend, that can only happen if they start to have trust in us, respect us and acknowledge our existence in the community.” “(…) There are patients support groups in the community which are coordinated by the home-based carers and the nurses but we are not integrated with them as they don’t respect us or recognise us.”

(Focus group discussion: Traditional Health Practitioners)

Our findings show that there is limited capacity for the implementation of a comprehensive approach to the prevention of chronic diseases in both the public and the primary health care system infrastructure.

Quotations

“(…) eeehh I will say about 76% of our health facilities are friendly enough to accommodate the programme to run smoothly.”

(In-depth Interview: Provincial programme manager).

Quotations

“(…) some infrastructures are very good and some very poor.”

(Semi-structured Interview: District programme manager).

Findings from interviews with managers show that the relationship between nurses and chronic disease patients is not good, due to the concerns such as shortage of medication. This was found to cause patients to have little trust of public health staff/organisations.

Quotations

"(...) eeehhh as I have indicated I don't think the relationship is good and to put it point blank the relationship is sour..." "(...) if eeehhh I will give an example, if you go to health facility you find that your medication is not complete, definitely sure you lose confidence in visiting that facility again then you go to another health facility." "(...) and then the other issue is our eeehhh I can't justify the nurse fatigue, the one I will call nurse fatigue eeehhh where now our community members together with their relationship with health professionals are not good really. Each and every one has got his or her own attitude when they meet together they explode.

(Semi-structured Interview: Provincial programme manager).

Quotations

"(...) the relationship between health providers and community members I can only asses it through the defaulter rates and as now we have increase in defaulters it means the relationship is not good at all. Even if we don't have medications sometimes they need to come to the clinic such that we can be able to assess progress and refer if needs be."

(Semi-structured Interview: District programme manager).

4.4.3.5 The situational analysis of the clinics on the resource availability for chronic disease management.

In making decisions about how to improve the management and prevention of chronic diseases, it was important to have good knowledge of the current situation in the health facilities. An approach to collect data for the situational analysis in the three clinics involved visits to the clinics and working with managers to complete a questionnaire about their facilities.

The results of the situational analysis are presented in Table 16 and include a lack of general administrative resources, which means that the clinics function without equipment, such as cabinet filling systems for chronic patients files, a shortage of vacutainer tubes, broken chairs in consulting rooms and no urine test strips. The clinics have enough clinical nurse practitioners, but had few enrolled nursing

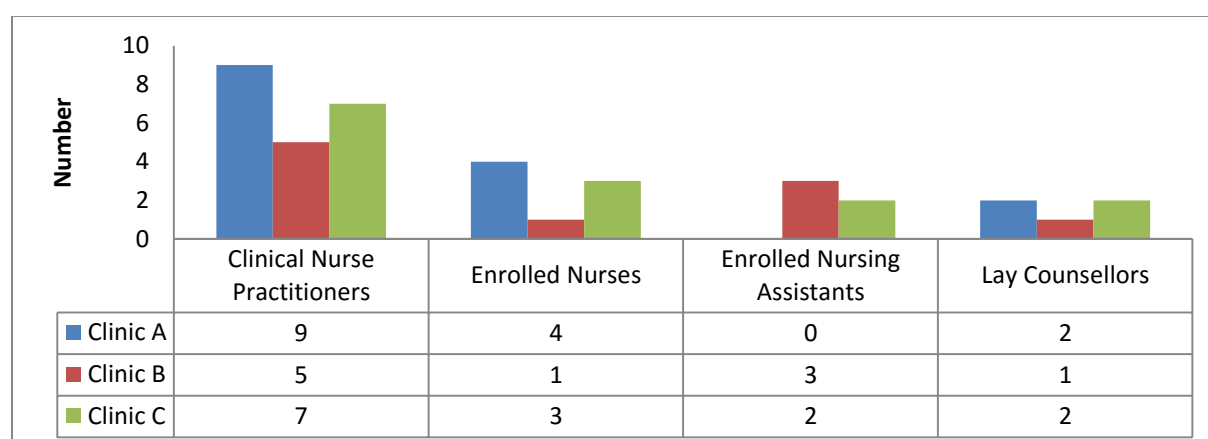
assistants, while Clinic A did not have any enrolled nursing assistants and this, therefore, represents a shortage of staff to render nursing assistance activities. Clinic B had only one enrolled nurse, while the other two clinics had more than two enrolled nurses (Figure 4). There was not enough space for rendering health services at Clinic B and, therefore, a request had been made to have park homes erected to be provided additional working space.

Table 16: Non- communicable disease management resource checklist for clinics in Dikgale HDSS

Equipment	Clinic A	Clinic B	Clinic C	Needs	Comments
Algorithm for management of T2D and HT	N/A	N/A	N/A	20	Others have hand drawn charts
BMI Chart	A	N/A	N/A	10	Only having 1 BMI Wheel
Chronic files	A	N/A	A		Not enough in the clinics
Chronic referral forms	N/A	A	N/A		Rely on copies from nearby schools
Glucometer	A, F	A, F	A, F	6	No test strips
Haemoglobin (HB) Meter	A, F	A, F	A, F	3	
Height measure	A	A	A		
Laboratory forms	A	A	A		Receive from laboratory
Specimen bottles	A	A	A		Receive from laboratory
Sphygmomanometer with different size cuffs	A, F	A, F	A, F	8	Only with one size and depends on batteries
Thermometer	A	A	A		Receive from laboratory
Urine test strips	N/A	N/A	N/A		Always not available
Weighing scale	A, F	A, F	A, F		
Television set for health promotion	N/A	N/A	N/A	3	
Computer and printer	N/A	N/A	N/A	3	
Filling system	A, NF	A, NF	A, NF	6	Filling system is a mess
Nurses chairs needed	11	6	7	24	Chairs not comfortable
Patient chairs needed	0	100	12	112	Most chairs broken
Peak flow meters	1	0	1	6	
ENT Set	0	2	1	10	

A = Available, N/A= Not available, F= Functional, NF= Not functional

Figure 4: Health Care Workers categories employed per clinic in HDSS



4.4.4. Discussion and conclusion.

This was the first analytical study to report the barriers to, and facilitators for, improving the management of chronic non-communicable diseases at a primary healthcare level in a rural area of the Limpopo Province. Our study revealed that provision of health care services in the Limpopo Province is coordinated by a district health team, under the leadership of a District Executive Manager, who reports to the Member of Executive Council (MEC) at the Provincial level. The results show that there are clear lines of accountability at all levels of the health service and transparency of decision making, which aims to improve access to quality health services and strengthen the public sector in order to improve the health system's performance (Matsoso and Fryatt, 2012).

Our findings show disagreement with the findings of an earlier study conducted in the same area, which showed that nurses lack training on chronic disease management (Maimela et al., 2015). The findings of the current study show that the views of managers disprove what the nurses have said, in that they say nurses are trained on chronic diseases. This concurs with a study by Wagner et al., which urged the teams to improve the relevant skills of practice team members through the use of more effective training methods (Wagner et al., 2001). The main problem mentioned is the fact that nurses do not give feedback to each other after coming back from the training or the workshops. Education and training provides an opportunity for an increase of knowledge and improvement of attitude within treatment team personnel which, in turn, has an effect on the promotion of patients' health and a qualitative improvement of services, as well as nurses' job satisfaction (Aminoroaia et al., 2014).

A health information system is a mechanism used for transferring practice guidelines into simple flow sheets, which capture the data necessary to measure outcomes of health care (Green et al., 2006) and this system was found to be available in the current study. Our study findings show that there were no electronic personal records (PHR) available in the clinics studied, they are only using chronic management registers, which is a paper-based system. The electronic PHR system supports patient centered health care, as patients access, manage and share their health information in a private, secure and confidential environment (Archer et al., 2011; Tenforde et al., 2012). PHR has great potential for addressing cost and quality issues in the management of chronic disease (Tenforde et al., 2012).

Managers of the community health workers (CHWs) programme in our the current study reported that CHWs conduct door to door campaigns and attend traditional council meetings to distribute health information to disadvantaged communities. This has been reported to be effective in integrating community health workers into a reformed health care system in other studies Fu et al., 2012, Bovbjerg

et al., 2013). The community prevention programmes provided access to community-based education for patients and are also designed to create community lay experts, who could sustain prevention and disease management efforts (Plumb et al., 2012). But the current study revealed that there are no community prevention programmes, in a form of training on the risk factors for chronic diseases except for the community support groups.

Clinical guidelines are one of several tools available to health service providers and users for the improvement of the quality of care (Legido-Quigley et al., 2012). The current study revealed that clinical guidelines are available in the clinics, but the challenge was in implementation as the nurses were not using them to guide day-to-day practices, because nurses are short staffed in the clinics. This is supported by a study by Donnellan *et al.*, which reported that the perceived barriers to, and facilitators of, implementation of national stroke guidelines included time constraints, as nurses didn't have enough time to read and shortage of staff (Donnellan et al., 2013). Implementation of the policies and programme guidelines to influence behaviors was found to be a challenging issue, because community members and nurses lacked information on the control of risk factors for chronic NCDs. Our study revealed that there is shortage of nurses in the clinics and they were, therefore, unable to conduct educational outreach visits, which are critical to improve the care delivered to patients in the community (O'Brien et al., 2007). The findings of the current study concur with findings from another study conducted in South Africa, reporting that there were also shortages of health workers, such as enrolled nurses and counsellors, who assist in rendering health services (Daviaud and Chopra, 2008).

In an effort to strengthen collaboration between different health care providers to improve the control and management of chronic non-communicable diseases, the managers interviewed in our study revealed that the Department of Health in South Africa intends to establish community ambassadors for chronic conditions. A study in South Asia reported that the use of ambassadors (Blair, 2012) to motivate patients to adhere and cope with NCDs was successful. In the latter study the ambassadors used extraordinary social positioning of the CHW role to transform clients' attempts to access services through multiple, manoeuvrable avenues of communication (Blair, 2012; Black et al., 2015). The use of ambassadors to motivate community members in the control and prevention of chronic diseases serves as a community intervention, which can involve active participation of the community members, is supported by a study by March et al., (March et al., 2015). Further collaboration, which includes the support from the political leadership, integration of services and adjustment of the health care system, is necessary to address the changing profile of disease (Steyn, 2006).

The situational analysis concerned with the availability of resources for chronic disease management in the current study showed that the services provided by the current health care system are principally unable to significantly alleviate the burden of chronic disease, mainly due to the under-staffed and poorly managed health care service (Steyn, 2006). This is supported by findings from our study, showing the shortage of nurses and lack of resources for chronic disease management. A discussion paper by Forbes and While acknowledged the importance of community resources and policies, service access and integration, decision support (e.g. the development and implementation of evidence based guidelines), and clinical information systems (e.g. electronic records with built-in prompting systems) (Forbes and While, 2009).

The main conclusion drawn from the findings of this study can be summarised as a currently insufficient situation for the effective provision of NCD services in primary health care in the Dikgale HDSS. The health services provided by the three health facilities mainly focused on diagnoses and treatment of diseases, whereas prevention and health promotion were not sufficiently covered. There is a poor relationship between nurses and chronic disease patients, which results in patients having little trust in public health staff/organisations. The current South African proposal, which aims at implementing National Health Insurance under the political leadership of the Minister of Health, calls for a system in which public financing is used to purchase a comprehensive package of services from accredited public and private providers (Matsoso et al., 2012). This will also strengthen collaboration to improve the management of chronic diseases and have potential gains in the quality of care by addressing poor management, poor governance, lack of accountability, and unresponsiveness of the health system in rural areas of the Limpopo Province.

Phase III:

4.5 Development of an integrated evidence-based management model for chronic non-communicable diseases and their risk factors in rural area of Limpopo Province, South Africa

4.5.1 Introduction

Chronic health conditions are a substantial challenge to global health and by 2020 they will account for 73% of all deaths, constituting 60% of the global burden of disease (Epping-Jordan et al., 2005). NCD's have increased in South Africa over the past 15 years. They now account for an estimated 37% of all-cause mortality and 16% of disability-adjusted life years (Puoane et al., 2012). The overall level of non-communicable disease mortality is similar across all provinces in South Africa, but the causes are different (Bradshaw, 2001). Most NCDs share risk factors [4], many of which are modifiable (Cerqueira et al., 2010), and are usually adopted early in life (Bradshaw, 2001). This provides considerable opportunities for intervention (Cerqueira et al., 2010; Puoane et al., 2012); however, progress in reducing NCD risk factors will only be attained if appropriate attention is given to the social and cultural contributing factors (Puoane et al., 2012).

Chronic disease management (CDM) entails an integrated approach, with the patient, the family, and the community being active participants over a lifetime of care (Beran and Yudkin, 2006; Nuño et al., 2012). Effective interventions to limit the progression of the diseases, or to mitigate the risk of complications, are needed (Kengne et al., 2013). These interventions should be cost-effective and financially feasible, particularly in low- or middle-income countries, before recommendations for their scale-up can be made (Gaziano et al., 2007; Beaglehole et al., 2008). Cost-effective interventions can be delivered as a package in primary health care (PHC) settings and this could lead to favourable changes in risk status and outcomes (Beaglehole et al., 2008).

Most of the actions in CDM are undertaken by the patient rather than by the health care worker, such as nurses, and, therefore, CDM interventions should be tailored to a person's strengths and challenges in managing his/her care (Hudon et al., 2012). Thus, collaborative efforts on the management of people with chronic diseases in primary health care settings plays an important role in chronic disease management, as primary health care providers link their services to other specialised services in the communities (Dennis et al., 2008). Primary health-care design (or redesign) typically includes the introduction of planned follow-up visits to all patients with chronic disease and the reorganisation of health workers' roles and responsibilities, towards a multidisciplinary team approach (Beaglehole et al., 2008). Therefore, PHC requires a greater level of organisation that must be sustained, commonly over a

patient's lifetime (Beaglehole et al., 2008), which is a challenge in low- and middle-income countries involved in delivering these interventions (Beaglehole et al., 2008).

The aim of this study was to develop an integrated, evidence-based chronic disease management model on the premise that multiple-strategy interventions are consistently more effective than single-strategy interventions (Newell et al., 1999). As new and improved efforts are needed to develop integrated, evidence-based interventions, the focus on improving community capacity to plan interventions should also focus on making existing strategies more efficient, while developing the new strategies, then address the methods for evaluation (Siantz and Aranda, 2014). This will lead to effective community-based interventions which will offer three distinct advantages as follows: firstly, because the intervention is implemented population-wide, it is inclusive and not dependent on the health care system; secondly, by directing strategies at an entire population an intervention can reach individuals at all levels of risk; and, finally, some lifestyle and behavioural risk factors are shaped by conditions not under an individual's control. Community-based interventions can be designed to affect environmental and social conditions (IOM, 2012; Siantz and Aranda, 2014). Therefore, the main focus of our study was to develop appropriately effective intervention strategies that will facilitate change, to prevent and control chronic diseases within and across cultural contexts (O'Connor et al., 2011) in rural areas.

4.5.2 Methodology

A multifaceted intervention, called 'quality circles' (Boaden and Dale, 1993; Beyer et al., 2003; Wensing et al., 2004) was developed to improve the quality and the management of chronic diseases in the Dikgale HDSS. These quality circles used the findings from previous studies, which formed part of the larger project in the study area, namely, the quantitative study using STEPwise survey and qualitative studies using focus group discussions and semi-structured interviews. This intervention comprised small group sessions with experts to discuss and provide feedback on the prevention, management and control of chronic diseases in rural areas. Quality circles (QCs) have become an important method of quality improvement (QI) in primary care (Beyer et al., 2003). The rationale to use this research methodology included the fact that the method involves small groups of employees doing similar or related work, who voluntarily meet to identify, define, analyse and solve work-related problems or issues (Shireen, 2014).

4.5.2.1 Sampling

The quality circles comprised of members representing all areas within the disease control and prevention spectrum. Eligibility criteria included people who work as clinic managers in the study area, those with a bachelor's degrees in nursing or associate degrees, those who have conducted extensive research in chronic disease management, executive managers in Department of Health in Limpopo, chronic disease managers in Limpopo the Province. A total of 35 participants took part in the study, during which several educational/presentational sessions were held in order to familiarise the participants in the quality circles with the issues of group dynamics, problem-solving training, techniques of quality circles, role of each member and procedures of the circles. The representation of the quality circle members, comprised of the following disciplines, is presented in Table 17:

Table 17: Participants in the quality circles

Category	No
Clinic managers from Dikgale HDSS	03
Sub District Manager	01
Chronic disease programme managers from Department of Health	06
Registrars' from Polokwane/Mankweng hospital complex	05
Staff and students from University of Limpopo Medical Science Department	10
Health Promotion from Limpopo Department of Health	02
Staff member from MRC/Wits-Agincourt Research Unit in Mpumalanga province	01
A representative from the executive management of Department of Health in Limpopo Province	02
A representative from the Dikgale traditional authority	01
Expertise from Antwerp University in Belgium representing the Unit International Health, Department of Primary and Interdisciplinary care, Department of Sociology and Research Methodology.	04
Expertise from University of Umeå, Sweden	01

Patients, nurses, community health workers and traditional health practitioners were excluded in this study because of the use of the quality circles methodology (Boaten and Dale 1993), which was an innovative approach to address quality improvement activities. But the responses of these people from previous studies, which formed part of the major project, were used in the context of chronic disease management improvement in primary health care settings. This process involved the identification of, and discussion about, actual problems in addressing chronic diseases and possible solutions, which were mainly raised by patients, nurses, community health workers, traditional health practitioners and

managers in earlier studies in the same study area. Next, priorities for an integrated community-based chronic disease approach were set and a start was made on an implementation plan.

4.5.2.2 Data management and analysis

This study followed a workshop format. A three-day workshop for the quality circles, comprising of team members from different disciplines, was held. The workshop members met to discuss problems relating to the improvement of chronic disease management. Three small groups of approximately 11 participants were formed. These small groups were tasked to discuss current practices and explore evidence-based practices (Boaten and Dale, 1993) to improve chronic disease management in the study area. The groups worked through a series of stages and participants were encouraged to analyse problems, following a sequential process, in order to find possible causes and develop solutions and then to formally present project proposals for consideration (Maimela et al., 2015).

Interventions, which formed the integrated chronic disease management model, were discussed and these took into account the evidence based and/or grounds in theoretical aspects. The basis for the discussion used the findings from previous studies which formed part of the larger project in the study area, namely the quantitative study using STEPwise survey and qualitative studies using focus group discussions and semi-structured interviews. The STEPwise survey results were concerned with the prevalence of risk factors for NCDs; focus group discussions results were concerned with the perceptions and perspectives of chronic patients and health care providers on chronic disease management [(Maimela et al., 2015), addressing NCDs through CHWs and THPs; while semi-structured interview results were concerned with the barriers to, and facilitators for, improving management of chronic NCDs at primary healthcare level by managers the for clinics, CHWs programme and chronic disease programme at district and provincial level. Quality circle discussions were also based on assessment of the needs, which were inclusive of consultation with key stakeholders and involved a multidisciplinary approach, where applicable, which considered the optimal and equitable utilisation of health care resources (Cibulskis and Edwards, 1993).

The strategic process of developing an integrated chronic non-communicable disease management model in this study was elaborative (Cibulskis and Edwards, 1993). This was multifaceted and multidisciplinary, incorporating different experts (Sackett et al., 2000; Cretin et al., 2004; Maloney, 2012), who met to discuss and made presentations of their ideas to management, especially ideas relating to quality of output, in order to improve the management of NCDs in a rural area. The quality

circle group method was a good approach to use to analyse the context of the problems and their situation in the Dikgale HDSS. The process involved three steps.

- Firstly, the presentations of results on the prevalence of risk factors for NCDs in the study area and the findings from the focus group discussions, including the interviews with the managers, on chronic disease management were undertaken.
- Secondly, three groups were formed, and members were divided into break-out sessions, with the aim of developing intervention strategies for the improvement of chronic disease management that were feasible for implementation in the context of the rural area of Dikgale, with the available resources. Each session was allocated a moderator with a specific focus as follows: Group One focused on addressing interventions at a patient level and interventions at an organisational level; Group Two focused on addressing interventions at a community level and an organisational level; Group Three focused on interventions at a health services level and at a managerial level. Each group was composed of a clinic manager, a district manager, a provincial manager, staff from Public Health Medicine, students from the University of Limpopo and colleagues from other sectors, as listed in Table 4.5.1.
- Thirdly, proposed interventions to improve chronic NCDs and integration of services in this rural area of Limpopo Province were planned. Finally, the interventions which will form part of the model were defined in relation to the chronic disease model by Wagner and colleagues. From the previous studies in the Dikgale HDSS, the team members identified and verified that the causes of poor chronic NCD management were indeed causes, ensuring that solutions address the real issues. Moderators and the research team made a proposition based on group discussions, which were presented, discussed and adapted in the last part of the workshop in preparation for presentation to the Provincial Department of Health in the Limpopo Province.

The research team understood the quality objectives and created a solution for the improvement of chronic disease management in the form of a proposed model. The model was discussed with executive management of the Limpopo Department of Health, in consultation with the Belgian Vlaamse Interuniversitaire Raad (VLIR) team, and this resulted in inputs and activities which are needed for the development and implementation of the interventions for improving chronic disease management.

Several meetings were held and presentations were made to clinicians working in the public health facilities, namely, clinics and hospitals in the Limpopo Province, to critique the developed model.

4.5.3 Results

In the previous studies conducted as part of the bigger project in the study area, the quantitative study revealed high prevalence of behavioural and biomedical risk factors for NCDs. Approximately one in three of the study participants were found to be hypertensive, starting at a young age of 15 to 24 years. Approximately 90% of the participants were below the WHO recommendations for fruit and vegetable consumption, while more than half had low physical activity levels. A quarter of the participants were overweight and obese, while one in third had high total cholesterol levels. The qualitative studies also revealed that a lack of knowledge on chronic diseases was predominant amongst patients, nurses, CHWs and THPs. Training on chronic disease management was also lacking or insufficient and there was poor supervision of health facility operations by the district and provincial managers. The CHWs were not respected by nurses and their remuneration was not regularly received. There was poor relationship between THPs and clinic nurses due to lack of formal referral system. This was mainly due to the unavailability of a formal structure to represent the THPs in government.

The quality circles used the abovementioned findings as a basis for discussion of the specific needs in relation to capacities for chronic disease prevention and management in the Dikgale HDSS. The discussions were tailored around the ability to integrate determinants of health approach into programme planning (to address the root causes of chronic disease). Further discussions addressed the integration of health services to improve management and prevention of chronic non-communicable diseases. Model development followed three major steps, as follows:

- To identify inputs (resources), activities, outputs and outcomes in a form of logic framework to improve management of chronic NCDs;
- To identify the prerequisites needed to strengthen integrated, evidence-based chronic non-communicable disease management;
- The development of the integrated, evidence-based chronic non-communicable disease management model.

4.5.3.1 Logic framework for improvement of management and prevention of chronic non-communicable diseases

A framework, in the form of a logic model, was established from the results of the quality circle activities to systematically lay out the programme elements and path showing what can be done to improve management and prevention of chronic non-communicable diseases. The logic framework is presented in Figure 5. The main activities in the framework will focus on capacity building for health care providers, community screening and referral of chronic patients to clinics and referral of patients back to CHWs and THPs for monitoring in the community. The outputs, which should lead to the outcomes, are, trained health care providers, counselled community members, screened community members and referred patients. The outcome measures for these interventions would be improved quality of NCD management, increased access to NCD screening, increased knowledge about risk factors for NCDs and access to treatment and prevention strategies in the communities.

The intermediate outcomes, which will lead to the impact of the interventions, will be, a decrease in risk behaviour and increased access to NCD treatment. Decreased NCD risk factors, increased NCD incidences and decreased NCD morbidity and mortality will be assessed as the impact of the interventions. The interventions in the proposed framework can strengthen the development of an integrated, evidence-based chronic non-communicable disease management model, focusing on implementation and later evaluation. This framework will be used to organise thinking around model development; how to relate model activities and investment to expected results, which are improved chronic non-communicable disease management. The framework will also be used to set up performance indicators in the clinics; allocate responsibilities to all involved in chronic care and, finally, to communicate information on model implementation concisely and unambiguously.

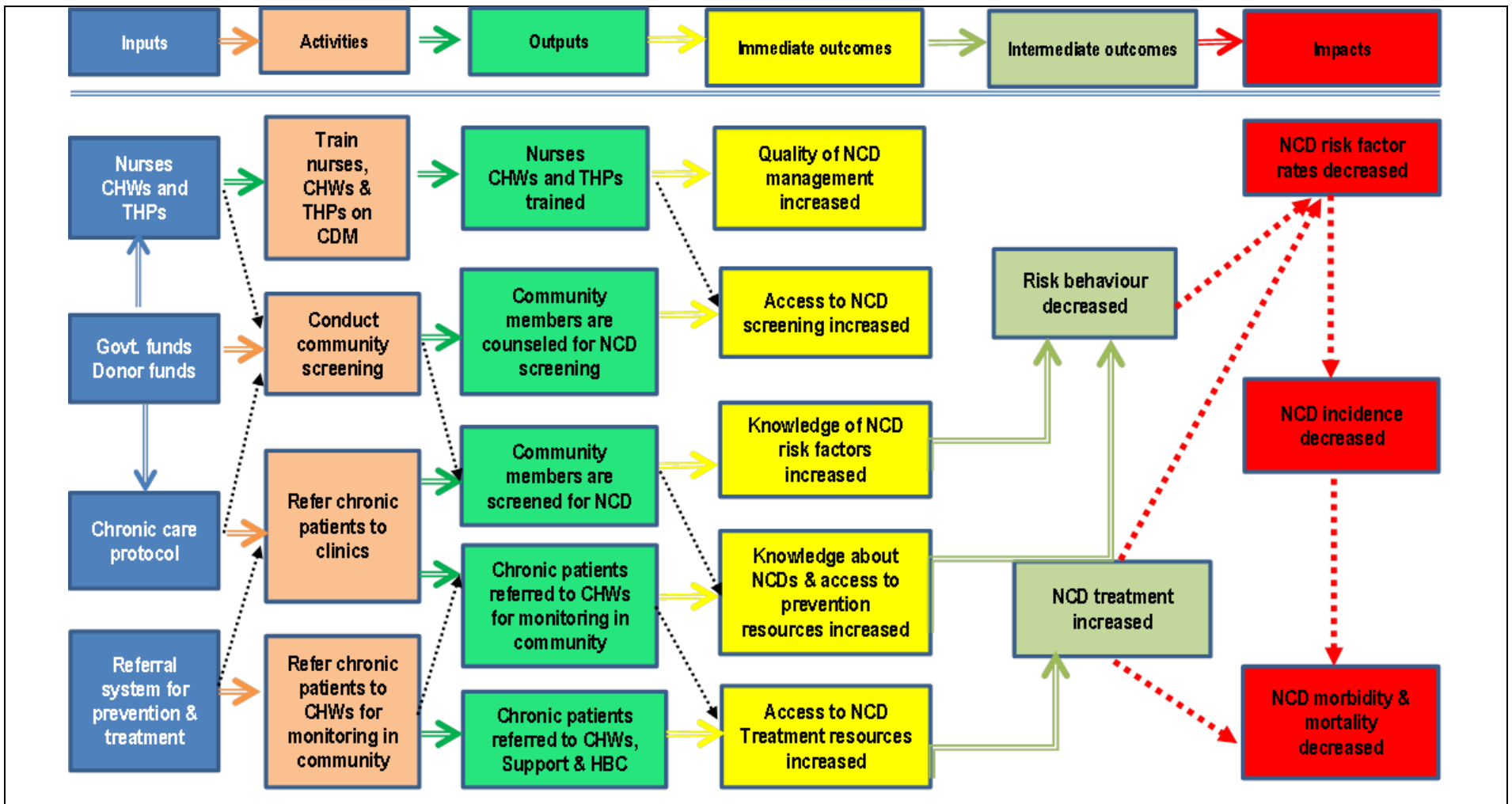


Figure 5: Logic Model to improve management and prevention of chronic non-communicable diseases

4.5.3.2 Inputs and activities to strengthen integrated, evidence-based chronic non-communicable disease management model in the Dikgale HDSS.

The discussions from the research team and executive management of the Limpopo Department of Health resulted in inputs and activities which are needed for the development and implementation of the interventions for improving chronic disease management. Looking at the current health system in the Limpopo Province, the team suggested that the interventions can optimally and equitably utilise the currently available health care resources to implement an integrated model, which can be culturally sensitive and appropriate to the population of the Dikgale HDSS . The inputs and activities agreed upon to guide the process involved in achieving improved chronic non-communicable disease management are outlined schematically in figure 6 as follows:

- There are prerequisites, which were identified from the qualitative results, which must be considered to enhance collaboration amongst health care practitioners, for example, addressing their attitudes. This can foster a working relationship amongst nurses, CHWs and THPs. The provision or availability of Standard Operation Procedures (SOPs) for health care practitioners was emphasised in order to standardise quality health care services by nurses, CHWs and THPs. Creation of a supportive environment for health care workers by the district and provincial offices was identified as necessary to enhance the environment for all employees in order to improve their productivity and morale.
- Readiness of health care practitioners can be improved by conducting training, which will impart knowledge and prepare health care workers for the workplace. Therefore, strengthening of the collaboration and integration of health care practitioners ability to serve the poor communities in the Dikgale HDSS must be emphasised.
- The activities addressing periodic community screening, targeting high risk groups and raising of awareness of common NCDs and their risk factors in the community were identified. Findings from the qualitative study show that awareness can be achieved through the medium of community radio stations, community dialogues and mass campaigns to reach more community members. Establishment of a surveillance system to monitor the occurrence of NCDs and their risk factors was also identified as an intervention needed in the health facilities.
- The involvement of the people themselves, both family and community members, was seen as a critical aspect which can be achieved through the establishment of a chronic non-communicable management and health promotion forum. This forum could collaborate with

community members to establish a network of chronic disease ambassadors whose task it will be to motivate patients through their health problems in the communities.

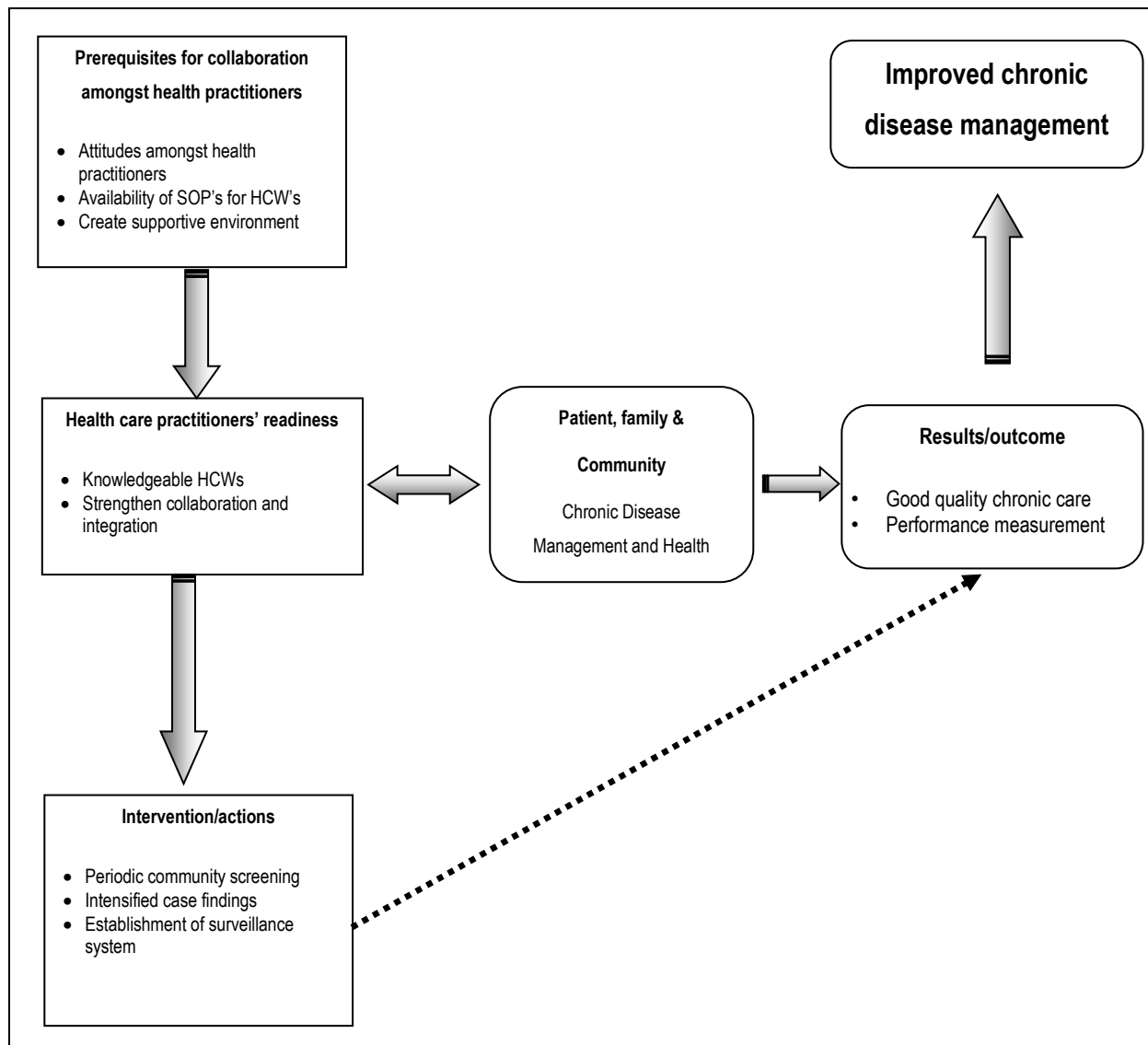


Figure 6: Prerequisites needed to strengthen an integrated, evidence-based chronic non-communicable disease management the Dikgale HDSS.

4.5.3.3 Integrated evidence-based chronic non-communicable disease management model in the Dikgale HDSS.

The logical framework (Figure 5), together with the activities and inputs (Figure 6) presented above, supports the development of an integrated chronic non-communicable disease management model (Figure 7, which was the main objective of this study. As this model was developed and proposed based on the findings from the study, it is evidence-based and focused on the local situation in the Dikgale HDSS. The framework was developed in an integrated or coordinated fashion with respect to service

delivery. This model describes four interacting system components, namely, health care providers, health care system, community partners and patients with their families.

The main feature of this model is the integration of services provided by nurses, CHWs and THPs. A well-established clinic information system is proposed in the model so that health care providers have access to better informed patient care. The health care system based on this model will be tasked to organise health care in the rural area to improve management and prevention of chronic illnesses. Support systems in a form of supervisory visits to clinics, provision of medical equipment and training of health care providers should be provided. Contribution from community partners in a form of better leadership to mobilise and coordinate resources for chronic care is emphasised in the model. This productive interaction will be supported by the district and provincial Health Departments through re-organisation of health services in order to give traditional leaders a role in leadership to improve community participation.

This study suggests that patients may be the ambassadors to inform other patients and will play a role in the motivation of other patients in the community through their health problems. Since the ambassadors will be those community members who suffer from chronic diseases, but have managed their chronic illness well in the past, it will be a good motivation for chronic patients to learn from the best practices of those who managed their conditions well in the past. The ambassadors will be tasked to encourage chronic patients to self-manage their conditions, together with the involvement of their family members and community partners at large. Informed patients, who will form part of the prepared and proactive team, will contribute to the functional and clinical outcomes in the community. This will eventually lead to improved health outcomes, reduced burden of chronic diseases and improved sustainability of the health system.

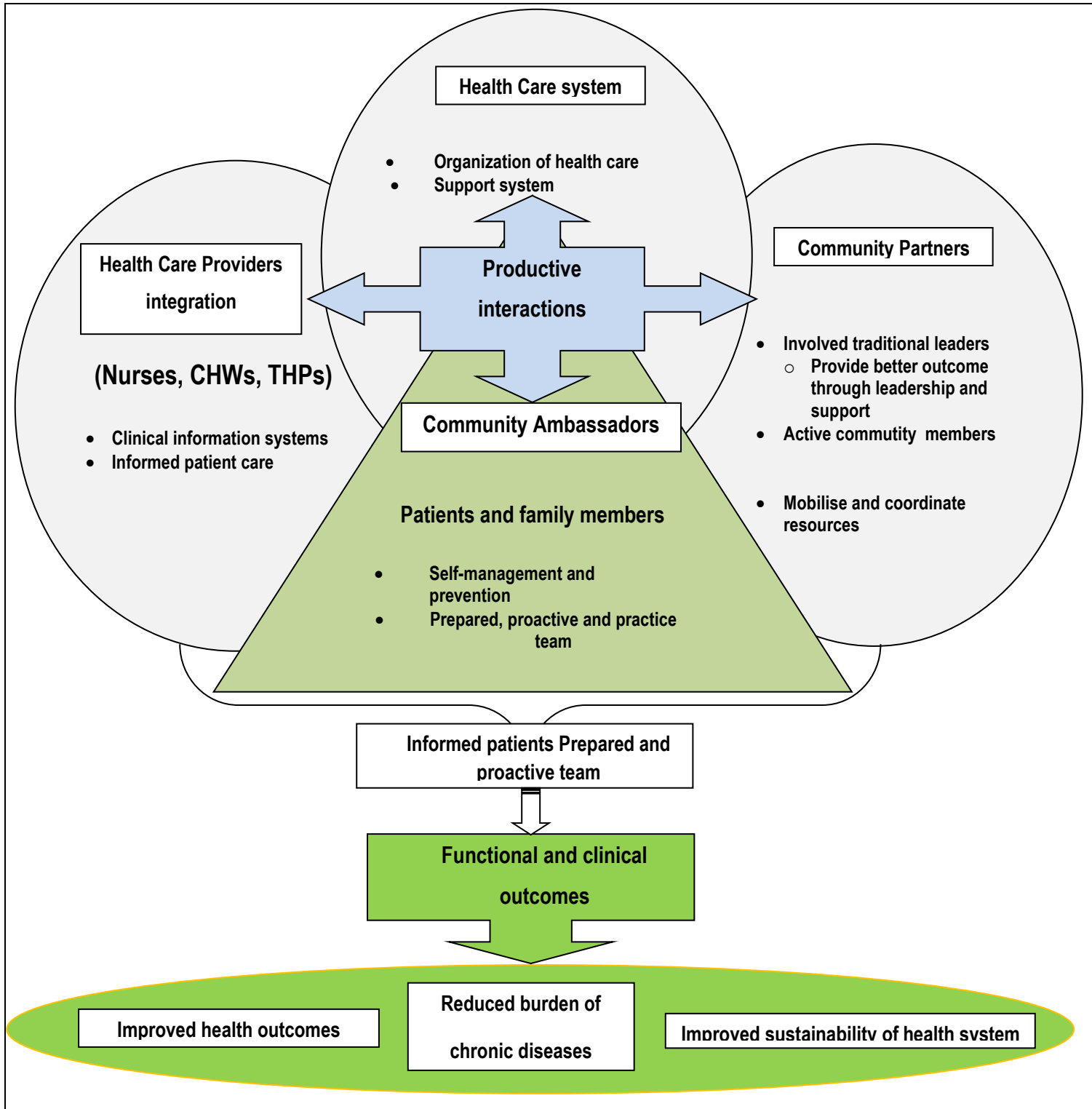


Figure 7: Integrated, evidence-based chronic non-communicable disease management model in the Dikgale HDSS

4.5.4 Discussion

An integrated multi-faceted approach to improving care of chronic conditions has been shown to lead to better outcomes (Siminerio et al., 2004). The integrated, evidence-based chronic non-communicable disease management model developed in the current study describes changes that are needed at primary health care facilities in the Dikgale HDSS. These changes are based on four interacting system components, namely, health care providers, health care system, community partners and patients with their families. These health system changes are supported by the concept of an Ideal Clinic introduced in South Africa as a means of moving the health system from a hospital-centric, curative system to preventive and promotive primary health care system that is cost effective and meets community needs (Moleko et al., 2014). This is also supported by the Chronic Care model developed by Wagner and colleagues, which comprises four components, namely, self-management support; delivery system design; decision support and clinical information systems (Epping-Jordan et al., 2004; Epping-Jordan et al., 2005). The clinical information system in the study area can be established using the available resources used to collect health information in the health facilities. This will require improvement on the current system for the information to reach the decision makers and people living with chronic disease, including their families, should have access to this information. The challenge which might be encountered in this rural area is the availability of necessary software and internet access for processing the gathered information in order to improve service delivery on chronic disease management. A compatible system will be developed to meet the infrastructure limitations in the rural health facilities of Dikgale HDSS.

An important difference in the current proposed integrated model is the integration of services from nurses, community health workers (CHWs) and traditional health practitioners (THPs). This addition to the model was due mainly to the fact that, in this rural area, health services are provided by nurses in the clinics and CHWs and THPs in the community. This study also supports the notion that patients may become the ambassadors used to inform other patients, as occurred in recent smoking cessation programmes (Laniado-Laborin, 2009), and who will also be involved in decision making (Concannon et al., 2012). Ensuring that the different expertise was found to form a multidisciplinary team, which used evidence from the field in developing the interventions, was one of the strengths of this study. The difficulties encountered in the study included how to combine the outcomes from many large group discussions with lots of priorities.

Implications for health care and further research

There are two gaps which must be closed in order to achieve proper control of chronic diseases, namely, the gap between effective intervention in research studies and what clinicians do in practice and the gap between what clinicians in their offices recommend to patients and what patients do with

those recommendations at home and in their communities (Sackett et al., 2000). To successfully close these gaps, we have discussed the proposed interventions with experts in chronic disease management, including clinicians and researchers, together with executive managers in the Department of Health in the Limpopo Province, as evidence collected from the health facilities in the study area. The public health implication of the study means that our interventions are oriented towards health promotion and prevention through a primary health care approach, in order to effectively respond to the complex social, cultural and behavioural issues associated with NCDs. Therefore, further research will be conducted in the study area on planned community intervention programmes, which are an important component of the strategy to help in the improvement of management of chronic diseases and the prevention of NCDs (Kengne et al., 2013). This future research will include a public health approach which is greatly influenced by community engagement on a variety of levels (Hil et al., 2011; Morrin et al., 2013), thus bringing about better relationships between community members and social groups, community health workers, traditional health practitioners and public health professionals, which are central to health promotion and prevention. Further studies are needed on how to engage stakeholders to assist with the development of guidelines and decision aids, comparing interventions and strategies at the front line of care, assessing findings, developing communication strategies and serving as ambassadors for high-integrity evidence (Concannon et al., 2012).

4.5.5 Conclusion

Based on information from the field, we developed a chronic disease model with four interacting system components, namely, health care providers, health care system, community partners and patients with their families. The developed model suggests the inclusion of essential elements that recognise the importance of community linkages and support from the health care system. This model has an additional aspect, the establishment of community ambassadors, in an effort to strengthen collaboration in order to improve the control and management of chronic non-communicable diseases.

CHAPTER 5: GENERAL DISCUSSION

5.1 Introduction

Healthcare and health services are undergoing a transformation, therefore, care coordination is an important aspect to be considered in order to achieve a high-quality, high-value, patient-centered health care system (Schultz and McDonald, 2014). To address the burden of chronic diseases in the Dikgale HDSS, effective interventions must be developed in a culturally competent manner to address the integration of health services provided by different health care practitioners (Mayosi et al., 2009).

5.2 Methodology

The research methodology for the whole study followed mixed methods methodology (Creswell et al., 2004; Tashakkori and Creswell, 2007) with an aim on integrating quantitative and qualitative data collection and analysis in a single study to develop an intervention program in a form of a model to improve management of chronic disease management in a rural area. The use of this mixed method methodology included the principle of making a decision on the priority or weight given to the quantitative and qualitative data collection and analysis in the study, the sequence of the data collection and analysis, and the stage/stages in the research process at which the quantitative and qualitative data are connected and the results are integrated (Ivankova et al., 2006). When used in combination, both quantitative and qualitative data yield a more complete analysis, and they complement each other as this brings the understanding of the strengths and weaknesses of quantitative and qualitative research methodologies.

Four social scientific methods which were used for data collection and each method targeted different sources of information and has implications for different aspects of the study unit of analysis. Our study was developmental in nature, because the first method was used sequentially to help inform the second and third methods. This was done in the form of sequential triangulation, because the model or interventions were developed as a phase, with results from the Phase 1 to Phase 3 essential for planning the model development.

As in other research studies, our study had ethical approval and a consent form was used to protect the human rights of the participants (Dresser, 1998). The quantitative part of the study used the well-known STEPS Instrument (Nawi et al., 2009), which has been widely used in many developing countries to assess the prevalence of risk factors for NCDs. The STATA statistical software version 12 for Windows (STATA Corporation, College Station, Texas) was used in all quantitative data analysis and data were coded and presented according to WHO guidelines (WHO, 2007). Our study used logistic regression

(Ismail and Anil, 2014) to determine which factors may or may not correlate with the incidence of the disease. The qualitative data was tape-recorded, coupled with detailed notes, which were taken simultaneously during the interviews, and transcriptions were done according to standard rules (MacLean et al., 2004). Finally a model was developed using a strategic process (Davidson and Elliott, 2001)

5.3 Prevalence of chronic non-communicable diseases risk factors

This is the first study to show the baseline data about the behavioural and biochemical risk factors for NCDs in the Dikgale HDSS using WHO STEPS approach. It is interesting to notice that an epidemiological transition is happening in this rural area, and that there is a high prevalence of risk factors for NCDs. Similar findings in relation to the prevalence of cigarette/pipe smoking were reported in a study conducted in the Mpumalanga Province by Thorogood et al., 2007. Our study has reported a lower prevalence of cigarette/pipe smoking than the South Africa national average in 1996 of 31% (Reddy et al., 1996). This may be due to the fact that this national study included both urban and rural areas and smoking is known to be more common in urban areas (Reddy et al., 1996). Our study found that the overall the prevalence of smoking and alcohol use was higher in men than women, which is similar findings from another study conducted in Vietnam (Pham et al., 2009). In our study, alcohol use was associated with older age, males, low education and being in second income quintile, which is consistent with other studies (Bich et al., 2009; Kaur et al., 2011).

It is well documented that the prevalence of smoking increases with age, and our study support this finding as it found that smoking was associated with increasing age, the male gender, low education, divorce, unemployment and low income. This concurs with other studies conducted in nine rural INDEPTH Health and Demographic Surveillance Systems in Asia (Ashraf et al., 2009). The present study shows that the median age at initiation of smoking was 19 years, which is consistent with the study conducted by Sugathan et al., in Kerala, India (Sugathan et al., 2008) and this raises concerns about secondary tobacco exposure and the possible influence of parental smoking on youth. The current study revealed that there is higher prevalence in the use of smokeless tobacco products amongst women than amongst men, and this was associated with increasing age, females, low education, widowers, unemployment and low income. These findings are consistent with a study conducted in a South Asian population (Kakde et al., 2012). Our study found that the prevalence of inadequate fruit and vegetable consumption, defined as less than five servings a day, was high, this was also been found in a study in South Africa conducted in 2009, which found that 80% of adults aged ≥ 15 years eat fewer fruit and vegetable than recommended (Hall et al., 2009). A striking finding from our study is the fact that there was no gender difference in the average consumption of fruits and vegetables, which differs from a study conducted in rural adult populations in INDEPTH HDSS sites in

Asia (Kanungasukkasem et al., 2009). From a public health point of view, a high consumption of fruit and vegetable reduces the risk of heart disease and blood pressure (BP); and some forms of tumour (Bich et al., 2009). This means that the people in the Dikgale HDSS are at high risk of developing cardiovascular disease.

Women in the current study had a high percentage of low physical activity, which concurs with findings from the World Health Survey 2003, which showed that women were more physically inactive than men in South Africa (Lambert and Kolbe-Alexander, 2006). Another study from South Africa showed that there are high levels of physical inactivity, with 48% of adult men and 63% of adult women categorised as inactive in South Africa (Bradshaw, 2001). Similar findings are reported from studies conducted elsewhere (Mehan et al., 2006; Anand et al., 2007; Ng et al., 2009). The current study showed that none of the participants had been involved in high physical activity at a level defined in the WHO recommendations, which shows that this rural area lacks recreational facilities for physical activities. Physical activity is widely recognised as a means of primary prevention of chronic diseases and is important in patients' treatment and rehabilitation. Moreover, physical activity has beneficial effects on an individual's health and well-being. Despite the benefits of regular physical activity, the percentage of physically inactive adults in the world is high (Anand et al., 2007). Physical inactivity is recognised as an independent coronary artery disease risk factor and it is one of six major cardiovascular risk factors. Being physically active significantly reduces the risk of obesity (Cook, 2012b).

There might be greater under-reporting of physical activity behavior in rural communities (Cook, 2012a; Hansen et al., 2012) as physical activity epidemiology has been based on self-report methods, which is known to produce contradictory evidence when compared to measurements based on objective methods (Cook et al., 2012a). Therefore, the use of objective measures of physical activity, in addition to, or in place of, subjective or self-report measures of physical activity, should be promoted in physical activity epidemiology research (Cook et al., 2012a; Hansen et al., 2012). A study by Cook et al., reported that rural African women accumulate in excess of 10 000 steps per day as a result of greater involvement in subsistence or lifestyle activities, such as housework, yard work and walking for transport (Cook et al., 2012b). Therefore, objective measures of physical activity could assist in the quantification of free-living physical activity, considering the inherent inaccuracy and insensitivity of self-report physical activity measures, as light-to-moderate intensity physical activity predominates in rural areas (Hansen et al., 2012; Cook et al., 2012b).

The current study shows a hypertension prevalence of 38.0%, with no gender difference, which is higher than the 29.2% prevalence found in a previous study in the Dikgale HDSS (Alberts et al., 2005). Our study findings are contrary to the findings of a study conducted in Vietnam (Pham et al., 2009), which

found that more men than women were hypertensive. Lower education was found to be associated with hypertension in the present study, which had also been observed in a study conducted in rural Vietnam (Minh et al., 2005). Obesity is a growing health problem globally (Kaur et al., 2011) and is considered a new epidemic that impacts on both developed and developing countries (Rodríguez-Oliveros et al., 2011). In the current study a high prevalence of overweight and obesity among females was observed, which is consistent with findings from a study in a rural population in Tamil Nadu, India (Kaur et al., 2011). Furthermore, obesity and overweight are high in the age groups 15-34 years, a situation which has been found elsewhere in South Africa (Goedecke et al., 2006). A similar trend was observed in northern India (Kaur et al., 2011) and in rural Jordan (Al-Nsour et al., 2012). Obesity was found to be associated with hypertension, high fasting blood glucose, low HDL cholesterol and raised triglyceride in the current study and this concurs with other studies (Bradshaw et al., 2010, Thankappan et al., 2010). Weight gains, coupled with abnormal BMI, are major risk factors for diabetes and studies have indicated that diabetes prevalence is foreshadowed by changes in population level BMI (Al-Nsour et al., 2012). Women had higher odds of overweight and obesity than men, which is also similar to a study conducted in Kerala, India (Thankappan et al., 2010). Nevertheless, the high prevalence of overweight and obesity among the people in this rural population is disturbing. This is supported by Zhou et al., 2012, who found that, in South Africa, overweight and obesity are prevalent among almost all population and age groups, especially in the rural areas (Zhou et al., 2012).

The prevalence of biochemical risk factors, such as high fasting blood glucose and low HDL-C was found to be high in our study. High fasting blood glucose was generally associated with increasing age and low fruit and vegetable intake, which is not consistent with a study conducted by Bradshaw et al., in South Africa (Bradshaw et al., 2010) or with a study conducted in the U.S.A (Cowie et al., 2006). The current study findings show that the prevalence of high fasting blood glucose was higher in females than in males. This is in contrary to the findings of a study conducted in the U.S.A (Cowie et al., 2006), which showed that the prevalence was significantly higher in men than in women in the total population ($P < 0.001$). High fasting blood glucose was associated with older age, low education and employment in the present study. Males had a lower prevalence of high cholesterol levels than females in the current study, which is higher than in the results of a study conducted in Saudi Arabia (Al-Nuaim et al., 1996). In the current study, high cholesterol levels were significantly associated with older age, low education, people who were never married and who were unemployed. It is critical to control the total cholesterol levels as the abnormal cholesterol levels are major risk factors for coronary heart disease (Venkitachalam et al., 2012).

The present study shows that the prevalence of low HDL-C is higher in women (57%) than in men (23%). This is in agreement with a study in rural KwaZulu-Natal (Motala et al., 2011), where women had

a higher (65%) prevalence of low HDL-C than did men (29%). The prevalence found in our study is, however, different to that reported by a similar study in the same area by Alberts et al., and the main reason for the difference maybe that the Alberts et al., study involved participants aged 30 years and above, while this study included participants 15 years and above. The present study reports an overall prevalence of 45%, which is higher than that reported by Thorogood et al., 2007 in a rural population of Mpumalanga. Hypertriglyceridemia was prevalent in approximately 24.8% of the sample population, as compared to the findings from studies conducted in Angola (10.6%) and Nigeria (15.0%). The prevalence of high triglyceride levels in African-American men and women was 21.0 and 14.0%, respectively (Capingana et al., 2013). In the current study, the prevalence was similar amongst men and women.

In conclusion, there is a need to consider inputs into health policy so that chronic NCDs risk factors can be prevented, in order to reduce the incidence of NCDs. This can be achieved only if the South African Government recognises the impact of NCDs on public health and develops a health policy which clearly prioritises the promotion of healthy lifestyles and healthy environments and the provision of health and nutrition services, mainly in rural areas.

5.4 The perceptions and perspectives of chronic disease patients and health care providers on chronic disease management

The exploration of the experiences, challenges, barriers to and facilitators of chronic disease management from the patients' and nurses' perspective was accomplished by using focus group discussions. Generally, our results show that, despite the different conditions of chronic patients and positions of nurses in the healthcare system, they mentioned similar challenges with regard to knowledge, expectations, experiences, barriers and needs of CDM in the Dikgale HDSS.

The current study findings concur with research findings about poor knowledge of the risk factors for NCDs such as diabetes, hypertension and stroke (de-Graft et al., 2010). The current study showed that chronic disease patients lack knowledge on what causes chronic diseases, which concurs with a study in South Africa, which found that people living with chronic diseases have poor knowledge about causes and management of chronic diseases (Kagee et al., 2007). The chronic diseases are mainly attributed to witchcraft, mainly because of poor knowledge, and this leads to problems, including delays in treatment (de-Graft et al., 2010).

The current study showed that chronic disease patients have first contact with health care workers at primary health care level in the study area, which is similar to findings from a study conducted in Australia (Jordan et al., 2008). The patient's encounter with health care workers provides an opportunity

to start information exchange and successful self-management practices. However, the current study showed that nurses often do not have the resources, such as quality equipment, required medication and promotional materials which, could be used to inform patients in self-management. The lack of supply of medications to the health facilities on a continuous basis prevents proper management of chronic diseases (Beran and Yudkin, 2006).

The results from the current study show that nurses are not trained in the management of chronic diseases, which is also highlighted in other studies (Epping-Jordan et al., 2004, de-Graft et al., 2010). Lack of supervision and poor dissemination of guidelines were found to be contributing factors to lack of knowledge by nurses in the clinics within the study area. The National Department of Health in South Africa has published guidelines to be used for the management and control of non-communicable diseases, but that the major barrier in the implementation of the guidelines has been insufficient dissemination of information and lack of monitoring (Mayosi et al., 2009).

The current study showed that patients would like to receive more information on the management of their condition and how to prevent complications. Nurses must ensure that they include an opportunity to discuss side effects of medications during consultations with patients (Stenne et al., 2011). The study findings also showed that there is poor referral of patients from traditional healers to the clinics, and that there is no integration of health services with traditional health practitioners. A the study conducted in South Africa by Mngqundaniso and Peltzer (2008) indicated that nurses expressed a low regard for traditional healing, meaning they do not respect THPs and, therefore, nurses practiced low rates of referrals to traditional healers. Referral of patients from traditional healers to the clinics was only done in the patient's interest and when patients requested to be referred to the clinics (Mngqundaniso and Peltzer, 2008). Although there are some concerns, the potential of involving traditional healers in chronic disease management deserves further consideration.

5.5 Addressing chronic non-communicable diseases through community health workers and traditional health practitioners

The current study revealed that CHWs often do general health promotion activities, such as educating the community members, including emphasis on treatment adherence. A well-planned training programme is a critical aspect in preparing health care workers for effective service delivery (O'Brien et al., 2009). Our study findings showed that the CHWs had a wide variation in training, which is concurrent with other studies (Kash et al., 2007; Petersen et al., 2014a). The training was generally once-off training, with little in-service training, refresher training or course updates taking place. CHWs reported that their training was mainly on HIV, TB and child health diseases. The current study showed that very few CHWs had training on hypertension and diabetes, while this was not the case in a study

conducted in Brazil, where hypertension; AIDS and diabetes were included in the training programmes (Pinto et al., 2012). The findings from the current study revealed that support and supervision of community health workers in routine care is generally poor. Studies by Tulenko et al., 2013, and Petersen et al., 2014a indicated that supervision and support for CHWs at the level of programme implementation need urgent attention. Therefore, this needs to be strengthened in order to improve the accountability of CHW programmes to the district and community governance structures for health and development (Tulenko et al., 2013).

Some CHWs felt unappreciated or unaccepted by the community members and by nurses from the clinics, which is similar to the findings from a study by Petersen et al., 2014b. The current study revealed that poor and inconsistent remuneration of the CHWs were prevalent amongst all the CHWs, which was also found in other studies in South Africa (Peltzer and Davids et al., 2011; Black et al., 2011). This was reported to be demoralising for CHWs, impacting negatively on their work motivation, leading to a poor work ethic, added stress and a negative impact on service provision.

CHWs in our study reported environmental challenges that hinder their ability to deliver services to the community, such as lack of resources, the distance to be covered to reach the patients as they service hard-to-reach communities. Similar findings were reported in study conducted in Brazil (Pinto et al., 2012) where CHWs identified lack of resources and hard-to-reach patients as critical challenges in their work. In an effort to strengthen collaboration to improve the control and management of chronic non-communicable diseases, the managers interviewed in our study revealed that the Department of Health in South Africa intends creating and implementing ambassador programme for chronic conditions. A study in South Asia reported the successful use of ambassadors (Blair, 2012) to motivate patients to adhere and cope with NCDs. In the latter study the ambassadors used the extraordinary social positioning of the CHW role hybridity to transform clients' deadlocked attempts to access services into multiple, navigable avenues of communication (Black et al., 2011).

The traditional health practitioners interviewed in our study mentioned that patients see no conflict in seeking medical help from both Western health system (clinics) and traditional African healing. This was mainly because nurses diagnose and treat the pathology, while traditional healers establish what is wrong with the body–mind complex and, importantly, who or what made the person ill, as a social function in trying not only to treat the symptoms. This has been explained in detail in a review for traditional health practitioners in South Africa (Gessler et al., 1995; Peltzer 2009) and THPs in rural areas can undoubtedly contribute positively to the health of the population.

Interviews with traditional health practitioners from the current study revealed that there are barriers preventing them from taking part in health service delivery, in collaboration with the nurses, for example, cultural insensitivity from the nurses (disrespect). This has also been reported from a study conducted in Ghana (Gessler et al., 1995). In the current study, the THPs mentioned that they protect their indigenous knowledge and, therefore, they are unable to share what they do to the patients with anyone else. Similar to a study in Ghana, THPs reported that they get blamed if patients come to the hospital later in the course of an illness, after visiting them. The hospital staffs tend to blame interventions made by traditional healers for the worsening condition of the patients, or even a patient's death (Gessler et al., 1995).

THPs in the current study indicated that they share the goal of improving health with the nurses, which implies that they should work together. The main challenge that THPs mentioned during the interviews was the unavailability of a formal structure to represent them. The World Health Organization has reported that there were healer organisations in over 20 African countries (McMillen, 2004). This means that there is a need for establishing a formal structure that will represent the THPs in the Dikgale HDSS, working together with government and the health care system.

5.6 Barriers and facilitators for improving management of chronic non-communicable diseases at primary healthcare level in a rural area of Limpopo Province, South Africa.

Our study showed several barriers to and facilitators of chronic disease management which, if they can be addressed, will facilitate progress in the Dikgale HDSS in relation to the control, prevention and management of chronic NCDs. Lack of training for nurses and lack of feedback by nurses, who attended workshops, was found to be a barrier. There are sets of skills which can be acquired through training, such as motivational skills, understanding patients' beliefs, and values, including willingness to address societal influences on health care, to improve health promotion and preventive care attitudes (Maizes et al., 2009, Aminoroaia et al., 2014).

Healthcare information systems act as facilitators by having an effect and impact on health care procedures, work practices and patient treatment outcomes [Mäenpää et al., 2009]. Therefore, it is critical that the health system in the Limpopo Province consider the introduction of electronic personal records at primary health care clinics, so that patients can have easy access to their health information (Green et al., 2006). In addition to health information, door-to-door campaigns and community meetings at traditional council meetings should be encouraged in rural areas to strengthen community prevention programmes and provide community-based education to local people.

Proper utilisation of clinical guidelines by health care workers improves quality of care (Legido-Quigley et al., 2012). It is good to notice that clinical guidelines were available in the clinics involved the current study to guide day-to-day practices. The main issue to be addressed in the current study is to make available sufficient human resources, such as nursing staff, lay counsellors (Daviaud and Chopra, 2008) and pharmacists, to serve the disadvantaged communities. In addition to the human resource, the managers in the current study advocates for the establishment of community ambassadors (March et al., 2015). This will be done with the support of the Department of Health, to motivate community members in the control and prevention of chronic diseases. Some resources were found to be lacking, while others were found to be non-functional, which makes the current health system in the Limpopo Province to be unable to provide NCD services in primary health care.

5.7 Development of an integrated evidence-based management model for chronic non-communicable diseases and their risk factors, in a rural area of Limpopo Province, South Africa.

An integrated, multi-faceted approach to improving care of chronic conditions has been shown to result in better outcomes (Siminerio et al., 2004). The integrated, evidence-based chronic non-communicable disease management model developed in the current study describes changes that are needed at primary health care facilities in a rural area. The model is based on four interacting system components, namely, health care providers, health care system, community partners and patients with their families. These health system changes are supported by the concept of an Ideal Clinic, introduced in South Africa in order for the health system to move from a hospital-centric, curative system to a preventive and promotive primary health care system that is cost-effective and meets community needs. This is also supported by the Chronic Care model developed by Wagner and colleagues, which comprises four components, namely, self-management support; delivery system design; decision support, and clinical information systems (Epping-Jordan et al., 2005). An important difference in the current proposed integrated model is the integration of services rendered by nurses, community health workers (CHWs) and traditional health practitioners (THPs). This addition to the model was due mainly to the fact that, in this rural area, health services are provided by nurses in the clinics and CHWs and THPs in the community.

The developed model suggests essential elements that recognise the importance of community linkages and support from the health care system. This is supported by a study by Solberg et al., which recommends delivery system redesign, effective clinical information systems, access to decision support, and good self-management support for patients (Solberg et al., 2006). Improving the health of people with chronic illness requires transforming a system that is essentially reactive - responding mainly when a person is sick - to one that is proactive and focused on keeping a person as healthy as possible (Wagner et al., 1996a). This has not been explored in the South African context and requires

not only determining what care is needed, but also defining the roles and tasks for ensuring the patient gets care, using structured, planned interactions. As mentioned in other studies, it requires making follow-up a part of standard procedure, so that patients are not left on their own once they leave the health care facilities (Wagner et al., 1996b, Calkins et al., 1999). Patients with more complex chronic conditions may need more intensive management (care or case management) for a period of time to optimise clinic care and self-management. Health literacy and cultural sensitivity are two important emerging concepts in health care. Providers are increasingly being called upon to respond effectively to the diverse cultural and linguistic needs of patients (Wagner et al., 1996a; Wagner et al., 1996b; Calkins et al., 1999; McDonald et al., 2007; Hughes et al., 2012). The supportive environment in the health care system, as suggested by the current model, can be adapted to achieve the involvement of the traditional leaders and active community participation to mobilise resources.

The current model has an additional aspect, namely, the establishment of the community ambassadors, in an effort to strengthen collaboration to improve the control and management of chronic non-communicable diseases. This is supported by a study in South Asia which reported the use of ambassadors (Blair, 2012) to motivate patients to adhere to treatment regimes and to cope with NCDs. As the ambassadors will be drawn from the same community, they will use the services of the CHWs to encourage patients adhere to treatment and behavioural changes in order to reduce risk factors for NCDs. This will lead to the community having informed and motivated patients taking part in the self-management of their conditions, thus leading to improved health outcomes, including reduced burden of chronic non-communicable diseases, and improved sustainability of the health system in a rural area.

To achieve effective, equitable and efficient health services systems that improve the health of rural populations, political will is needed to support the implementation of the proposed interventions in order to improve management of NCDs. There is a need to channel efforts to improve the measurement of a small set of priority indicators in order to enhance political visibility, while using limited resources in the most effective manner. Political and financial support should be provided to tackle the growing challenge of chronic diseases in rural areas.

CHAPTER 6: RECOMMENDATIONS

6.1 Introduction

For the proposed integrated, evidence-based chronic non-communicable management model to be functional, there are two sets of recommended interventions that should be implemented in a rural area of the Dikgala HDSS. These interventions are targeted at two different levels, namely, the health facility level and community level, to improve management of chronic non-communicable diseases in the Dikgale HDSS.

6.1.1 Health facility level interventions

Recommended interventions at health facility level include exploring the supply of chronic medication for longer periods by piloting the delivery of medication to chronic patients for a longer period (3 months). In addition, planning and conducting essential training programmes to capacitate the nurses, community health workers and traditional health practitioners to deliver health services that are appropriate to improve management of NCDs need to be explored.

6.1.2 Community level interventions

The recommended interventions at community level, derived from this study include exploring the utilisation of chronic disease community ambassadors to strengthen collaboration between patients, CHWs and nurses in order to improve chronic disease management in the Dikgale HDSS. It is also recommended that there is a need to explore an intervention programme which can be used to send reminders on patients' mobile phones, to improve follow-up on treatment adherence.

6.2. Contribution of the study and implications for health care

The current study in the Dikgale HDSS provides baseline data on risk factors for NCDs, and these epidemiological data will be of value to health policy makers in developing and implementing interventions for chronic disease risk factor prevention and control (Ng et al., 2009) in the Limpopo Province. This study suggests that NCD risk factors are common among adults in rural areas of the Limpopo Province and, therefore, we propose that primary health care services increasingly accommodate screening for chronic NCDs and their risk factors at community level. Addressing the cultural principles of this rural area and implementing the developed integrated, evidence-based chronic disease management model as a pilot into these clinics in the Dikgale HDSS can serve as a contribution to the improvement of chronic diseases in the area.

The gaps between effective interventions in research studies and what clinicians do in practice, and between what clinicians in their offices recommend to patients and what patients do at home and in their communities (Hill et al., 2011) should be closed. These gaps should be closed by changing the

behavioural and cultural practices which predispose people acquiring chronic NCDs. Further research has to be conducted to establish how to successfully close these gaps. Further public health implications from this study include the fact that our interventions are oriented towards health promotion and prevention, through a primary health care approach, in order to effectively respond to the complex social, cultural and behavioural issues associated with NCDs. Therefore, further research should be conducted in the study area on planned community intervention programmes, which are an important component of the strategy to help solve issues around the prevention of NCDs (Kengne et al., 2013). This could include a public health approach, which is greatly shaped by community engagement on a variety of levels (Morris et al., 2013; West, 2014) and, thus, bringing about better relationships between community members and social groups, community health workers, traditional health practitioners and public health professionals, all of whom are at the core of health promotion and prevention. Lastly, further experimentation is needed on how to engage stakeholders in developing guidelines and decision making, comparing interventions and strategies at the front lines of care, assessing findings, developing communication strategies and how to establish an ambassador's corps for high-integrity evidence.

6.3 Limitations of the study

Our study findings need to be interpreted cautiously as the Dikgale HDSS is developed as a sub-district level surveillance system in a rural setting of Capricorn District of the Limpopo Province in South Africa. It is not possible, therefore, to extrapolate our findings to a larger population at a provincial or country level. However, findings in our study are in line with most of the findings from other sub-national or national surveys from other parts of the world.

The survey was cross-sectional and some of the sampled participants for STEPwise survey had migrated from the study area and were, therefore, not part of the study. Variables included self-reporting, which may have resulted in self-report bias and we did not compute measures of agreement between self-reported conditions and those obtained from actual measurements. Seasonally variable behaviors, such as dietary intake, may not be representative and, therefore, cause and effect cannot be determined for associations between BMI and selected health conditions.

6.4 Representativeness of the study results

A total of 2 981 participants were selected to take part in the completion of the STEPwise approach to chronic disease risk factor surveillance (STEPS) questionnaire. Our study had a high proportion of non-respondents, mainly because the majority of the participants who work, leave for work early in the morning and return late in the evenings. These participants were, therefore, not available to be consulted at home, even after repeated visits, while others had migrated out of the study area. As some participants were leaving their households early in the morning to work, they did not provide blood

samples for biomedical measurements after fasting. This, therefore, resulted in a response rate of 47.2%. It was not, therefore, possible to extrapolate our findings to a larger population at a provincial or country level. However, findings in our study are in line with most of the findings from other sub-national or national surveys from other parts of the world.

Competing interests

I hereby declare that there are no competing interests in my pursuance of this study and that there are also no financial gains, as my interests are solely academic, aimed at contributing to an improvement in chronic disease management in rural areas of the Limpopo Province.

6.5 Concluding remarks

Our study reveals that an epidemiological transition is occurring in the Dikgale HDSS of the Capricorn District in the Limpopo Province of South Africa. The rural area already has a high burden of risk factors for non-communicable diseases, especially smoking, alcohol consumption, low fruit and vegetable intake, physical inactivity, overweight and obesity, hypertension and dyslipidaemia. The substantial increase in hypertension in this rural population signifies an inadequate diagnosis and poor control of raised blood pressure (BP). Therefore, health interventions aimed at controlling risk factors at population level should be planned and implemented, in collaboration with the Limpopo Provincial Government, with the aim of slowing the progress of the coming epidemic in non-communicable diseases. This highlights the importance of reaching out to the poor rural communities with messages regarding diet, smoking, alcohol use and general health.

Health care workers (nurses), chronic disease patients, community health workers and traditional healers lack knowledge on the management of chronic diseases. In the context of a shift to integrated management of chronic non-communicable in rural South African settings, it would be appropriate for both CHWs and THPs to be utilised to fill the gap in implementing interventions to promote behavioural change for better control of all chronic NCDs. Lastly there is a need to establish a link with traditional healers and integrate their services in order to facilitate early detection and management of chronic diseases in the community, with the support from the traditional authority or community leaders.

There is a shortage of medication and some of the medical equipments used are old, while other equipments are not functional. The main conclusion drawn from the findings of this study can be summarised as the health system currently has inadequate capacity for the effective provision of NCD services in primary health care at the Dikgale HDSS in most aspects. Health services provided by the three health facilities mainly focused on diagnoses and treatment of diseases, whereas prevention and health promotion were not sufficiently offered and delivered to the target populations. Therefore,

concerted action is needed to strengthen the delivery of medications to the clinics and to improve the chronic disease knowledge amongst both nurses and patients, by conducting in-service training and workshops.

The main aim of this study was to develop an integrated, evidence-based chronic disease management model and, therefore, the evidence that emerged from the study indicate the need for organisational interventions in a form of integrating the services offered by nurses, CHWs, THPs and the community members, to optimise the effective use of available resources in this rural area. This entails the provision of standardised training to all health care providers, clearly defining their role and scope of practice and the formalisation of the working relationships. The current study addresses the issue of the disintegration of health practitioners to improve prevention and management of chronic diseases, an increase of which has increased demand on health services at both the primary care and at the hospital level. Therefore, effective intervention strategies for implementation and adaptation within and across cultural contexts that facilitate change, should be appropriately identified to prevent and control chronic diseases in rural areas. In conclusion, the findings from the current study add value to the greatest opportunity for integration, which will focus much on chronic diseases, as they require patients to come into contact with health workers in several times. The political leadership, under the guidance of the Member of Executive Councils for both the Department of Health and the Department of Corporate Governance, Human Settlements and Traditional Affairs (CoGHSTA) should engage with communities and traditional health practitioners to strengthen service integration. These integrated approaches could create immediate synergies in service delivery by involving all health care providers, such as nurses, CHWs and THPs, in the context of the socio-cultural issues within this rural area of the Limpopo Province. Therefore, at primary health care level, a single point of entry for chronic disease prevention and management programmes should be developed in this rural area, by properly assessing the pathway tied to care planning and service delivery.

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Appendix A: Ethical clearance from Medunsa Research Ethics Committee



MEDUNSA RESEARCH & ETHICS COMMITTEE

CLEARANCE CERTIFICATE

MEETING: 01/2013
PROJECT NUMBER: MREC/HS/05/2013: PG

PROJECT:

Title: Development of an integrated evidence-based chronic disease management model in a rural area of Limpopo Province, South Africa

Researcher: Mr E Maimela
Supervisor: Prof M Alberts
Dr SEP Modjadji
Co-supervisor: Prof PJ van Geertruyden
Prof H Meulemans
Department: Medical Sciences, Public Health & Health Promotion
School: Health Sciences
Degree: PhD Medical Sciences

DECISION OF THE COMMITTEE:

MREC approved the project.

DATE: 07 February 2013


PROF GA OGUNBANJO
CHAIRPERSON MREC

The Medunsa Research Ethics Committee (MREC) for Health Research is registered with the US Department of Health and Human Services as an International Organisation (IORG0004319), as an Institutional Review Board (IRB00005122), and functions under a Federal Wide Assurance (FWA00009419)
Expiry date: 11 October 2016

Note:

- i) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.
- ii) The budget for the research will be considered separately from the protocol. PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.



Appendix B: Request letter to Limpopo Department of Health for permission to conduct the study

Mr E Maimela

Department of Medical Sciences
University of Limpopo
Turloop Campus, 0727

Head of Department: Department of Health
Mrs D Mafubedu
Att: Research Manager
Mr D Selamolela
Office 157
Private Bag X 9302
Polokwane, 0700

This correspondence is with regard to requesting permission to conduct a research study in Limpopo Province. The research is done to fulfil requirements for a Doctor of Philosophy (PhD) in Medical Science with University of Limpopo Turloop campus in collaboration with Antwerp University in Belgium. The title, aim and objectives of my research study are as follows:

- (i) **Title: Development of an integrated, evidence-based chronic disease management model, in a rural area of Limpopo Province, South Africa.**
- (ii) **Purpose of the study:**

The main purpose of this study is to develop an intervention programme for the management and control of chronic diseases by introducing an integrated, evidence-based chronic disease management model in Primary Health Care facilities. This will help to establish the mechanism and the processes of redesigning the primary health care system with the clear purpose of reducing morbidity and mortality due to chronic illness.

- (iii) **Research question:**
The overall research question to be answered in this study will be “What is the process for the development of an evidence-based integrated chronic disease model”?

- (iv) **Aim of the study:**
The main aim of this study is to develop an integrated, evidence-based chronic disease management model.

I Mr. E Maimela, working in the Department of Health as an Epidemiologist, would therefore request to have permission to access the health facilities around Dikgale HDSS, District and Provincial coordinators for Chronic Disease Management as per my approved protocol. Attached find the approved protocol with ethical clearance for the study

Yours Sincerely,

Mr. Eric Maimela
PhD Candidate

Appendix C: Permission from Limpopo Provincial Department of Health to conduct the study



LIMPOPO

PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH

Enquiries: Selamolela Donald

Ref:4/2/2

Maimela E
Public Health Programme
Department of Health
Polokwane
0700

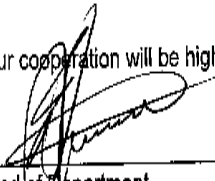
Greetings,

Re: Development of an integrated evidence-based chronic disease management model in a rural area of Limpopo Province, South Africa.

The above matter refers.

1. Permission to conduct the above mentioned study is hereby granted.
2. Kindly be informed that:-
 - Further arrangement should be made with the targeted institutions.
 - In the course of your study there should be no action that disrupts the services.
 - After completion of the study, a copy should be submitted to the Department to serve as a resource.
 - The researcher should be prepared to assist in the interpretation and implementation of the study recommendation where possible.

Your cooperation will be highly appreciated.


Head of Department


Date

Appendix D: Permission from Capricorn District Department of Health to conduct the study



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

**DEPARTMENT OF HEALTH AND SOCIAL DEVELOPMENT
CAPRICORN DISTRICT**

ENQ : MALEMA DMM
TEL : 015 290 9266
FROM : PRIMARY HEALTH CARE
DATE : 04 JULY 2013
TO : ASSISTANT MANAGER POLOKWANE MUNICIPALITY
Cc : OPERATIONAL MANAGERS DIKGALE LOCAL AREA
**SUBJECT : DEVELOPMENT OF AN INTERGRATED EVIDENCE-BASED
CHRONIC DISEASES MANAGEMENT MODEL IN A RURAL
AREA OF LIMPOPO PROVINCE**

The above matter bears reference

1. Permission has been granted to Mr Maimela E to conduct the above mentioned study.
2. Kindly be informed that :
 - In the course of your study there should be no action that disrupts the services.
 - After completion of the study, a copy should be submitted to the Department to serve as a resource.
 - The researcher should be prepared to assist in the interpretation and implementation of the study recommendation where possible.

Your cooperation will be highly appreciated.


.....
Senior Manager PHC

2013.07.04
.....
Date

Appendix E: WHO STEPS Instrument

WHO STEPS Instrument

<SOUTH AFRICA, LIMPOPO PROVINCE / DIKGALE HEALTH AND
DEMOGRAPHIC SURVEILLANCE SITE>
2011 PERMANENT

Survey Information / Tshedimošo ka ga dinyakišišo

Nomoro ya Motšekarolo

--	--	--	--	--

Location and Date / Lefelo le Letšatši		Response / Dikarabo	Code									
1	Cluster/Centre/Village ID / Nomoro ya Motse (go ya ka DHDS)		11									
2	Cluster/Centre/Village name / Leina la Motse		12									
3	Interviewer ID or Initials / Nomoro ya Mmotšišiši		13									
4	Date of completion of the instrument / Letšatši la go tlatsa form ye	<table border="0"> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>dd</td> <td>mm</td> <td>year</td> </tr> <tr> <td>Letšatši</td> <td>Kgwedi</td> <td>Ngwaga</td> </tr> </table>				dd	mm	year	Letšatši	Kgwedi	Ngwaga	14
dd	mm	year										
Letšatši	Kgwedi	Ngwaga										

Consent, Interview Language and Name / Tumelelo ya go tšea karolo, Leleme la poledišano, Le Leina		Response / Karabo	Code									
5	Consent has been read and obtained / Kwano ya go tšea karolo e badilwe ebile e hweditšwe	Ee 1 Aowa 2 Ge eba Aowa, GONA FETŠA POLEDIŠANO	15									
6	Interview Language [Insert Language] / Leleme la Poledišano	English / Sekgowa 1 Pedi / Sepedi 2	16									
7	Time of interview (24 hour clock) / Nako ya Poledišano (go ya ka di-iri tše masomepedinne tša letšatši)	<table border="0"> <tr> <td> </td> <td>:</td> <td> </td> </tr> <tr> <td>hrs</td> <td></td> <td>mins</td> </tr> <tr> <td>Di-Iri</td> <td></td> <td>Metsotso</td> </tr> </table>		:		hrs		mins	Di-Iri		Metsotso	17
	:											
hrs		mins										
Di-Iri		Metsotso										
8	Family Surname / Sefane		18									
9	First Name / Leina la Mathomo		19									
Additional Information that may be helpful / Tlaleletšo yeo e ka thušago												
10	Contact phone number where possible / Nomoro ya mogala ge ele gona		110									

Record and file identification information (I5 to I10) separately from the completed questionnaire.

Step 1 Demographic Information

Legato la pele Tshedimošo ya tša bodudi

TŠE BOHLOKWA: Tshedimošo ya tša bodulo																							
Potšišo		Karabo	Code																				
11	Sex (<i>Record Male / Female as observed</i>) / Bong (<i>Monna/ Mosadi</i>)	Male / Monna 1 ♀Female / Mosadi 2	C1																				
12	What is your date of birth? / Letšatši la Matswalo? <i>Don't Know 77 77 7777 /Ga ke tsebe 77 77 7777</i>	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"> _ _ </td> <td style="text-align: center;"> _ _ </td> <td style="text-align: center;"> _ _ _ _ </td> <td style="padding-left: 10px;"><i>If known, Go to C4 / Ge a tseba, E ya go C4</i></td> </tr> <tr> <td style="text-align: center;">dd</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">year</td> <td></td> </tr> <tr> <td style="text-align: center;">Letšatši</td> <td style="text-align: center;">Kgwedi</td> <td style="text-align: center;">Ngwaga</td> <td></td> </tr> </table>	_ _	_ _	_ _ _ _	<i>If known, Go to C4 / Ge a tseba, E ya go C4</i>	dd	mm	year		Letšatši	Kgwedi	Ngwaga		C2								
_ _	_ _	_ _ _ _	<i>If known, Go to C4 / Ge a tseba, E ya go C4</i>																				
dd	mm	year																					
Letšatši	Kgwedi	Ngwaga																					
EXPANDED: Demographic Information / TŠA TLALELETŠO: Tshedimošo ya tša bodulo																							
16	What is your <i>ethnic group</i> ? Naa o mohlobo mang (go ya ka polelo/ setso)	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right;">[Pedi]</td> <td style="text-align: right;">1</td> </tr> <tr> <td style="text-align: right;">[Tsonga]</td> <td style="text-align: right;">2</td> </tr> <tr> <td style="text-align: right;">[Venda]</td> <td style="text-align: right;">3</td> </tr> <tr> <td style="text-align: right;"><i>Other (Specify) / Ye nawe (hlalosa)</i></td> <td style="text-align: right;">4</td> </tr> <tr> <td style="text-align: right;">Refused / Gake dumele go araba</td> <td style="text-align: right;">88</td> </tr> </table>	[Pedi]	1	[Tsonga]	2	[Venda]	3	<i>Other (Specify) / Ye nawe (hlalosa)</i>	4	Refused / Gake dumele go araba	88	C6										
[Pedi]	1																						
[Tsonga]	2																						
[Venda]	3																						
<i>Other (Specify) / Ye nawe (hlalosa)</i>	4																						
Refused / Gake dumele go araba	88																						
		<i>Other (Specify) / Ye ngwe (hlalosa)</i> _ _ _ _	C6other																				
17	What is your marital status ? / Maemo a gago a lenyalo ke eng?	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right;">Never married / Ga se ka nyala/nyalwa</td> <td style="text-align: right;">1</td> </tr> <tr> <td style="text-align: right;">Currently married / Ke nyetše/nyetšwe</td> <td style="text-align: right;">2</td> </tr> <tr> <td style="text-align: right;">Separated / Re kgaogane, fela esego ka se molao</td> <td style="text-align: right;">3</td> </tr> <tr> <td style="text-align: right;">Divorced / Re kgaogane ka semolao</td> <td style="text-align: right;">4</td> </tr> <tr> <td style="text-align: right;">Widowed / Ke hlokofaletswe ke molekane</td> <td style="text-align: right;">5</td> </tr> <tr> <td style="text-align: right;">Cohabiting / Re dudisane re sa nyalana</td> <td style="text-align: right;">6</td> </tr> <tr> <td style="text-align: right;">Refused / Ga ke dumele go araba</td> <td style="text-align: right;">88</td> </tr> </table>	Never married / Ga se ka nyala/nyalwa	1	Currently married / Ke nyetše/nyetšwe	2	Separated / Re kgaogane, fela esego ka se molao	3	Divorced / Re kgaogane ka semolao	4	Widowed / Ke hlokofaletswe ke molekane	5	Cohabiting / Re dudisane re sa nyalana	6	Refused / Ga ke dumele go araba	88	C7						
Never married / Ga se ka nyala/nyalwa	1																						
Currently married / Ke nyetše/nyetšwe	2																						
Separated / Re kgaogane, fela esego ka se molao	3																						
Divorced / Re kgaogane ka semolao	4																						
Widowed / Ke hlokofaletswe ke molekane	5																						
Cohabiting / Re dudisane re sa nyalana	6																						
Refused / Ga ke dumele go araba	88																						
18	Which of the following best describes your main work status over the past 12 months? / Ke efe ya tše di latelago yoe e laetšago mošomo wa gago mo kgweding tse lesomepedi (12) tša go feta? [INSERT COUNTRY-SPECIFIC CATEGORIES] / [TSENTŠHA MAGORO GO YA KA NAGA YEO] (USE SHOWCARD) / (ŠOMIŠA KARATA GO HLALOŠA)	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right;">Government employee / Ke somela mmušo(government)</td> <td style="text-align: right;">1</td> </tr> <tr> <td style="text-align: right;">Non-government employee / Ke a soma fela e sego mušong</td> <td style="text-align: right;">2</td> </tr> <tr> <td style="text-align: right;">Self-employed / Ke mo-itšhomi</td> <td style="text-align: right;">3</td> </tr> <tr> <td style="text-align: right;">Non-paid / Ke šoma mosomo wa go se lefšwe</td> <td style="text-align: right;">4</td> </tr> <tr> <td style="text-align: right;">Student / Moithuti</td> <td style="text-align: right;">5</td> </tr> <tr> <td style="text-align: right;">Housewife / Mohlokomedi wa legae</td> <td style="text-align: right;">6</td> </tr> <tr> <td style="text-align: right;">Retired / O panolotse ka baka la botsofe</td> <td style="text-align: right;">7</td> </tr> <tr> <td style="text-align: right;">Unemployed (able to work)/ Ga ke šome (fela nka kgona go šoma)</td> <td style="text-align: right;">8</td> </tr> <tr> <td style="text-align: right;">Unemployed (unable to work) / Ga ke šome (feela nka se kgone go šoma)</td> <td style="text-align: right;">9</td> </tr> <tr> <td style="text-align: right;">Refused / Ga ke rate go araba potšišo</td> <td style="text-align: right;">88</td> </tr> </table>	Government employee / Ke somela mmušo(government)	1	Non-government employee / Ke a soma fela e sego mušong	2	Self-employed / Ke mo-itšhomi	3	Non-paid / Ke šoma mosomo wa go se lefšwe	4	Student / Moithuti	5	Housewife / Mohlokomedi wa legae	6	Retired / O panolotse ka baka la botsofe	7	Unemployed (able to work)/ Ga ke šome (fela nka kgona go šoma)	8	Unemployed (unable to work) / Ga ke šome (feela nka se kgone go šoma)	9	Refused / Ga ke rate go araba potšišo	88	C8
Government employee / Ke somela mmušo(government)	1																						
Non-government employee / Ke a soma fela e sego mušong	2																						
Self-employed / Ke mo-itšhomi	3																						
Non-paid / Ke šoma mosomo wa go se lefšwe	4																						
Student / Moithuti	5																						
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Unemployed (unable to work) / Ga ke šome (feela nka se kgone go šoma)	9																						
Refused / Ga ke rate go araba potšišo	88																						
20	Taking the past year , can you tell me what the average earnings of the household have been? (RECORD ONLY ONE, NOT ALL 3) Mo ngwageng wa go feta lapa le hweditše mogolo o mo kaakang ka kakaretšo? (Ngwala e tee feela, e sego tšse kamoka3)	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right;">Per week / Ka beke</td> <td style="text-align: center;"> _ _ _ _ _ _ _ _ </td> <td style="text-align: right;"><i>Go to T1 / Eya go T1</i></td> </tr> <tr> <td style="text-align: right;">OR per month / Goba Ka Kgwedi</td> <td style="text-align: center;"> _ _ _ _ _ _ _ _ </td> <td style="text-align: right;"><i>Go to T1 / Eya go T1</i></td> </tr> <tr> <td style="text-align: right;">Goba Ka ngwaga</td> <td style="text-align: center;"> _ _ _ _ _ _ _ _ </td> <td style="text-align: right;"><i>Go to T1 / Eya go T1</i></td> </tr> <tr> <td style="text-align: right;">Refused / Ga ke dumele go araba potšišo</td> <td style="text-align: right;">88</td> <td></td> </tr> </table>	Per week / Ka beke	_ _ _ _ _ _ _ _	<i>Go to T1 / Eya go T1</i>	OR per month / Goba Ka Kgwedi	_ _ _ _ _ _ _ _	<i>Go to T1 / Eya go T1</i>	Goba Ka ngwaga	_ _ _ _ _ _ _ _	<i>Go to T1 / Eya go T1</i>	Refused / Ga ke dumele go araba potšišo	88		C10a								
Per week / Ka beke	_ _ _ _ _ _ _ _	<i>Go to T1 / Eya go T1</i>																					
OR per month / Goba Ka Kgwedi	_ _ _ _ _ _ _ _	<i>Go to T1 / Eya go T1</i>																					
Goba Ka ngwaga	_ _ _ _ _ _ _ _	<i>Go to T1 / Eya go T1</i>																					
Refused / Ga ke dumele go araba potšišo	88																						
			C10b																				
			C10c																				
			C10d																				
21	If you don't know the amount, can you give an estimate of the annual household income if I read	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right;">≤ R11 352 (Q) 1</td> <td style="text-align: right;">1</td> </tr> <tr> <td style="text-align: right;">More than Q 1, ≤ Q 2 (R11352 - R18 574)</td> <td style="text-align: right;">2</td> </tr> </table>	≤ R11 352 (Q) 1	1	More than Q 1, ≤ Q 2 (R11352 - R18 574)	2	C11																
≤ R11 352 (Q) 1	1																						
More than Q 1, ≤ Q 2 (R11352 - R18 574)	2																						

some options to you? Is it <i>[INSERT QUINTILE VALUES IN LOCAL CURRENCY]</i> (READ OPTIONS) Ge o sa tsebe palo ya tšhelete, naa o ka akanya gore ke bokae? <i>[INSERT QUINTILE VALUES IN LOCAL CURRENCY]</i>	More than Q 2, ≤ Q 3 (R 18575 – R30 164)	3
	More than Q 3, ≤ Q 4 (R30 165 – R68 527)	4
	More than Q 4 (> R 68 528)	5
	Don't Know / Ga ke tsebe	77
	Refused / Ga ke dumele go araba potšišo	88

Step 1 Behavioural Measurements / Legato la pele Kelo ya maitshwaro

CORE: Tobacco Use / DIPOTŠISO TŠE BOHLOKWA: Tšhumišo ya Motsoko		
Now I am going to ask you some questions about various health behaviours. This includes things like smoking, drinking alcohol, eating fruits and vegetables and physical activity. Let's start with tobacco. / Bjale ke tlo go botšiša dipotšišo mabapi le tsa maphelo. Go akaretša go kgoga, go nwa bjala, go ja dienywa le merogo le go thobolla mmele. A re thome ka ka motsoko.		
Question / Potšišo	Response / Karabo	Code
22 Do you currently smoke any tobacco products , such as cigarettes, cigars or pipes? <i>(USE SHOWCARD)</i> / Naa gona bjale o kgoga e mengwe ya metšoko ya go swana le sekerete, sikara goba peipe? <i>(ŠOMIŠA KARATA YA GO HLALOŠA)</i>	Yes / Ee 1 No / Aowa 2 <i>If No, go to T6 / Ge eba aowa gona fetela go T6</i>	T1
23 Do you currently smoke tobacco products daily ? / Naa le kgoga mehuta ye tšatši le tšatši?	Yes / Ee 1 No / Aowa 2 <i>If No, go to T6 / Ge eba aowa gona fetela go T6</i>	T2
24 How old were you when you first started smoking daily? If not known probe by asking questions such as when you started was your first child already born and how old is that child presently? / Naa o be o na le mengwaga e me kae ge o thoma go kgoga? Ge a sa tsebe, botsisa dipotsiso tsa thlahlo tsa go swana le gore ge ba thoma go fola ngwana wa bona wa mathomo o be a setse a belegwe ebile o botsise gore ngwana woo o na le mengwaga ye me kae gona bjale.	Age (years) / Mengwaga Don't know / Ga ke tsebe 77 <input type="text"/> <i>If Known, go to T5a / Ge a tseba eya go T5a</i>	T3
25 Do you remember how long ago it was? <i>(RECORD ONLY 1, NOT ALL 3)</i> / Naa o gopola gore ke lebaka le le kaakang? <i>(TLATŠA GA TEE FELA E SEGO GA RARO KAMOKA)</i> Don't know / Ga ke tsebe 77	In Years / Mengwaga <input type="text"/> <i>If Known, go to T5a / Ge a tsebe eya go</i>	T4a
	OR in Months / GOBA Dikgwedi <input type="text"/> <i>If Known, go to T5a / Ge a tsebe eya go</i>	T4b
	OR in Weeks / GOBA Dibeke <input type="text"/>	T4c
26 On average, how many of the following do you smoke each day? <i>(RECORD FOR EACH TYPE, USE SHOWCARD)</i> / Ka palogare, naa o kgoga e me kae metšoko ye e latelago? <i>(TLATŠA MEHUTA KAMOKA, MMONTŠHE KARATA)</i> Don't Know / Ga ke tsebe 77	Manufactured cigarettes / Sekerete <input type="text"/>	T5a
	Hand-rolled cigarettes / Sekerete sa go bofiwa goba go tatwa <input type="text"/>	T5b
	Pipes full of tobacco / Peipe ye e tletšego motšoko <input type="text"/>	T5c
	Cigars, cheroots, cigarillos / Sikara go ya ka mehutihuta <input type="text"/>	T5d

	Other / E mengwe Ge eba ye mengwe e ya _____ go T5other goba T9	T5e
	Other (please specify) / E mengwe(Hlaloša): _____ Go to T9 / E ya go T9	T5other

EXPANDED: Tobacco Use / DIPOTŠIŠO TŠA TLALELETŠO: Tšhomišo ya Motsoko			
Question / Potšišo	Response Karabo	Code	
<p>Please note that questions 27 – 29 and 33 are for people who are not currently smoking. (That is those who have never smoked or those who had smoked but stopped smoking).</p> <p>Lemoga gore dipotšišo 27 -29 le 33, ke tša bao ba sa folego gona bjale. (Bao ba sakago ba fola goba bao ba bego ba fola feela ba emiša go fola).</p>			
27	In the past, did you ever smoke daily ? / Lebakeng la go feta naa o ile wa kgoga tšatši ka tšatši? Yes / Ee 1 No / Aowa 2 If No, go to T9 Ge eba aowa fetela go T9	T6	
28	How old were you when you stopped smoking daily ? / Naa o be ona le mengwaga e me kae ge o tlogela go kgoga tšatši ka tšatši? Age (years) / Megwaga _____ If Known, go to T9 / Don't Know / Ga ke tsebe 77 Ge ba tseba fetela go T9	T7	
29	How long ago did you stop smoking daily? (RECORD ONLY 1, NOT ALL 3)	Years ago / Mengwaga ya go feta _____ If Known, go to T9 / Ge ba tseba fetela go T9	T8a
	Naa ekaba lebaka le le kae o tlogetše go kgoga tšatši ka tšatši? (TLATŠA KARABO E TEE FELA E SEGO KAMOKA)	OR Months ago / GOBA Dikgwedi tša go feta _____ If Known, go to T9 / Ge ba tseba fetela go T9	T8b
	Don't Know / Ga ke tsebe 77	OR Weeks ago / GOBA Dibeke tša go feta _____	T8c
30	Do you currently use any smokeless tobacco such as [snuff, chewing tobacco, betel]? (USE SHOWCARD) Naa gona bjale o šomiša motšoko wa go hloka muši bjalo ka [seneife, motsoko wa go jewa goba petele]? (MMONTŠHE KARATA GO HLALOŠA)	Yes / Ee 1 No / Aowa 2 If No, go to T12/ Ge eba aowa fetela go T12	T9
31	Do you currently use smokeless tobacco products daily ? / Naa gona bjale o šomiša motšoko wa go hloka muši?	Yes / Ee 1 No / Aowa 2 If No, go to T12 / Ge eba aowa fetela go T12	T10
32	On average, how many times a day do you use (RECORD FOR EACH TYPE, USE SHOWCARD)	Snuff, by mouth / Sneife, Ka molomong _____	T11a
		Snuff, by nose / Sneife ka nkong _____	T11b
	Ka palogare/ average, naa ka letšatsi o o šomiša ga kae?	Chewing tobacco / Motšoko wa go jewa _____	T11c
	(TLATŠA MEHUTA KAMOKA, ŠOMIŠA KARATA GO HLALOŠA)	Other / O mongwe _____	T11e
	Don't Know / Ga ke tsebe 77	Other (specify) / O mongwe (Hlaloša) _____ If Other, go to T11other, else go to T13 Ge eba o mongwe fetela go T11other, goba go T13	T11other
33	In the past, did you ever use smokeless tobacco such as snuff, chewing tobacco daily . / Mo lebakeng le le fetilego, naa o ile wa šomiša motšoko wa go hloka muši bjalo ka sneife goba motšoko wa go jewa?	Yes / Ee 1 No / Aowa 2	T12

34	During the past 7 days, on how many days did someone in your home smoke when you were present? / Mo matšatšing a 7 a go feta, naa go na le matšatši a makae mo go ilego gwa ba le yo mongwe ka lapeng yo a ilego a fola o le gona?	Number of days / Matšatši	<input type="text"/>	T13
		Don't Know / Ga ke tsebe	77	
35	During the past 7 days, on how many days did someone smoke in closed areas in your workplace when you were present? / Mo matšatšing a 7 a go feta, naa go na le matšatši a makae mo go ilego gwa ba le yo mongwe ka mošomong wa gago yo a ilego a fola o le gona?	Number of days / Matšatši	<input type="text"/>	T14
		Don't Know or do't work in closed areas / Ga ke tsebe goba ga ke šome mafelong a tšwaletšego	77	

CORE: Alcohol Consumption / DIPOTŠIŠO TŠE BOHLOKWA: Tšhomišo ya Bjala			
The next questions ask about the consumption of alcohol./ Dipotšišo tša go latela di amana le tšhomišo ya bjala.			
Question / Potšišo	Response / Karabo	Code	
36	Have you ever consumed an alcoholic drink such as beer, wine, spirits, fermented cider or <i>traditionally fermented beer</i> ? <i>(USE SHOWCARD OR SHOW EXAMPLES)</i> / Naa o ile wa nwa bjala bjalo ka biri, beine, dino tša bogale re bala le thothotho, disaita ("ciders") goba bjala bja Sesotho??	Yes / Ee 1 No / Aowa 2 <i>If No, go to D1</i> <i>Ge eba aowa fetela go D1</i>	A1a
37	Have you consumed an alcoholic drink within the past 12 months? / Naa o ile wa nwa bjala mo kgweding tše lesome pedi (12) tša go feta?	Yes / Ee 1 No / Aowa 2 <i>Ge eba aowa fetela go D1</i>	A1b
38	During the past 12 months, how frequently have you had at least one alcoholic drink? <i>(READ RESPONSES, USE SHOWCARD)</i> / Mo dikgweding tše lesome pedi (12) tša go feta, naa o ile wa nwa bjala makga a ma kae? <i>(BALA DIKARABO, O ŠOMIŠE KARATA)</i>	Daily / Tšatši ka tšatši 1 5-6 days per week / Matšatši a 5-6 ka beke 2 1-4 days per week / Matšatši a 1-4 ka beke 3 1-3 days per month / Matšatši a 1-3 Ka kgwedi 4 Less than once a month / Ka tlase ga ga-tee ka kgwedi 5	A2
39	Have you consumed an alcoholic drink within the past 30 days? / Naa o ile wa nwa bjala mo matšatšing a masome tharo (30) a go feta?	Yes / Ee 1 No / Aowa 2 <i>If No, go to D1/</i> <i>Ge eba aowa fetela go D1</i>	A3
40	During the past 30 days, on how many occasions did you have at least one alcoholic drink? / Mo matšatšing a masome tharo (30) a go feta, naa o ile wa nwa bjala makga a ma kae?	Number / Nomoro Don't know / Ga ke tsebe 77	A4
41	During the past 30 days, when you drank alcohol, on average , how many standard alcoholic drinks did you have during one drinking occasion? <i>(USE SHOWCARD)</i> / Mo matšatšing a masome tharo (30) a go feta moo o ilego wa nwa bjala, naa ka palogare o ile wa nwa bjala bjo bo kaakang lekgeng le tee? <i>(ŠOMIŠA KARATA GO HLALOŠA)</i>	Number / Nomoro Don't know / Ga ke tsebe 77	A5
42	During the past 30 days, what was the largest number of standard alcoholic drinks you had on a single occasion, counting all types of alcoholic drinks together? /	Nomoro Don't know / Ga ke tsebe 77	A6

	Mo matšatšing a masome tharo (30) a go feta, naa nomoro e kgolo ya bjala bjo o bo nwelego mo lebakeng le tee ge o akaretša dino kamoka ke eng?		
43	<p>During the past 30 days, how many times did you have for men: five or more for women: four or more standard alcoholic drinks in a single drinking occasion?</p> <p>/</p> <p>Mo matšatšing a masome tharo (30) a go feta, ke ga kae mo o ilego wa nwa dino tša go feta tše:- Hlano goba go feta (ge mmotšišwa e le monna) Nne goba go feta (ge mmotšišwa e le mosadi) Lebakeng le tee?</p>	<p>Number of times / Ga</p> <p>Don't know / Ga ke tsebe 77</p> <p style="text-align: center;">┌───┐</p>	A7

EXPANDED: Alcohol Consumption / DIPOTŠISO TŠA TLALELETŠO: Tšhomišo ya bjala			
44	<p>During the past 30 days, when you consumed an alcoholic drink, how often was it with meals? Please do not count snacks. /</p> <p>Mo matšatšing a masome tharo (30) a go feta, moo obego o enwa bjala, ke ga kae moo obego o bo nwa ebile o eja? Hlokomela gore o se bale diseneks (snacks).</p>	<p>Usually with meals / Le dijo ka mehla 1</p> <p>Sometimes with meals / Le dijo ka nako tše dingwe 2</p> <p>Rarely with meals / Ga se gantši 3</p> <p>Never with meals / Ntle le dijo 4</p>	A8
45	<p>During each of the past 7 days, how many standard alcoholic drinks did you have each day? (USE SHOWCARD) /</p> <p>Mo matšatšing a šupa(7) ago feta, naa o nwele bjala bjo bo kaakang tšatši le lengwe le le lengwe? (ŠOMIŠA KARATA GO HLALOŠA)</p> <p>Don't Know / Ga ke tsebe 77</p>	Monday / Mosupologo <input type="text"/>	A9a
		Tuesday / Labobedi <input type="text"/>	A9b
		Wednesday / Laboraro <input type="text"/>	A9c
		Thursday / Labone <input type="text"/>	A9d
		Friday / Labohlano <input type="text"/>	A9e
		Saturday / Mokibelo <input type="text"/>	A9f
		Sunday / Lamorena <input type="text"/>	A9g

CORE: Diet / DIPOTŠIŠO TŠA BOHLOKWA: Tša DiJo			
<p>The next questions ask about the fruits and vegetables that you usually eat. I have a nutrition card here that shows you some examples of local fruits and vegetables. Each picture represents the size of a serving. As you answer these questions please think of a typical week in the last year /</p> <p>Dipotšišo tše di latelago ke tša mabapi le dienywa le merogo yeo o ejago. Ke nale karata ya dijo yeo e laetšago dienywa le merogo e tlwaelegilego ya gae. Seswantšho se sengwe le se sengwe se laetša kalo ya dijo. Ge o araba dipotšišo ka kgopelo nagana ka beke ye e tlwaelegilego mo ngwageng wa go feta.</p>			
Question / Potsišo	Response / Karabo		Code
46	<p>In a typical week, on how many days do you eat fruit? (USE SHOWCARD) /</p> <p>Mo bekeng yeo e tlwaelegilego, na o ja dienywa matšatši a makae? (ŠOMIŠA KARATA GO HLALOŠA)</p>	<p>Number of days / Palo ya matšatši <input type="text"/> If Zero days, go to D3</p> <p>Don't Know / Ga ke tsebe 77 Ge di sa jewe fetela go D3</p>	D1
47	<p>How many servings of fruit do you eat on one of those days? (USE SHOWCARD) /</p> <p>Letšatši leo o jago dienywa o ja ga kae ka letšatši? (ŠOMIŠA KARATA GO HLALOŠA)</p>	<p>Number of servings / Palo ya go ja <input type="text"/></p> <p>Don't Know / Ga ke tsebe 77</p>	D2
48	<p>In a typical week, on how many days do you eat vegetables? (USE SHOWCARD) /</p> <p>Mo bekeng yeo e tlwaelegilego, na o ja merogo matšatši a makae? (ŠOMIŠA KARATA GO HLALOŠA)</p>	<p>Number of days / Palo ya matšatši <input type="text"/> If Zero days, go to D5</p> <p>Don't Know / Ga ke tsebe 77 Ge di sa jewe fetela go D5</p>	D3
49	<p>How many servings of vegetables do you eat on one of those days? (USE SHOWCARD) /</p> <p>Letšatši leo o jago merogo o eja ga kae ka letšatši? (ŠOMIŠA KARATA GO HLALOŠA)</p>	<p>Palo ya go ja <input type="text"/></p> <p>Don't Know / Ga ke tsebe 77</p>	D4

EXPANDED: Diet / DIPOTŠIŠO TŠA TLALELETŠO: Tša DiJo

50	<p>What type of oil or fat is most often used for meal preparation in your household?</p> <p>(USE SHOWCARD) (SELECT ONLY ONE)</p> <p>Naa o šomiša makhura a mohuta mang ge o aepa?</p> <p>(ŠOMIŠA KARATA GO HLALOŠA) (KGETA YE TEE FEELA)</p>	Vegetable oil / Makhura a merogo 1 Lard or suet 2 Butter or ghee / Botoro 3 Margarine / Margarine 4 5 <i>If Other, go to D5 other / Ge eba se sengwe fetela go D5other</i> Other / A mangwe None in particular 6 None used / Ga ke šomiše Makhura 7 Don't know / Ga ke tsebe 77	D5
		Other / Se sengwe <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	D5other
51	<p>On average, how many meals per week do you eat that were not prepared at a home? By meal, I mean breakfast, lunch and dinner. /</p> <p>Go ya ka palogare, naa o ja dijo tše kae tšeo di sa apewago ka gae? Ke ra gore difihlolo, matena le dilalelo.</p>	Number / Palo Don't know / Ga ke tsebe 77 <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	D6

CORE: Physical Activity / DIPOTŠITŠO TŠE BOHLOKWA: Thobollo ya mmele

Next I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person.

Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. *[Insert other examples if needed]*. In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate. /

Bjale ke ile go go botšiša ka nako yeo o e tseyago o thobolla mmele mo bekeng. Ka kgopelo araba dipotšišo le ge o ša ipone o le motho wa go fela a ithobolla mmele. Nagana pele ka nako yeo o etšeago o soma. Nagana ka mošomo ele dilo tšeo o di dirago go swana le mošomo wa go lefšwa goba wa go se lefšwe, go ithuta, mešomo ya ka gae, go lema, go thea dihlapo goba go nyakana le mošomo. [Tsentšha mehlala ye mengwe ge go hlokega]. Ge o fetola dipotšišo tše latelago; tseba gore ge re bolela ka mošomo o boima re ra gore mošomo woo o dirago gore o hemele godimo le pelo e kibela godimo, mola mošomo o boleta e le woo o dirago gore o se hemele godimo kudu le pelo e se kibela godimo kudu.

Question / Potšišo	Response / Karabo	Code	
Work / Go šoma			
Please note that in this case work means all paid and unpaid working activities . This sections should be filled by even those who are unemployed			
52	<p>Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like <i>[carrying or lifting heavy loads, digging or construction work]</i> for at least 10 minutes continuously? <i>[INSERT EXAMPLES] (USE SHOWCARD) /</i></p> <p>Naa mošomo wag ago o nyaka matsapa ao a dirago gore o hemele godimo goba pelo e kibela godimo [go swana le ge o kuka tse boima goba go epa goba go aga] go lekana nako ya metsotso ye lesome (10) goba go feta? [TŠENTŠHA MEHLALA YE MENGWE GE GO HLOKEGA]. (ŠOMIŠA KARATA GO HLALOŠA)</p>	<p>Yes / Ee 1</p> <p>No / Aowa 2 <i>Ge eba aowa fetela go P 4</i></p>	P1
53	<p>In a typical week, on how many days do you do vigorous-intensity activities as part of your work? /</p> <p>Mo bekeng ye e tšwaelegilego, ke matšatši a ma kae moo o šomago boima?</p>	<p>Number of days / Palo ya matšatši <input type="checkbox"/></p>	P2

54	How much time do you spend doing vigorous-intensity activities at work on a typical day? / Naa o tšea nako e kaakang ge o šoma boima mo letšatšng le le tee?	Hours : minutes / Di-iri : metsotso _____ : _____ hrs mins Di-iri metsotso	P3 (a-b)
55	Does your work involve moderate-intensity activity, that causes small increases in breathing or heart rate such as brisk walking [or carrying light loads] for at least 10 minutes continuously? [INSERT EXAMPLES] (USE SHOWCARD) / Naa mošomo wa gago o nyaka feela matsapa ao a dirago gore o hemele godimo ganyenyane feela goba pelo e kibebe godimo ganyenyane feela [Go swana le go sepela o sa phakiše goba go rwala thoto ya go se imele], mo nakong ya go lekana le metsotso ee lesome (10) goba go feta? [ŠOMIŠA MOHLALA] (ŠOMIŠA KARATA GO HLALOŠA)	Yes / Ee 1 No / Aowa 2 If No, go to P 7 / Ge eba aowa fetela go P 7	P4
56	In a typical week, on how many days do you do moderate-intensity activities as part of your work? / Mo bekeng ye e tlwaelegilego ke matšatši a ma kaakang moo o šomago mošomo o bofefo?	Number of days / Palo ya matšatši _____	P5
57	How much time do you spend doing moderate-intensity activities at work on a typical day? / Naa o tšea nako e kaakang ge o šoma mošomo o bofefo, mo letšatšng le le tee?	Hours : minutes / Di-iri : metsotso _____ : _____ hrs mins Di-iri metsotso	P6 (a-b)

Travel to and from places / Go ya le go boa mafelong a go fapana

The next questions exclude the physical activities at work that you have already mentioned.
Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship. [Insert other examples if needed] /
Dipotšišo tše di latelago di akaretša mošomo o boima wo re šetšego re boletše ka ona. Bjale ke rata go go botšiša mabapi le go ya le go boa mafelong a go fapana. Mohlala: Go sepela go ya mošomong, mabenkeleng mmarakeng goba mafelong a go rapela. [TŠENTŠHA MEHLALA E MENGWE GE GO HLOKEGA].

58	Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places? / Naa o a sepela goba o šomiša paesekela (ya materapo) go lekana nako ya metsotso e lesome goba go feta ge o eya goba o bowa mafelong?	Yes / Ee 1 No / Aowa 2 Ge eba aowa fetela go P 10	P7
59	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places? / Mo bekeng naa o tšea matšatši a ma kaakang o sepela goba o šomiša paesekela nako ya go lekana metsotso ye lesome (10) goba go feta, ge o eya goba o bowa mafelong?	Number of days / Palo ya matšatši _____	P8
60	How much time do you spend walking or bicycling for travel on a typical day? / Naa o tšea nako e kaakang mo letšatšng go sepela goba o šomiša paesekela?	Hours : minutes / Di-iri : metsotso _____ : _____ hrs mins Di-iri Metsotso	P9 (a-b)

CORE: Physical Activity, Continued / DIPOTŠIŠO TŠE BOHLOKWA: Thobollo ya mmele, (e tšwela pele)

Question / Potšišo	Response / Karabo	Code
Recreational activities / Maitapološo		
The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure), [Insert relevant terms]. / Dipotšišo tše di latelago a di akaretše mošomo le mokgwa wa dinamelwa tšeo o šetšego o di boletše. Bjale ke rata go go botšiša mabapi le tša dipapadi, tša boitekanelo le tša boitapološo (boiketlo) [tsentšha tšeo di swanetšego]		
61	Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large	Yes / Ee 1 P10

	<p>increases in breathing or heart rate like <i>[running or football]</i> for at least 10 minutes continuously? <i>[[INSERT EXAMPLES] (USE SHOWCARD) /</i> A naa o tšea karolo mo dipapading tšeboima, tša boitekanelo goba tša boitapološo (boiketlo) tšeo di fegedišago goba di dirago gore pelo e kibebe godimo (go kitima goba go raloka kgwele ya maoto) tekano ya</p>	<p>No / Aowa 2 <i>If No, go to P 13 / Ge e le aowa eya go P 13</i></p>	
62	<p>In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (<i>leisure</i>) activities? / Mo bekeng a naa o raloka papadi ye e thata, goba o tsenela tša boitekanelo, goba tša boitapološo (boiketlo) ga kaakang?</p>	<p>Number of days / Matšatši <input type="text"/></p>	P11
63	<p>How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day? / A naa o tšea nako e kaakang o raloka papadi yeo ye boima, goba o tšenetše tša boitekanelo goba tša boitapološo mo letšatšing?</p>	<p>Hours : minutes / Di-iri: metsoso <input type="text"/> : <input type="text"/> hrs mins di-iri mets</p>	P12 (a-b)
64	<p>Do you do any moderate-intensity sports, fitness or recreational (<i>leisure</i>) activities that cause a small increase in breathing or heart rate such as brisk walking, <i>[cycling, swimming, volleyball]</i> for at least 10 minutes continuously? <i>[[INSERT EXAMPLES] (USE SHOWCARD) ?</i> A naa o tsenela le tše dingwe tša dipapadi tša boitekanelo, goba tša boitapološo (boiketlo) tšeo di sego boima kudu e fela di kgona go go fegediša ga nnyane go ba tša dira gore gore pelo e kibebe godimo bjalo ka go sepediša (go otlela paesekela, go rutha, go ba kgwele ya diatla) metsotso yeo e ka bago e lesome o sa kgaotše? <i>[TSENTŠHA MEHLALA] (ŠOMIŠA KARATA GO HLALOŠA)</i></p>	<p>Yes / Ee 1 No / Aowa 2 <i>If No, go to P16 / Ge ele aowa eya go P16</i></p>	P13
65	<p>In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (<i>leisure</i>) activities? / Mo bekeng a naa o tsenela tše tša dipapadi, tša botekanelo goba tša boitapološo (boiketlo) tšeo di sego boima kudu ga kae?</p>	<p>Number of days / Matšatši <input type="text"/></p>	P14
66	<p>How much time do you spend doing moderate-intensity sports, fitness or recreational (<i>leisure</i>) activities on a typical day? / A naa o tšea nako e kaakang o tšenetše tšeo tša dipapadi, tša boitekanelo goba tša boitapološo (boiketlo) tšeo di sego boima kudu ka letšatši ?</p>	<p>Hours : minutes / Diiri:metsotso <input type="text"/> : <input type="text"/> hrs mins di-iiri metsotso</p>	P15 (a-b)

EXPANDED: Physical Activity / DIPOTŠIŠO TSA TLALELETŠO: Thobollo ya Mmele	
Sedentary behaviour / Mokgwa wa go dula felo go tee	
<p>The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at a desk, sitting with friends, traveling in car, bus, train, reading, playing cards or watching television, but do not include time spent sleeping. <i>[[INSERT EXAMPLES] (USE SHOWCARD) /</i> Potšišo e e latelago e mabapi le go dula fase goba go ithekga ka sengwe mosomong, ka gae, go ya le go bowa mafelong a itseng, goba le bagwera go akaretšwa nako eo o e tšerego o dutše setulong, o dutše le bagwera, o sepela ka sefatanaga, pese, setimela, o bala, o raloka dikarata, goba o bogetše thelebišene, e fela ga e akaretše nako yeo o e tsšerego o robetše <i>[TSENTŠHA MEHLALA] [BONTŠHA KA KARATA]</i></p>	

67	How much time do you usually spend sitting or reclining on a typical day? / A naa o fela o tšea nako e kaakang ka letšatši o dutše fase goba o ithekgile ?	<div style="display: flex; justify-content: center; align-items: center; gap: 10px;"> <div style="border-bottom: 1px solid black; width: 20px; height: 10px;"></div> : <div style="border-bottom: 1px solid black; width: 20px; height: 10px;"></div> </div> Hours : minutes / Di-iri:metsotso hrs mins di-iri mets	P16 (a-b)

CORE: History of Raised Blood Pressure / DIPOTŠITŠO TŠE BOHLOKWA: Tša madi a magolo			
Question / Potšišo	Response / Karabo		Code
68	Have you ever had your blood pressure measured by a doctor or other health worker? / A naa o ile wa bofša lepanta la tekolo ya boima bja kelo ya madi ke ngaka goba mošomedi o mongwe wa tša maphelo?	Yes / Ee 1	H1
		No / Aowa 2	
69	Have you ever been told by a doctor or other health worker that you have raised blood pressure or hypertension? / A naa o kile wa botšwa ke ngaka goba mošomedi o mongwe wa tša maphelo gore boima bja kelo ya madi bo goletše godimo goba o na le madi a magolo?	Yes / Ee 1	H2a
		No / Aowa 2 <i>If No, go to H6 / Ge ele aowa, eya go H6</i>	
70	Have you been told in the past 12 months? / A naa o boditšwe mo dikgweding tše lesome-pedi tša go feta?	Yes / Ee 1	H2b
		No / Aowa 2	

EXPANDED: History of Raised Blood Pressure / DIPOTŠITŠO TŠA TLALELETŠO: Tša madi a magolo			
71	Are you currently receiving any of the following treatments/advice for high blood pressure prescribed by a doctor or other health worker? / A naa ga bjale o nwa dihlare tše/o fiwa maele ka tša madi a magolo tšeo o di/ao o a fiwago ke ngaka goba mošomedi o mongwe wa tša maphelo?		
	Drugs (medication) that you have taken in the past two weeks / Diokobatši (dihlare) tšeo o di nwelego mo dibekeng tše pedi tša gofeta	Yes / Ee 1	H3a
		No / Aowa 2	
	Advice to reduce salt intake / Keletšo ya go fokotša letswai dijong	Yes / Ee 1	H3b
		No / Aowa 2	
	Advice or treatment to lose weight / Keletšo goba kalafo ya go fokotša boima bja mmele	Yes / Ee 1	H3c
		No / Aowa 2	
Advice or treatment to stop smoking / Keletšo goba kalafo ya go tlogela go kgoga motšoko	Yes / Ee 1	H3d	
	No / Aowa 2		
72	Have you ever seen a traditional healer for raised blood pressure or hypertension? / A naa o ile wa bonwa ke ngaka ya setšo mabapi le madi a magolo?	Yes / Ee 1	H4
		No / Aowa 2	
73	Are you currently taking any herbal or traditional remedy for your raised blood pressure? / A naa ga bjale o nwa mešunkwane goba dihlare tša setšo go alafa madi ao a magolo ?	Yes / Ee 1	H5
		No / Aowa 2	

CORE: History of Diabetes / DIPOTŠITŠO TŠE BOHLOKWA: Tša mabapi le bolwetši bja swikiri			
Question / Potšišo	Response / Karabo		Code
74	Have you ever had your blood sugar measured by a	Yes / Ee 1	H6

	doctor or other health worker? / A naa o kile wa lekolwa mabapi le bolwetši bja swikiri ke ngaka goba mošomedi o mongwe wa tša maphelo?	No / Aowa 2	
75	Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes? / A naa o kile wa botšwa ke ngaka goba mošomedi o mongwe wa tša maphelo gore kelo ya swikiri mading a gaao e godimo goba o nale bolwetši bja swikiri ?	Yes / Ee 1 No / Aowa 2 <i>If No, go to M1 / Ge eba aowa fetela go M1</i>	H7a
76	Have you been told in the past 12 months? / A naa o boditšwe mo dikgweding tše lesomepedi tša go feta ?	Yes / Ee 1 No / Aowa 2	H7b

EXPANDED: History of Diabetes / DIPOTŠIŠO TSA TLALELETŠO: Tša bolwetsi bja swikiri			
	Are you currently receiving any of the following treatments/advice for diabetes prescribed by a doctor or other health worker? / A naa ga bjale o hwetša kalafo/keletšo ya mabapi le bolwetši bja swikiri tše o di fiwago ke ngaka goba mošomedi o mongwe wa tša maphelo?		
77	Insulin / Tšhwaana ya taolo ya swikiri mo madding	Yes / Ee 1 No / Aowa 2	H8a
	Drugs (medication) that you have taken in the past two weeks / Diokobatši (dihlare) tše o di nwelego mo dibekeng tše pedi tša go feta	Yes / Ee 1 No / Aowa 2	H8b
	Special prescribed diet / Dijo tše o di kgethetšwego ke ngaka ?	Yes / Ee 1 No / Aowa 2	H8c
	Advice or treatment to lose weight / Keletšo goba kalafo ya go fokotša boima bja mmele	Yes / Ee 1 No / Aowa 2	H8d
	Advice or treatment to stop smoking / Keletšo goba kalafo ya go tlogela go kgoga motšoko	Yes / Ee 1 No / Aowa 2	H8e
	Advice to start or do more exercise / Keletšo goba kalafo ya go itšhidulla kudu	Yes / Yes 1 No / No 2	H8f
	78	Have you ever seen a traditional healer for diabetes or raised blood sugar? / A naa o ile wa bonwa ke ngaka ya setšo mabapi le bolwetši bja swikiri goba swikiri e ntši mo mading ?	Yes / Ee 1 No / Aowa 2
79	Are you currently taking any herbal or traditional remedy for your diabetes? / A naa ga bjale o nwa mešunkwane goba dihlare tša setšo go alafa bolwetši bjoo bja swikiri ?	Yes / Ee 1 No / Aowa 2	H10

CORE: History of TB			
Question / Potšišo	Response / Karabo		Code
Do you have cough with expectoration for more than 21 days	Yes / Ee	1	
	No / Aowa	2	
Coughing out blood?	Yes / Ee	1	
	No / Aowa	2 <i>If No, go to M1 / Ge eba aowa fetela go M1</i>	
Low grade fever with evening rise?	Yes / Ee	1	

		No / Aowa	2	
	Do you have felt a general weakness, loss of weight or loss of appetite?	Yes / Ee	1	
		No / Aowa	2	
	Do you ever have been checked for TB?			

EXPANDED: History of TB				
	Are you currently receiving any of the following treatments/advice for TB prescribed by a doctor or other health worker? / A naa ga bjale o nwa dihlare tše/o fiwa maele ka tša madi a magolo tšeo o di/ao o a fiwago ke ngaka goba mošomedi o mongwe wa tša maphelo?			
	Drugs (medication) that you have taken in the past two weeks / Diokobatši (dihlare) tšeo o di nwelego mo dibekeng tše pedi tša gofeta	Yes / Ee	1	
		No / Aowa	2	
	Have you ever have been treated for TB ?			
	Have you been treated for TB by the Health center?			
	Have you ever been treated for by any herbal or traditional remedy for TB? /	Yes / Ee	1	
		No / Aowa	2	
		No / Aowa	2	
	Are you currently taking any herbal or traditional remedy for TB? /	Yes / Ee	1	
		No / Aowa	2	

CORE: History of HIV				
Question / Potšišo	Response / Karabo			Code
Have you ever been tested for HIV?	Yes / Ee	1		
	No / Aowa	2		
Have you ever been tested for HIV in the last 12 months?	Yes / Ee	1		
	No / Aowa	2		
Do you know your HIV status?	Yes / Ee	1		
	No / Aowa	2		
Did you ever receive a blood donation?	Yes / Ee	1		
	No / Aowa	2		
Did you get advice in regard to avoid HIV transmission?	Yes / Ee	1		
	No / Aowa	2		

EXPANDED: History of HIV		
Are you currently receiving any of the following treatments/advice for HIV prescribed by a doctor or other health worker? / A naa ga bjale o nwa dihlare tše/o fiwa maele ka tša madi a magolo tše o di/ao o a fiwago ke ngaka goba mošomedi o mongwe wa tša maphelo?		
Drugs (medication) that you have taken in the past two weeks / Diokobatši (dihlare) tše o di nwelego mo dibekeng tše pedi tša gofeta	Yes / Ee 1 No / Aowa 2	
Have you been treated by the Health center?	Yes / Ee 1 No / Aowa 2	
Have you been treated by the Health center?	Yes / Ee 1 No / Aowa 2	
Are you currently taking any herbal or traditional remedy for HIV? /	Yes / Ee 1 No / Aowa 2	

Step 2 Physical Measurements

Nomoro ya Motšeaarolo

CORE: Height and Weight		
Question	Response	Code
80 Interviewer ID	<input type="text"/>	M1
81 Device IDs for height and weight	Height <input type="text"/> Weight <input type="text"/>	M2a M2b
82 Height	in Centimetres (cm) <input type="text"/>	M3
83 Weight <i>If too large for scale 666.6</i>	in Kilograms (kg) <input type="text"/>	M4
84 For women: Are you pregnant?	Yes 1 <i>If Yes, go to M 8</i> No 2	M5
CORE: Waist		
85 Device ID for waist	<input type="text"/>	M6
86 Waist circumference	in Centimetres (cm) <input type="text"/>	M7
CORE: Blood Pressure		
87 Interviewer ID	<input type="text"/>	M8

88	Device ID for blood pressure	_____	M9
89	Cuff size used	Small 1 Medium 2 Large 3	M10
90	Reading 1	Systolic (mmHg) _____	M11a
		Diastolic (mmHg) _____	M11b
91	Reading 2	Systolic (mmHg) _____	M12a
		Diastolic (mmHg) _____	M12b
92	Reading 3	Systolic (mmHg) _____	M13a
		Diastolic (mmHg) _____	M13b
93	During the past two weeks, have you been treated for raised blood pressure with drugs (medication) prescribed by a doctor or other health worker?	Yes 1 No 2	M14
	Enlargement neck glands (Lymphnodes)	Yes 1 No 2	

EXPANDED: Hip Circumference and Heart Rate			
94	Hip circumference	in Centimeters (cm) _____	M15
95	Heart Rate		M16a
	Reading 1	Beats per minute _____	
	Reading 2	Beats per minute _____	
	Reading 3	Beats per minute _____	

Step 3 Biochemical Measurements

Nomoro ya Motšearolo _____

CORE: Blood Glucose			
Question	Response	Code	
96	During the past 12 hours have you had anything to eat or drink, other than water? Yes 1 No 2	B1	
97	Technician ID _____	B2	
98	Device ID _____	B3	
99	Time of day blood specimen taken (24 hour clock) Hours : minutes _____ : _____ hrs mins	B4	
100	Fasting blood glucose mmol/l _____ . _____	B5	

	Choose accordingly: mmol/l or mg/dl	mg/dl	_____	
101	Today, have you taken insulin or other drugs (medication) that have been prescribed by a doctor or other health worker for raised blood glucose?	Yes	1	B6
		No	2	
CORE: Blood Lipids				
102	Device ID		_____	B7
103	Total cholesterol Choose accordingly: mmol/l or mg/dl	mmol/l	_____	B8
		mg/dl	_____	
104	During the past two weeks, have you been treated for raised cholesterol with drugs (medication) prescribed by a doctor or other health worker?	Yes	1	B9
		No	2	

EXPANDED: Triglycerides and HDL Cholesterol				
105	Triglycerides Choose accordingly: mmol/l or mg/dl	mmol/l	_____	B10
		mg/dl	_____	
106	HDL Cholesterol Choose accordingly: mmol/l or mg/dl	mmol/l	_____	B11
		mg/dl	_____	

Dikgaruru goba dintwa le Dikgobalo

CORE: Injury / DIPOTŠIŠO TŠE BOHLOKWA: Kgobalo		
The next questions ask about different experiences and behaviours that are related to road traffic injuries. / Dipotšišo tše di latelago di botšiša ka ga maetemogelo le maitshwaro ao a amanago le kotsi tša tseleng.		
Question / Potšišo	Response / Karabo	Code
1	All of the time/ Ka nako tšohle	1
	Sometimes / Nako ye ngwe	2
	Never / Ga se ka le bofa	3
	Have not been in a car in past 30 days / Ga se ka namela koloi mo matšatšing a 30 a go feta	4
	No seat belt in the car I usually am in/ Koloi yeo ke e šomišago ga ena mapanta a banamedi	5
	Don't know/ Ga ke tsebe	77
	Refused / Ga ke dumele go araba	88
	Mo matšatšing a masome tharo (30) a go feta, naa o ile wa šomiša lepanta	

	la polokego a koloï ge o be o le mootledi goba monamedi wa sefatanaga?			
2	In the past 30 days, how often did you wear a helmet when you drove or rode as a passenger on a motorcycle or motor-scooter? / Mo matšatšing a masome tharo (30) a go feta, naa o ile wa apara sešireletša hlogo (Helmet) ge o be o otlela goba o nametše sethuthuthu?	All of the time / Ka nako tšohle 1 Sometimes / Nako ye ngwe 2 Never / Ga se ka e apara 3 Have not been on a motorcycle or motor- scooter in the past 30 days / Ga se ka namela sethuthu mo matšatšing a 30 a go feta 4 Do not have a helmet / Ga ke na sešireletša hlogo (Helmet) 5 Don't Know / Ga ke tsebe 77 Refused / Ga ke dumele go araba 88	V2	
3	In the past 12 months, have you been involved in a road traffic crash as a driver, passenger, pedestrian or cyclist? / Mo dikgweding tše lesome pedi (12) tša go feta, naa o ile wa amega kotsing ya go thulana o le mootledi, monamedi,	Yes (as a driver) / Ee (ke le mootledi) 1 Yes (as a passenger) / Ee (Ke le monamedi) Yes (as a pedestrian) / Ee (ke le mosepela ka dinao) 2 Yes (as a cyclist) / Ee (ke le monamedi wa paesekela) 3 No / Aowa 4 Don't Know / Ga ke tsebe 5 77 Refused / Ga ke dumele go araba 88	If no go to V5/ Ge eba aowa fetela go V5 If don't know go to V5 / Go go sa tsebje	V3

	mosepela ka dinao goba monamedi wa paesekela?		fetela go V5 If refused, go to V5/ Ge go sa arabjwe fetela go V5	
4	Did you have any injuries in this road traffic crash which required medical attention? / Naa, mo kotsing ye o ile wa ba le dikgobalo tšeo di nyakago thušo ya tša kalafo?	Yes / Ee No / Aowa Don't Know / Ga ke tsebe Refused / Ga ke dumele go araba	1 2 77 88	
The next questions ask about the mostserious accidental injury you have had in the past 12 months. / Dipotšišo tše di latelago di botšiša ka ga kotsi ye šoro yeo le ilego la ba le yona dikgweding tše lesome pedi (12) tša go feta.				
5	In the past 12 months, were you injured accidentally, other than the road traffic crashes which required medical attention,? / Mo dikgweding tše lesome pedi tša go feta, naa o ile wa gobatša ke se sengwe ka ntle ga kgobalo ya kotsi ya sefatanaga, e se maikemišetšo, moo go ilego gwa nyakega thušo ya kalafo	Yes / Ee No / Aowa Do not Know/ Ga ke tsebe Refused / Ga ke dumele go araba	1 2 If No go to V8 Ge eba aowa fetela go V 8 77 88	V5

6	Please indicate which of the following was the cause of this injury. Naa ke efe ya tše di latelago ye e bakilego dikgobalo.	Fall / Go wa	1	
		Burn / Go swa	2	
		Poisoning / Go ja goba go nwa mpholo	3	
		Cut / Go segega	4	
		Near-drowning / Gonyaka go nwelela	5	
		Animal bite / Go longwa ke phoofolo	6	
		Other (specify) / Se sengwe(hlaloša)	7	
		Don't Know / Ga ke tsebe	77	
		Refused / Ga ke dumele go araba	88	
		Other (specify) / Se sengwe (hlaloša)		
7	Naa o be o le kae ge o bona kgobalo?	Home / Ka gae	1	V7
		School / Sekolong	2	
		Workplace / Mošomong	3	
		Road/Street/Highway / Mmileng	4	
		Farm / Polaseng	5	
		Sports / Dipapading	6	
		Other (specify) / Go gongwe (hlaloša)	7	
		Don't Know / Ga ke tsebe	77	
		Refused / Ga ke dumele go araba	88	
		Other (specify) / Go gongwe (hlaloša)		

EXPNDDED: Unintentional Injury / DIPOTŠIŠO TŠA TLALELETŠO: Dikgobalo tšeo esego tša maikemišetšo

The next questions ask about behaviours related to your safety and whether or not you drink alcohol while driving or being a passenger. /
 Dipotšišo tše di latelago di botšiša ka maitshwara ao a amanago le polokego gape di botšiša ka go nwa goba go se nwe bjala mola le otlela goba le le monamedi

Question / Potšišo		Response / Karabo	Code
8	<p>In the past 30 days, how often did you wear a helmet when you rode a bicycle or pedal cycle? /</p> <p>Mo matšatšing a masome tharo (30) a go feta, naa ke ga kae moo o bego o apara sesireletsa hloogo (Helmet) ge o be o otlela paesekela?</p>	<p>Always / Ka mehla 1</p> <p>Sometimes / Nako ye ngwe 2</p> <p>Never / Ga ke e apare 3</p> <p>Did not ride in the past 30 days. / Ga se ka namela paesekela 4</p> <p>matšatšing a masome tharo (30) a go feta 77</p> <p>Don't Know / Ga ke tsebe 88</p> <p>Refused / Ga ke dumele go araba</p>	V8
9	<p>In the past 30 days, how many times have you driven a motorized vehicle when you have had 2 or more drinks? (USE SHOWCARDS)</p> <p>Mo matšatšing a masome tharo (30) a go feta, naa ke ga kae moo o bego o otlela sefatanaga o be o nwelee mapotlelwana goba dikotikotiana tše pedi goba go feta? (ŠOMIŠA KARATA GO HLALOŠA)</p>	<p>Number of times / Palo <input type="text"/> <input type="text"/></p> <p>77</p> <p>Don't Know/ Ga ke tsebe 88</p> <p>Refused / Ga ke dumele go araba</p>	V9
10	<p>In the past 30 days, how many times have you ridden in a motorized vehicle where the driver has had 2 or more alcoholic drinks? (USE SHOWCARDS)</p> <p>Mo matšatšing a masome tharo (30) a go feta, naa ke ga kae moo o sefatanaga seo o bego o se nametše mootledi wa sona a be a nwele mapotlelwana goba dikotikotiana tše pedi goba go feta?</p>	<p>Number of times / Palo <input type="text"/> <input type="text"/></p> <p>77</p> <p>Don't Know / Ga ke tsebe 88</p> <p>Refused / Ga ke dumele go araba</p>	

CORE: Violence / DIPOTŠIŠO TSE BOHLOKWA: Dikgaruru goba dintwa

Question / Potšišo		Response / Karabo	Code
11	<p>In the past 12 months, how many times were you in a violent incident in which you were injured and required medical attention? /</p>	<p>Never / Ga se ka amega 1 If never go to V14 / Ge eba o se wa amega</p>	V12

	Mo dikgweding tše lesome pedi (12) tša go feta, ke ga kae mo o ilego wa amega dikgarurung goba ntweng mo o ilego wa gobala la go nyaka thušo ya kalafo?	Rarely / Ga se gantši (1-2) 2 Sometimes / Ga mmalwanyana (3-5) 3 Often / Ga ntši (6 goba go feta) 4 Don't Know / Ga ke tsebe 77 Refused / Ga ke dumele go araba 88	fetela go V14
The next questions ask about the most serious violent incident you have had in the past 12 months. / Dipotšišo tše di latelago di botšiša dikgaruru goba dintwa tše šoro tše di ilego tša go ama mo dikgweding tše lesome pedi (12) tša go feta.			
12	Please indicate which of the following caused your most serious injury in the past 12 months? (USE SHOWCARDS) Bolela gore ke efe ya tše di latelago yeo e hlotšeng dikgobalo tše šoro mo dikgweding tše lesome pedi (12) tša go feta. (ŠOMIŠA KARATA GO HLALOŠA)	Being shot with a firearm/ Go thuntšhwa ka sethunya 1 A weapon (other than a firearm) was used by the person who injured me / Go gobatšwa ke yo mongwe ka sebetša seo esego sethunya 2 Being injured without any weapon (slapped, pushed..) / Go gobatšwa go se gwa šomišwa sebetša (matsogo, go kgorometšwa....) 77 Don't Know / Ga ke tsebe 77 Refused / Ga ke dumele go araba 88	V12
13	Please indicate the relationship between yourself and the person(s) who caused your injury. / Bolela gore o amana bjang le motho yo a go gobaditšego.	Intimate partner/ Molekane 1 Parent / Motswadi 2 Child, sibling, or relative / Ngwanago, ngwaneno goba wa leloko 3 Friend or acquaintance / Mogwera 4 Unrelated caregiver / Mohlokamedi wo esego wa leloko 5 Stranger / Motho wa go se tsebje 6 Official or legal authorities / Motho wa molao 7 Other (specify) / O mongwe(Hlaloša) 8 88	V13

		Refused / Ga ke dumele go araba		
		Other (Please specify) / O mongwe (Hlaloša)		V13other
14	Looking back on your childhood (before age 18 years), did a parent or adult in the household ever push, grab, shove, slap, hit, burn, or throw something at you? / Ge o lebelela morago nako yeo o bego o sa le ngwana (pele ga mengwaga ye 18), naa motswadi goba motho yo mongwe o mogolo o ile a go kgorometša, swaraswara, betha ka mpama, betha, tšhuma goba go go foša ka se sengwe?	Never / Aowa Very rarely / Esego gantši Once a month / Ga tee ka kgwedi Once a week / Ga tee ka beke Almost daily / Tšatši ka tšatši Don't Know / Ga ke tsebe Refused / Ga ke dumele go araba	1 2 3 4 5 77 88	V14
15	Looking back on your childhood, did an adult or anyone at least five years older than you ever touch you sexually or try to make you touch them sexually or force you to have sex? / Ge o lebelela morago nako yeo o bego o sa le ngwana, naa go ile gwa ba le motho yo mogolo goba yo mongwe yo a go fetago ka mengwaga ye mehlano (5) yo a ilego a go forohla setho sa bong goba go go gapeletša go robala le yena?	Yes / Ee No / Aowa Refused / Ga ke dumele go araba	1 2 3	V15
16	Since your 18 th birthday, have you ever experienced a sex act against your will ? Ka morago ga mengwaga ye lesome seswai (18) naa o ile wa itemogela thobalano ka kgapeletšo?	Never / Aowa Once / Ga tee A few times (2 to 3 times) / Ga mmalwa (ga 2-3) Many times (4 or more times) / Ga ntši (ga 4 goba go feta) Don't Know / Ga ke tsebe Refused / Ga ke dumele go araba	1 2 3 4 77 88	V16

EXPANDED: DIPOTŠISO TŠA TLALELETŠO: Dikgaruru goba Dintwa

The next questions ask about behaviours related to your safety. /

Dipotšišo tše di latelago di botšiša ka maitshwaro ao a amago tšhireletšo ya gago

Question / Potšišo		Response / Karabo		Code
17	In the past 12 months, have you been frightened for the safety of yourself or your family because of the anger or threats of another person(s)? /	Yes / Ee No / Aowa Refused / Ga ke	1 2 If No go to V19 Ge eba aowa fetela go V19 88 If refused, go	V17

	Mo dikgweding tše lesomepedi tša go feta, naa o ile wa tšhošwa ke tšhireletšo ya gago goba ya lapa la gago ka baka la go befelwa goba go tšhošetšwa ke motho yo mongwe?	dumele go araba	to V19 / Ge go sa fetolwe fetela go V19	
18	Please specify of whom you were most often frighten? / Bolela gore o be o tšhošetšwa ke mang?	Intimate partner/ Molekane Parent / Motswadi Child, sibling, or other relative / Ngwanago, ngwaneno goba wa leloko Friend or acquaintance / Mogwera Unrelated caregiver / Mohlokomedi wo esego wa leloko Stranger / Motho wa go se tsebje Official or legal authority / Motho wa molao Other(specify) / O mongwe(Hlaloša) Refused / Ga ke dumele go araba	1 2 3 4 5 6 7 8 88	V18
		Other (Specify) / O mongwe (Hlaloša)		V18other
19	Have you carried a loaded firearm on your person outside the home in the last 30 days? / Naa o ile wa swara sethunya sa goba le dikolo mo mmeleng wa gago, o se ka gae?	No / Aowa Yes, for protection / Ee, go itšhirelletša Yes, for work / Ee, ka baka la mošomo Yes, for sport (Hunting target practice) / Ee, ka baka la dipapadi (Go tsoma, go ithuta go lebantšha) Refused / Ga ke dumele go araba	1 2 3 4 88	V19
20	Time of end of interview (24 hour clock) / Nako ya Poledišano (go ya ka di-iri tše masomepedinne tša letšatši)	<div style="text-align: center;"> : hrs mins Di-Iri Metsotso </div>		17b

Appendix F: The definitions of variables used in results

MET	Metabolic equivalent (MET) is the ratio of a person's working metabolic rate relative to the resting metabolic rate. One MET is defined as the energy cost of sitting quietly, and is equivalent to a caloric consumption of 1 kcal/kg/hour.
Moderate intensity physical activity	Refers to activities which take moderate physical effort and that make you breathe somewhat harder than normal. Examples include cleaning, vacuuming, polishing, gardening, cycling at a regular pace or horse-riding. Moderate intensity activities require an energy expenditure of approximately 3-6 METs.
Vigorous intensity activity	Refers to activities which take hard physical effort and which make you breathe much harder than normal. Examples include loading furniture, digging, playing football, tennis or fast swimming. Vigorous activities require an energy expenditure of greater than 6 METs.
Risk Factor	Refers to any attribute, characteristic, or exposure of an individual, which increases the likelihood of developing a disease, or other unwanted condition/event.
Serving (of fruit or vegetable)	For vegetables this refers to one cup of raw, leafy green vegetables, (spinach, salad etc.), one half cup of other vegetables, cooked or raw (tomatoes, pumpkin, beans etc.), or a half cup of vegetable juice. For fruits, this refers to one medium-sized piece of fruit (banana, apple, kiwi etc.) or a half cup of raw, cooked or canned fruit or a half cup of juice from a fruit (not artificially flavored).
Alcohol consumption status	Alcohol consumption status of all respondents. Abstainers have not consumed alcohol in the last 12 months.
Standard drinks per drinking day	A standard drink contains approximately 10 g. of pure alcohol. Number of standard drinks consumed on a drinking day among those respondents who have drunk in the last 12 months.
Literacy	Proportion of respondents being able to read and write. Instrument question: Can you read and write?
Highest level of education	Highest level of education achieved by the survey respondents. Instrument question: What is the highest level of education you have completed?

Appendix G: Informed consent form for participants



Informed Consent Form.
Development of integrated, evidence-based chronic disease management model,
in a rural area of Limpopo Province.

University of Limpopo, Department of Medical Sciences support the practice of protecting research participants' rights. Accordingly, this project was reviewed and approved by the University Ethics committee and permission granted from Limpopo Department of Health. The information in this consent form is provided so that you can decide whether you wish to participate in our study. It is important that you understand that your participation is considered voluntary. This means that even if you agree to participate you are free to withdraw from the experiment at any time, without penalty. This study is an investigation into the Knowledge, Attitude and Practices for Community Health Care Workers, Traditional Health Practitioners, Leaders of NGO's and Faith Based Healers on Chronic Disease Management. For this study, you will be requested to participate in a Focus Group Discussion or In-depth Interview.

In addition, you will be tape recorded during the Focus Group Discussion or In-depth interviews, so that we can review the tapes for any clarity which might be needed after the interviews. These tapes will accessed only by project personnel, who will transcribe them, and then the tapes will be placed in a locked file cabinet in my office until when they will be destroyed. During this period only the principal investigator will have access to these tapes.

This study poses no known risks to your health and your name will not be associated with the findings. For participation in this research project, you won't receive any remuneration. Upon completion of your participation in this study you will be provided with a brief explanation of the question this study addresses. If you have any questions not addressed by this consent form, please do not hesitate to ask. You will receive a copy of this form, which you should keep for your records.

We thank you for your time.

Researcher's Signature: _____

(Researcher's name, office and phone number): _____

CONSENT STATEMENT:

I have read the above comments and agree to participate in this experiment. I give my permission to be tape recorded, under the terms outlined above. I understand that if I have any questions or concerns regarding this project I can contact the investigator at the above location or the University of Limpopo, Department of Medical Sciences

(Participant's signature) (date)

Appendix H: Participants Information leaflet for non-clinical research

Title of the study: Development of evidence-based integrated chronic disease management model, in a rural area, Limpopo Province, South Africa.

Mokgatha tema yo a rategago,
Dear Participant,

1. Matseno

1. Introduction

Re go mema go tšea karolo mo thuto nyakišišong. Letlakala tshedimošo le le tla go thuša go tšea sephetho ge o na le kganyogo go tšea karolo mo thutong ye. Pele o dumela go tšea karolo, o swanetše go kwišiša gore thuto nyakišišong ye. Poledišano ye e tlo tšea metsotso ye masome a mararo (30) go iša go iri (60). Ge o na le potšišo ye Letlakala tshedimošo le e sa e arabego ka botlalo, o se ke wa tshaba go botšiša Monyakišiši, Morena Eric Maimela

We invite you to participate in a research study. This information leaflet will help you to decide if you want to participate in the study. Before you agree to take part, you should fully understand what is involved. It will take almost 30 minutes to 60 minutes to complete the interview. If you have any questions that this leaflet does not fully explain, please do not hesitate to ask the investigator, Mr Eric. Maimela.

2. Semelo le maikemišotšo a thuto nyakišišong ye

2. The nature and purpose of this research study

Maikemišotšo a magolo a thuto nyakišišo ye ke hlabolla taolo ya malwetši a go se fole ka go tšweletša mohlala wo o akaretšega bohlatse bja taolo ya malwetši a go se fole ka go ditirelo tša holokomelo tša maphelo tša motheo. Wena bjalo ka motšea karolo, o mothopo o bohlokwa go tšweletša tshedimošo ya taolo ya malwetši a go se fole.

The main purpose of this research study is to develop an intervention program for the management and control of chronic diseases by introducing an evidence-based integrated chronic disease management model in Primary Health Care facilities. You as a participant, you are a very important source of information on the management and control of chronic diseases.

3. Tihalošo ya tshepidišo ye tla go latelwa

3. Explanation of procedures to be followed

Thuto nyakišišo ye e swaragana le dipolelišano ka mokgwa wa sehlopha polelišano le polelišano ye e tšeneletšego mabapi le taolo ya malwetši a go se fole.

This research study involves the interviews in a form of focus group discussion and in-depth interviews regarding the management and control of chronic diseases.

4. Kotsi le go hloka kgothatšo go leng gona

4. Risk and discomfort involved

Ga go na kotsi mo go tšeeng karolo mo thuto nyakišišo, le ge o ka ikwa o kare o nyaka go tlogela go tšea karolo o dumelwetšwe go ka tlogela.

There are no risks in participating in this research study and should you at any time during the interview feel that you no longer want to take part, you can withdraw.

5. Kgonagalo ya go holega ka thuto nyakišišo ye

5. Possible benefits of this research study

Le ge o ka se holege semetseng go tšwa go thuto nyakišišo ye, di poelo tša thuto nyakišišo di tla re thušša go hlabolla hlokomelo ya balwetši ba malwetši a go se fole.

Although you will not benefit directly from the research study, the results of the research study will enable us to improve care of patients with chronic diseases.

6. Di tokelo tša gago bjalo ka motšea karolo ke di fe?

6. What are your rights as a participant?

Go tšea karolo ga gago mo thuto nyakišišong ye ke ka boithaopo. O ka gana go tšea karolo goba o ka tlogela nako ye ngwe le yengwe gare ga polediano ntle le go fa lebaka. Go tlogela ga gago go ka go ame felo goba tswaro ya gago mo kliniking.

Your participation in this study is entirely voluntary. You can refuse to participate or stop at any time during the interview without giving any reason. Your withdrawal will not affect you or any treatment at the clinic in any way.

7. A thuto nyakišišo e hweditše tumelelo ya maleba?

7. Has the research study received ethical approval?

Thuto nyakišišo ye e hweditše tumelelo go tšwa go ba Yunibesithi ya Limpopo le Kgoro ya tša Maphelo ka Profenseng ya Limpopo. Ge o rata go hwetša se ngwalolla tumelelo o ka fiwa sona.

This research study has received written approval from the Research Ethics Committee of the University of Limpopo and the Department of Health in Limpopo Province. Copies of the approval letters are available if you wish to have one.

Appendix I: Focus Group Discussion Guide

Focus Group Discussion Guide for Patients, Community Health Workers, Traditional Health Practitioners and Nurses.

[As the team gets into the community and having sensitized the community leader on the study, the FGDs for patients, community health workers, traditional health practitioners and nurses. should be conducted before returning to interview officials at higher levels (District Level). This is important because questions raised will constitute part of the questions that will be posed to persons at the management higher level]

APPROPRIATE GREETINGS

PRESENTATION OF THE TEAM

We are working within a study conducted by **University of Limpopo (Turffloep Campus)** and your community has been chosen among the ones in this project. We will hold discussions with you on issues related to the delivery of essential health services in relation to chronic diseases in your community, your experiences of health services, and your relation with health services providers, involvement on the implementation of health interventions, major concerns about health and health programmes and how to address them. Your participation in the discussion is very valuable if you are willing to be involved. All information will be used without mentioning your names and held in confidence within the research team and among its collaborators. We seek your consent to record the discussion so that we could capture all the ideas expressed. We expect this discussion to last for about **60 minutes**.

INTRODUCTIONS.

Community: _____ Number of participants: _____

Type of Group: _____ Length of Discussion: _____ Date: _____

Moderator: _____ Note-taker: _____

Appendix J: Focus Group Discussion for Chronic Disease Patients

Name of Facility: _____

Record Start Time: _____

Number of participants: _____

Introduction

Matseno

Dumela. Leina la ka ke **Eric Maimela**. Ke mo legatong la sehlopha sa banyakišiši sa Unibesithi ya Limpopo (Turfloop campus). Re ikgakaganya le thuto ya malwetsi a go se fole mo profenseng ya rena kudu re lebeletse tikoigong ya ga-Dikgale.

Introduction

Good morning/afternoon. My name is **Eric Maimela**. I am here on behalf of the research team from University of Limpopo (Turfloop Campus). We are conducting a study on "**Chronic Disease Management**" in this province focusing on Dikgale HDSS .

Tshedimso ye re kgoboketsang e tla thusa lefapha la tsa maphelo go beakanya gabotse le go diragatša thibela malwetši le go laolo ditragalo re lebeletše malwetsi a go se fole. O kgethilwe go tsea karolo ka gare ga dipoledišane/diteko tše, ka ge re lemogile gore dikgopolo/maikutlo a gago a bohlokwa. Rekgopela gore o o abelane le rena dikgopolo tša gago mabapi le ditaba tšeo re tlo bago re boledišana ka tšona ka bo tšhepegi.

The information we are collecting will help the Department of Health to plan better and implement disease prevention and control activities in relation to chronic diseases. You have been selected to participate in this interview because we feel your views are important. I therefore, kindly request you to share your honest views on the issues we will be discussing.

Go tsea karolo ga gago ka mo gare ga dipoledišano tše, ke ka boitaopo o na le boikgethelo bja go se arabe tše dingwe tša di potšišo tšeo o sa ikwego go di araba, seo se ka se go ame felo. Ke rata go go tšhepiša gore tshedimoššo yeo o tlogo mpha yona e tla tšewa go ba sephiri le gore e tla dirišwa fela go maikemišetšo a thuto ye. Poledišano ye e tlo tšea metsotso ye masome a mararo (30) go iša go iri (60).

A o ka ba o na le dipotšišo goga ditshwayo pele re tšwela pele?

Your participation in this interview is voluntary and you are free not to respond to any questions you feel uncomfortable with and this will not affect you in any way. I would like, however, to assure you that the information you provide shall be kept confidential and will only be used for the purposes of this study. This interview will last approximately 45 to 60 minutes.

Do you have any question or comment before we proceed?

Mmotšološi (Ge go na le dipotšišo goba ditshwayotshwayo di lebelele pele o tšwela pele le poledišano). Ke rata go go kgopela gore o ntumelele go gatiša oiledišano ya rena gore re kgone go swara dilo ka moka tšeo re boledišanago ka tšona,

Interviewer (If any question/comment, please first address them before proceeding with the interview). I also wish to kindly request you to allow me tape-record this interview so that I can capture everything we discuss.

Mmotšološi: Ge mmotšološwa a gana gore poledišano e gatišwe ke setšeamantšu o se se diriše eupša o tšwele pele ka poledišano, o ngwale tšohle tšeo o di kwelego.

Interviewer: *In case, the respondents refuses tape –recording, do not use the tape but proceed with the interview and write down as much as you can.*

Inclusion criteria

- Adults patients diagnosed with diabetes or hypertension from the health facilities in the study area and gender balanced with be maintained where possible.

Exclusion criteria

- Elderly individuals who were critically ill and unable to comprehend questions will be excluded.

Can you tell me **your name**, your **current condition** and **how long you have been hypertensive/diabetic?**

Re botše maina a gago, bolwetši bja gago le ke go tloga neng o fokola bolwetsi bja madi a magolo goba bja swikiri?

Tell us (in short) how you became hypertensive/diabetic?

Re botše ka bokopana gore go tlile bjang gore on lwale?

Theme 1: Beliefs on non-communicable diseases and their risk factors

- *"What do you think might be the cause of your condition"*
 - probe for personal health beliefs.
- *"Ke eng se o nagang gore se ka ba se hlotše bolwetši bja gago"*
 - Nyakolla ka di tumelo tša maphelo a botho.
- *What were the first signs/symptoms you recognized as "abnormal"? Looking after the initiation of the help seeking process.*
- Dika tša mathomo tše o di bonego di sa thlwaelega e bile eng? Re lebelela morago ga go nyaka thušo
- How did you originally plan to deal with your condition?
- O thomile go nagana eng go rarolla bolwetsi bja gago pele?
- If you considered seeking professional help, what did you originally expect from that?
- Ge o be o nagana go hwetša thušo ya malaba, o be o lebeletše eng go seo?

Theme 2: Health seeking behaviours

- *How did you experience the first encounter with a "helper"?*
- O hweditše thulagano ya gago le mothuši e le bjang kgetlo la pele?
- *In what way was that encounter helpful? (treatment versus prevention of complications)*
 - Was it according to your expectations? In what way?
- Thulaganyo ya gago e be e na le mogola? (Hlathlobo vs dibelo ya go matlafala ga bolwetsi)
 - E be e le go ya le ka kakanyo ya gago?
 - Ka tsela efe?

Theme 3: Experiences with the current health care system

(Relate always to “your condition” rather than the vague “hypertension” and “diabetes”)

(Hlaloša go ya ka bolwetsi bja gago bja “madi a magolo” le “bolwetši bja swikiri”)

- Explain how patients are involved in making suggestions on improving chronic disease management
 - How in your opinion are you yourself involved in the management of your condition?
 - (probing for “locus of control”?) Is there any involvement? What degree?
 - Who is taking “action? The “helper” or the person him/herself?
- Hlaloša ka mo bolwetsi ba tšea go karolo go tliša di kakanyo go kaonafatša taolo ya malwetši a gosefole.
 - Go ya ka kakanyo ya gago o tšea karolo bjang go kaonafatša taolo ya bolwetsi bja gago
 - (O tšea karolo go fihla kae go kaonafatša bolwetsi bja gago?)
 - Ke mang a tšea go karolo go kaonafatša bolwetsi bja gago?
 - Mothuši goba molwetši ka bo yena?
- In what way do you feel the health care meets your personal needs?
- Ke ka tsela e fe yeo kgoro ya maphelo e kgotsafatšago dinyakwa tša gago?
- Describe your relationship with the health care providers in this facility
- Hlatolla kamano ya gago le baoki mo kliniking ye?
- What is according to you the right way for finding information about the daily personal management of your condition? (probe for self-management education)
- Go ya ka wena ke tsela e fe ya maleba ya go hwetša ditaba mabapi le go laola seemo sa gago sa bolwetsi tšatši ka tšatši?
- What is necessary for you to have sufficient understanding about your condition for managing it yourself on a daily basis?
 - Where or from whom would you like to receive information on the management of your condition?
- Ke eng se bohlokwa seo o se hlokago go ba le kwišišo ya maleba ka go laola bolwetsi bja gago ka bo wena tšatši ka tšatši?
 - Ke mo kae mo o ka ratago go hwetša ditaba ka go laola bolwetsi bja gago?
 - Ke mang o ka ratago gore a go fe ditaba ka go laola bolwetsi bja gago?
- “What could you suggest to other people in your region for not becoming affected as you? (Looking after preventive behaviours).
- Ke kakanyo di fe tšeo o ka difago batho ba bangwe mo tikologong ya lena gore ba se hwetše bolwetsi bjalo ka wena? (A re lebelele ditsela tša thibelo)
- What would you do to improve in the current health care for chronic diseases? Probe for pros and cons
- Ke eng seo o ka se lokišago ka kgoro ya tša maphelo mabapi le malwetši a go se fole?

Record Start Time: _____

[REITERATE OR HIGHLIGHT MAJOR DISCUSSIONS. THANK PARTICIPANTS FOR THEIR TIME. CLOSE APPROPRIATELY].

Appendix K: Focus Group Discussion for nurses

FRONTLINE HEALTH FACILITY PERSONNEL

1. Disease burden in the region/district/area

- a. What are the most common chronic diseases in this area?
- b. Who are the most affected?
- c. What factors are responsible for the disease burden in this area?

2. Interventions/programmes in place

- a. How are chronic disease patients managed in your health facility?
- b. How are health programmes in your health facility integrated with other stakeholders? E.g., THPs, CHCW's, NOG's, etc.
- c. What health programmes are there in this community in relation to **chronic disease management**?
- d. What is the role of the government in the implementation of these health programmes? (Is the government responsive to your needs?)
- e. Which organizations are involved in health care activities in this community?
- f. What is your view regarding the effectiveness of these programmes to meet the people's needs in relation to **chronic disease management**?
- g. What are your challenges with regard to integrating health services with THPs?
- h. Is there a systematic approach to coordinate health care interventions across levels?
- i. What trainings have you attended in relation to chronic disease management? What was covered in the trainings?

3. FRONTLINE HEALTH FACILITY LEVEL CONCERNS

If given the opportunity, what questions would you like to ask Government officials and/or health care providers about health care delivery in this community in relation to **chronic disease management**? (**Probe for provision of health facilities, medicines, posting of health personnel, etc**)

4. Role of health district in the provision of essential healthcare

- a. What is the role of the district health management team (LGA) in the provision of health care in this area? (**Probe on delivery of materials, supervision, reporting, etc.**)
- b. What challenges do you face in your interaction with the district/LGA Health Management Teams?

5. Community awareness of health problems in relation to chronic disease management

- a. What is your view of the community's use of the services in place?
- b. What opportunities exist?
- c. What are the difficulties?
- d. How are the people in this community encouraged to take part in health service delivery?
- e. How does your community get information on health? (**Probe on media, community meetings, etc.**)
- f. What is your view regarding the community's attitude towards the services you provide?

6. Community participation in health service delivery in relation to chronic disease management

- a. How are communities involved in health service delivery?
 - I. Mobilization and sensitization
 - II. Governance (decision-making)
 - III. Planning (the extent to which the communities have been involved – **probe for examples**)
 - IV. Implementation (service provision)

- V. Financing
- VI. Monitoring and evaluation
- b. How are community views channelled to influence or as a response to policies?
- c. How is feedback on policies channelled to community members?
- d. How the community members' are organised to participate in health service delivery? **(Probe whether they are organised in committees, groups, etc).**
- e. What challenges do you encounter in support the community's participation in health care delivery?
- f. What is your view about the level of community participation?

7. Readiness (willingness and ability/capacity) of the communities to engage in health service delivery in relation to chronic disease management

- a. How willing and ready are the people in this community to get involved in health service delivery? **(Please, give some examples).**
- b. What training has been undertaken for community members to increase their participation in health activities?
- c. What difficulties do people face in their participation in health care activities in this community?

8. How can communities be effectively involved in chronic disease management?

- a. What would you consider to be the roles of the communities in health care delivery **(Probe for awareness creation, financing, supporting community health worker, etc)**
- b. How can communities be made to play these roles?
- c. For how long have you been working in this clinic?

Questions asked by participants

Appendix L: Focus Group Discussion for Community Health Workers

COMMUNITY HEALTH WORKERS/VOLUNTEERS

1. Role in the Community Health Workers in relation to chronic disease management

- a. What health activities are you engaged in?
- b. What other activities are you engaged in?
- c. What do you think is your role in chronic disease management?
- d. Do you think you are given the opportunity to play that role?
- e. How long have you been a CHWs in this area?
- f. How were you selected to be a CHW?
- g. What is your view on this selection process?
- h. How are CHWs in this area organised?
(Probe on whether they are in groups, etc)
- i. What motivates you to keep doing this work? (Probe on community support).
- j. Are you receiving any financial or other remuneration? If yes, please specify.
- k. How do you relate with the health workers at the health facilities?
(Probe on referrals, supervision, supplies, reporting, etc).
- l. How do you collaborate with Traditional Health Practitioners in your area?
(Probe on referrals, supervision, supplies, reporting, etc).

2. Capacity to implement health delivery interventions in relation to chronic disease management

- a. What training activities have you and other CHWs received?
- b. What were you trained on?
- c. What is your view about this training?
- d. What is the relationship between CHWs, health workers and Traditional Health Practitioners in this community?
- e. What difficulties do you encounter in your work?

3. Disease burden chronic disease in the area

- a. What are the most common chronic diseases in this area?
- b. What are the main factors for the mentioned diseases?
(Probe on the causes for the various diseases)
- c. Which groups are the most affected?

4. COMMUNITY LEVEL CONCERNS

- a. If given the opportunity, what questions would you like to ask Government officials and/or health care providers about health care delivery in this community in relation to chronic disease management?
(Probe for provision of health facilities, medicines, posting of health personnel, etc)

5. Community Health Care workers awareness of chronic disease prevention and management

- a. What is your view of the community's use of your services in place?
- b. What opportunities exist for CHWs in chronic disease management?
- c. What are the constraints for CHWs in relation to chronic disease prevention and management?
- d. How are the CHWs in this community encouraged to take part in health service delivery?
- e. How does CHWs get information on chronic disease prevention and management?
(Probe on media, community meetings, etc).

6. Community Health workers participation in health service delivery in relation to chronic disease prevention and management

- a. How are CHWs involved in health service delivery?
- b. Governance (decision-making)
- c. Planning (the extent to which the communities have been involved – **probe for examples**)
 - I. Implementation (service provision)
 - II. ii. Monitoring and evaluation
 - III. iii. Financing
 - IV. iv. Mobilization and sensitization
 - V. Communication and delivery of health messages
- d. How are CHWs views channelled to influence or as a response to policies?
- e. How is feedback on policies channelled to CHWs?
- f. How are CHWs organised to participate in health service delivery? Probe whether they are organised in committees, groups, etc
- f. What is your view about the level of CHWs participation?
(Probe on community-based insurance, voucher schemes, waivers).

7. Readiness (willingness and ability/capacity) of the communities to engage in health service delivery)

- a. How willing and ready are the CHWs in this community to get involved in health service delivery? **Please, give some examples.**
- b. What training has been undertaken for CHWs to increase their participation in health activities?
- c. What difficulties do people face in their participation in health care activities in this community?

Appendix M: Focus Group Discussion for Traditional Health Practitioners

1. Kimelo ya malwetši tikologong ye

1. Disease of burden in the area

a)	Ke malwetši afe a go se fole a atilego tikologong ye? What are the most common chronic diseases in this area?
b)	Ke batho ba fe ba amegago kudu? Who are the most affected?
c)	Ke dilo di fe tše di na go le maikarabelo a kimelo ya malwetši a go se fole dikologong ye? What factors are responsible for the burden of chronic disease in this area?

2. Mananego a alego gona a go laola goba go kaonafatša malwetši a go se fole

2. Programmes in place for management or control of chronic disease

a)	Ke mananego a fe a tša maphelo ao le swaraganego le ona mo setšhabeng mabapi le taolo ya malwetši a go se fole? What health programmes are you involved in this community in relation to chronic disease management ?
b)	Ke tema efe ya dingaka tša setšo ka go diragatša mananego a a maphelo? (A mmušo o na le boikarabelo go dinyakwa tša lena?) What is the role of the Traditional Health Practitioners in the implementation of these health programmes? (Is the government responsive to your needs?)
c)	Ke mekgatlo efe yeo dingaka tša setšo di šomišanago le yona go diragatša ditirelo tša hlokomelo ya maphelo mo setšhabeng? Which organizations are THPs partnering with in the implementation of health care services in this community?
d)	Kgopolo ya gago ke efe mabapi le tšhomo ya mananego a go araba dinyakwa tša batho mabapi le taolo ya malwetši a go se fole? What is your view regarding the functionality of these programmes to answer the people's needs in relation to chronic disease management ?
e)	A go na le peakanyo ya go iša balwetši go ditirelo tša maphelo? Is there a referral system for patients do be referred to health facilities?
f)	A go na le peakanyo ya go šala morago kaonafalo ya balwetši? Is there a system to follow up patient's improvements?
g)	A go na le tšhomišano magareng ga dingaka tša setšo le baabi ba hlokomelo ya tša maphelo mo setšhabeng? Is there collaboration between THPs and Health care providers in this community?

3. Dipelaelo tša dingaka tša setšo

3. Traditional health practitioners concerns

Ge o ka fiwa sebaka, ke Dipotšišo dife tšeo o ka ratago go botšiša badirela Mmušo goba ba hlokomelo ya tša maphelo mabapi le kabo ya hlokomelo ya tša maphelo mo setšhabeng mabapi le taolo ya malwetši a go se fole? **(Nyakišiša/fatišiša ka tlišo ya ditirelo tša maphelo, dihlaro, mešomo ya bašomi ba tša maphelo, kopanyo ya ditirelo tša maphelo le dingaka tša setšo, bjalobjalo)**

If given the opportunity, what questions would you like to ask Government officials and/or health care providers about health care delivery in this community in relation to **chronic disease management**? **(Probe for provision of health facilities, medicines, posting of health personnel, Integration of Health Services with Traditional Health Practice, etc)**

4. Tema ya dingaka tša setšo ka kabo ya ditirelo tša maphelo tše bohlokwa

4. Role of Traditional Health Practitioners in the provision of essential healthcare

a	Ke tema efe ya dingaka tša setšo mo kabong ya hlokomelo ya tša maphelo mo motseng? (Nyakišiša ka thomelo ya balwetši go ditirelo tša maphelo tša mmušo, bolebeledi bja balwetši, go begela ditirelo tša maphelo, bjalobjalo)
	What is the role of the Traditional Health Practitioners in the provision of health care in this area? (Probe on referral of patients to Public Health Facilities, patient supervision, reporting to health facilities, etc.)
b	ke mathata afe ao o kopanago le ona ge o ikgokaganya le ditirelo tša maphelo tša mmušo?
	What challenges do you face in your interaction with the Public Health Facilities?

5. Go lemoga ga setšhaba ka mathata a maphelo mabapi le taolo ya malwetši a go se fole

5. Community awareness of health problems in relation to chronic disease management

a)	Kgopolo ya gago ke efe ka setšhaba mabapi le ditirelo tšeo di lego gona tša maphelo tša setšo?
	What is your view of the community's use of the Traditional Health services in place?
b)	Ke menyatla efe yeo e lego gona go ditirelo tša maphelo tša setšo?
	What opportunities exist for Traditional Health Services?
c)	Ke mathata afe a lego gona go ditirelo tša maphelo tša setšo?
	What are the difficulties Traditional Health Services?
d)	Dingaka tša setšo di hlohleletšwa bjang go tšea karolo mo go abeng ditirelo tša maphelo?
	How are Traditional Health Services in this community encouraged to take part in health service delivery?
e)	Na ditirelo tša gago tša setšo tša maphelo to thekga bjang taolo ya malwetši a go se fole?
	How does your Traditional Health Practice support Chronic Disease Management?
f)	Kgopolo ya gago ke efe ka setšhaba mabapi le tšhomošo ya ditirelo tša maphelo tša setšo tšeo o di fago?
	What is your view regarding the community's attitude towards the Traditional Health Services you provide?

6. Go tšea karolo ga Mmušo go aba ditirelo tša maphelo tša setšo mabapi le taolo malwetši a go se fole

6. Government participation in Traditional health service delivery in relation to chronic disease management

a)	Mmušo o ikamanya bjang le kabo ya ditirelo tša maphelo tša setšo?
	How is Government involved in Traditional health service delivery?
	i. Tsamaišo le kwalakwatšo
	Mobilization and sensitization
	ii. Taolo (tšea sephetho)
	Governance (decision-making)
	iii. Peakanyo (mmušo o ikgokaganya bjang – Nyakišiša mehlala)
	Planning (the extent to which the Government is been involved – probe for examples)
	iv. Kgokaganyo le tiragatšo (go aba ditirelo)
	Integration and Implementation (service provision)
v. Hlahlo	
Training	
vi. Tebeledišišo le go lekodišiša	
Monitoring and evaluation	
b)	Dikgopolo tša dingaka tša setšo di diriswa bjang go huetša goba bjalo ka phetholo go di peakanyo/maano a Mmušo?
	How are Traditional Health Practitioners views channelled to influence or as a response to government policies?
c)	Di pego morago tša Peakanyo/maano a mmušo di tlišwa bjang go dingaka tša setšo?
	How is feedback on policies channelled to Traditional Health Practitioners?
d)	Dingaka tša setšo di beakantšwe bjang go tšea karolo go tlišo ya ditirelo tša maphelo? (Nyakišiša ge e le gore di beakantšwe mo metseng, kgobokanya, bjalobjalo)
	How are the Traditional Health Practitioners organised to participate in health service delivery? (Probe whether they are organised in committees, groups, etc).
e)	Ke mathata afe ao le hlakanago le ona go thekgo ya dingaka tša setšo go tliša ditirelo tša maphelo?
	What challenges do you encounter in support of Traditional Health Practitioners participation in health care delivery?
f)	Kgopolo ya lena ka go tšea karolo ga dingaka tša setšo go taolo ya malwetši a go se fole ke efe?
	What is your view about the level of Traditional Health Practitioners participation chronic disease management?

7. Go itukiša (go dumela le bokgoni/tsebo) ga dingaka tša setšo go tšea karolo mabapi le taolo ya malwetši a go se fole

7. Readiness (willingness and ability/capacity) of the Traditional Health Practitioners to engage in health service delivery in relation to chronic disease management

a)	A dingaka tša setšo di ikemišeditše bjang mo setšhabeng se go tšea karolo go kabo ya ditirelo tša maphelo? How willing and ready are the Traditional Health Practitioners in this community to get involved in health service delivery? (Please, give some examples).
b)	Ke hlahlo efe ye e dirilwego go dingaka tša setšo go oketša go tšea karolo ga bona mo ditirelo tša maphelo? What training has been undertaken for Traditional Health Practitioners to increase their participation in health activities?
c)	Ke mathata afe a dingaka tša setšo di kopanago le ona go tšeeng karolo go ditirelo tša hlokomelo ya tša maphelo mo motseng? What difficulties do Traditional Health Practitioners face in their participation in health care activities in this community?

8. Na dingaka tša setšo di ka atlega bjang go tšea karolo go taolo ya malwetši a go se fole?

8. How can Traditional Health Practitioners be effectively involved in chronic disease management?

a)	Na e ka ba se fe seo le ka se hlokomelago gore dingaka tša setšo di tšee tema go kabo ya ditirelo tša maphelo? (Nyakišiša hlolo ya temošo, thekgo ya ditšhelete, thekgo ya bašomi ba tša maphelo ba motes, bjalobjalo) What would you consider to be the roles of the Traditional Health Practitioners in health care delivery (Probe for awareness creation, financing, supporting community health worker, etc)
b)	Na dingaka tša setšo di ka dirwa bjang gore di tšee karolo go taolo ya malwetši a go se fole? How can Traditional Health Practitioners be made to play roles in chronic disease management?

Dipotšišo?

Appendix N: Semi-structured interviews for Clinic Manager

[During the interview of this category of respondents, the interviewer should make use of questions generated from the chronic disease patients, traditional health practitioners during FGD sessions and IDIs with traditional health practitioners and health workers at the community level]

Date of the interview: _____

Name of the interviewer: _____

Name of respondent: _____

Position/title in the Health Facility: _____

Responsibilities in the Health facility:

Introduction

Good morning/afternoon. My name is.....I am here on behalf of the research team from University of Limpopo (Turffloop Campus). We are conducting a study on “**Chronic Disease Management**” in this province focusing on Dikgale HDSS .

The information we are collecting will help the Department of Health to plan better and implement disease prevention and control activities in relation to chronic diseases. You have been selected to participate in this interview because we feel your views are important. I therefore, kindly request you to share your honest views on the issues we will be discussing.

Your participation in this interview is voluntary and you are free not to respond to any questions you feel uncomfortable with and this will not affect you in any way. I would like, however, to assure you that the information you provide shall be kept confidential and will only be used for the purposes of this study. This interview will last approximately 45 to 60 minutes.

Do you have any question or comment before we proceed?

Interviewer *(If any question/comment, please first address them before proceeding with the interview).*

I also wish to kindly request you to allow me tape-record this interview so that I can capture everything we discuss.

Interviewer: *In case, the respondents refuses tape –recording, do not use the tape but proceed with the interview and write down as much as you can.*

1. Community knowledge about Chronic Disease Management

- a) What are the most common “**Chronic Diseases**” in your health facility?
- b) What are the main factors for the mentioned diseases? (**Probe on the causes for the various diseases**)
- c) Which groups of persons are the most affected?
- d) What are the local definitions for chronic disease management?
- e) Do people link the symptoms and manifestations to chronic diseases when consulting in your health facility?

2. Treatment-seeking behaviour

- a) What are the beliefs which guide treatment-seeking paths for community members
- b) What are the reasons which guide treatment-seeking paths for community members
- c) What is your view about the community’s use of the primary health care services available to them?
- d) What opportunities exist for communities about primary health services?
- e) What are the difficulties for communities with regard to primary health services?
- f) How are primary health practitioners engaged in mobilising communities to engage in health care delivery activities?
- g) How is primary health care information communicated to communities?
- h) What is the relationship between the primary health practitioners and community members?

3. Mode of acquisition of primary health care services

- a) What are the modes of acquiring primary health care services by community members?
- b) In what ways are communities involved in health service delivery?

- I. Mobilization and sensitization
- II. Governance (decision-making)
- III. Planning (the extent to which the communities views / needs have been taken into account or driven the agenda – **probe for concrete examples**)
- IV. Implementation (service provision)
- V. Monitoring and evaluation

4. Management of chronic diseases

- a) What are the systems available management of chronic diseases?
- b) Are there primary health care management meetings held for chronic diseases?
- c) Are there proper referral systems from the traditional health practitioners or private health care providers to the public health facilities?
- d) What health programmes are in place in your catchment area?
- e) What is the role of the government in addressing these programmes? Is the government responsive to the needs of the people? (Probe on investments in health)
- f) Who are your main partners in health care delivery, in the district?

5. Collaboration of primary health care with traditional healers and private health care practitioners

- a) Is there a formal collaboration with traditional healers?
- b) Is there willingness to collaborate with traditional healers?
- c) What are the collaboration areas with traditional healers?
- d) Is there a formal collaboration with private health practitioners?
- e) Is there willingness to collaborate with private health practitioners?
- f) What are the collaboration areas with private health practitioners?
- g) Is there a formal collaboration with Non-Governmental Organizations?
- h) Is there willingness to collaborate with Non-Governmental Organizations?
- i) What are the collaboration areas with Non-Governmental Organizations?

6. Concerns

Ask questions that were raised by chronic disease patients, traditional health practitioners and managers in the department of health as well as health workers at the community level at this point

Questions

- a) _____ ?
- b) _____ ?
- c) _____ ?
- d) _____ ?
- e) _____ ?
- f) _____ ?

Appendix O: Semi-structured interviews for Community Health Workers Manager

[During the interview of this category of respondents, the interviewer should make use of questions generated from the chronic disease patients, traditional health practitioners during FGD sessions and IDIs with traditional health practitioners and health care workers at the facility level]

Date of the interview: _____

Name of the interviewer: _____

Name of respondent: _____

Position/title in the Community/NGO: _____

Responsibilities in the Community/NGO:

Introduction

Good morning/afternoon. My name is.....I am here on behalf of the research team from University of Limpopo (Turffloop Campus). We are conducting a study on “**Chronic Disease Management**” in this province focusing on Dikgale HDSS .

The information we are collecting will help the Department of Health to plan better and implement disease prevention and control activities in relation to chronic diseases. You have been selected to participate in this interview because we feel your views are important. I therefore, kindly request you to share your honest views on the issues we will be discussing.

Your participation in this interview is voluntary and you are free not to respond to any questions you feel uncomfortable with and this will not affect you in any way. I would like, however, to assure you that the information you provide shall be kept confidential and will only be used for the purposes of this study. This interview will last approximately 45 to 60 minutes.

Do you have any question or comment before we proceed?

Interviewer *(If any question/comment, please first address them before proceeding with the interview).*

I also wish to kindly request you to allow me tape-record this interview so that I can capture everything we discuss.

Interviewer: *In case, the respondents refuses tape –recording, do not use the tape but proceed with the interview and write down as much as you can.*

1. Community knowledge about Chronic Disease Management

- a) What are the most common “**Chronic Diseases**” in the community you are serving?
- b) What are the main factors for the mentioned diseases? (**Probe on the causes for the various diseases**)
- c) Which groups of persons are the most affected?
- d) What are the local definitions for chronic disease management?
- e) Do people link the symptoms and manifestations to chronic diseases when you visit them in the households?

2. Treatment-seeking behaviour

- a) What are the biochemical and traditional beliefs which guide treatment-seeking paths for community members
- b) What are the logics which guide treatment-seeking paths for community members
- c) What is your view about the community’s use of the community health care services available to them?
- d) What opportunities exist for communities about community health care services?
- e) What are the difficulties for communities with regard to community health care services?
- f) How are community health care workers engaged in mobilising communities to engage in health care delivery activities?
- g) How is community health care information communicated to communities?
- h) What is the relationship between the community health care workers and community members?

3. Mode of acquisition of community health care services

- a) What are the modes of acquiring community health care services by community members?
- b) In what ways are communities involved in community health care service delivery?
 - I. Mobilization and sensitization

- II. Governance (decision-making)
- III. Planning (the extent to which the communities views / needs have been taken into account or driven the agenda – **probe for concrete examples**)
- IV. Implementation (service provision)
- V. Monitoring and evaluation

4. Management of chronic diseases

- a) What are the systems available for management of chronic diseases by community health care workers?
- b) Are there community health care workers management meetings held for chronic diseases?
- c) Are there proper referral systems from the community health care workers to the public health facilities?
- d) What health programmes are in place in your catchment area for community health care workers?
- e) What is the role of the government in addressing these programmes? Is the government responsive to the needs of the people? (Probe on investments in health)
- f) Who are your main partners in health care delivery, in the district?

5. Collaboration of community health care workers with primary health care workers and traditional healers including private health care practitioners

- a) Is there a formal collaboration with Primary Health Care facilities?
- b) Is there willingness to collaborate with Primary Health Care facilities?
- c) What are the collaboration areas with Primary Health Care facilities?
- d) Is there a formal collaboration with traditional healers?
- e) Is there willingness to collaborate with traditional healers?
- f) What are the collaboration areas with traditional healers?
- g) Is there a formal collaboration with private health practitioners?
- h) Is there willingness to collaborate with private health practitioners?
- i) What are the collaboration areas with private health practitioners?

- j) Is there a formal collaboration with other Non-Governmental Organizations?
- k) Is there willingness to collaborate with other Non-Governmental Organizations?
- l) What are the collaboration areas with other Non-Governmental Organizations?

6. Concerns

Ask questions that were raised by chronic disease patients, traditional health practitioners and managers in the department of health as well as health workers at the facility level at this point

Questions

- g) _____?
- h) _____?
- i) _____?
- j) _____?
- k) _____?
- l) _____?

**Appendix P: Semi-structured interviews for District Manager for
Chronic Disease Programme**

Chronic Disease burden in the Capricorn District?

Mod: What are the most common chronic diseases in this district? What are the main factors for the mentioned diseases?

Mod: Which groups of persons are the most affected?

Interventions/programmes in place for chronic disease management

Mod: What health programmes are in place in your district?

Mod: What is the role of the district in addressing these programmes? Is the government responsive to the needs of the chronic disease patients?

Mod: Who are your main partners in delivery of chronic disease management in the district?

Community awareness of health problems

Mod: What is your view about the community's use of the district health services available to them?

Mod: What opportunities exist for chronic disease patients?

Mod: What are the difficulties of chronic disease patients?

Mod: How is the District Health Management Team engaged in mobilising communities to engage in delivery of chronic disease management activities?

Mod: How is health information communicated to communities in this district?

Mod: What is the relationship between the health providers and community members on chronic disease management?

Community participation in health service delivery

Mod: In what ways are communities involved in health service delivery on chronic disease management?

Mod: Mobilization and sensitization communities on chronic disease management and prevention

Mod: Governance (decision-making)

Mod: Planning (the extent to which the communities views / needs have been taken into account or driven the agenda) chronic disease management

Mod: Implementation (service provision) chronic disease management activities

Mod: Monitoring and Evaluation of chronic disease management activities

Mod: How are community views channelled to influence or as a response to policies on chronic disease management?

Mod: How is feedback on policies channelled to community members on chronic disease management?

Mod: How is the community organised to engage in chronic disease management activities?

Mod: How is the community voice represented at the district level?

Medical structures and their functionality

Mod: Equipment for chronic disease management

Mod: Favourable environment for primary health care workers

Mod: Availability of medical staff

Mod: Quality of infrastructures

Readiness of community to participate in health care delivery

Mod: What is the willingness of communities in this area to get involved in health service delivery for chronic disease management?

Mod: What training and support activities are in place for enhancing community participation on chronic disease management?

Mod: What challenges do communities encounter in their involvement in health service delivery for chronic disease management?

Mod: What is your view regarding the ability of the programmes to meet the community members' expectations on chronic disease management?

How can communities be effectively involved?

Mod: What would you consider to be the roles of the communities in health care delivery for chronic disease management?

Mod: How can communities be made to play these roles?

**Health workers, community health care workers and traditional health practitioners concerns:
These are the comments and questions that arose during the study.**

Mod: Can You as District Manager kindly respond to these issues:

1. Shortage of medication for chronic disease patients
2. Lack of supervision from the district office
3. Lack of transport for nurses to conduct home visits for chronic disease patients
4. Shortage of medical staff
5. Lack of trainings for health care workers on chronic diseases
6. The equipment's which are not of good quality
7. Non functionality of the clinic committees

**Appendix Q: Semi-structured interviews for Provincial Manager
for Chronic Disease Programme**

[During the interview of this category of respondents, the interviewer should make use of questions generated from the chronic disease patients, traditional health practitioners during FGD sessions and IDIs with traditional health practitioners and health workers at the community level]

Date of the interview: _____

Name of the interviewer: _____

Name of respondent: _____

Position/title in the Province: _____

Responsibilities in the Province:

Introduction

Good morning/afternoon. My name is.....I am here on behalf of the research team from University of Limpopo (Turfloop Campus). We are conducting a study on “**Chronic Disease Management**” in this province focusing on Dikgale HDSS .

The information we are collecting will help the Department of Health to plan better and implement disease prevention and control activities in relation to chronic diseases. You have been selected to participate in this interview because we feel your views are important. I therefore, kindly request you to share your honest views on the issues we will be discussing.

Your participation in this interview is voluntary and you are free not to respond to any questions you feel uncomfortable with and this will not affect you in any way. I would like, however, to assure you that the information you provide shall be kept confidential and will only be used for the purposes of this study. This interview will last approximately 45 to 60 minutes.

Do you have any question or comment before we proceed?

Interviewer *(If any question/comment, please first address them before proceeding with the interview).*
I also wish to kindly request you to allow me tape-record this interview so that I can capture everything we discuss as we might take more time when writing your responses.

1. Chronic Disease burden in the Capricorn District?

Mod: What are the most common chronic diseases in this district? What are the main factors for the mentioned diseases?

Mod: Which groups of persons are the most affected?

2. Interventions/programmes in place for chronic disease management

Mod: What health programmes are there in place in the province for chronic disease management?

Mod: What is the role of the provincial office in addressing these programmes?

- Is the government responsive to the needs of the chronic disease patients?

Mod: Who are the main partners in delivery of chronic disease management in the province? E.g. NGO's etc

3. Community awareness of health problems

Mod: What is your view about the community's use of the health services available to them?

Mod: What opportunities exist for chronic disease patients?

Mod: What are the difficulties for chronic disease patients?

Mod: How is the Provincial Health Management Team engaged in mobilising communities to engage in delivery of chronic disease management activities?

Mod: How is health information communicated to communities in the province?

Mod: What is the relationship between the **health providers** and **community members** on chronic disease management?

Mod: What is the relationship between the **health providers** and **Traditional Healers** on chronic disease management?

4. Community participation in health service delivery

Mod: In what ways are communities involved in health service delivery on chronic disease Management and prevention?

Mod: How are communities mobilised and sensitized about chronic disease management and prevention

Mod: How are communities involved in Governance (decision-making)

Mod: How are communities involved in planning chronic disease management and prevention activities? (the extent to which the communities views / needs have been taken into account or driven the agenda)

Mod: How are communities involved in implementation (service provision) chronic disease management activities?

Mod: How are communities involved in Monitoring and Evaluation of chronic disease management activities?

Mod: How are community views channelled to influence or as a response to policies on chronic disease management?

Mod: How is feedback on policies channelled to community members on chronic disease management?

Mod: How is the community organised to engage in chronic disease management activities?

Mod: How is the community voice represented at the Provincial level?

5. Medical structures and their functionality

Mod: What is the state of equipment for chronic disease management?

Mod: Are there favourable environment for primary health care workers to implement chronic disease management programmes?

Mod: What can you say about availability of medical staff?

Mod: What can you say about the quality of infrastructures?

6. Readiness of community to participate in health care delivery

Mod: What is the willingness of communities in the province to get involved in health service delivery for chronic disease management?

Mod: What training and support activities are in place for enhancing community participation on chronic disease management?

Mod: What challenges do communities encounter in their involvement in health service delivery for chronic disease management?

Mod: What is your view regarding the ability of the programmes to meet the community members' expectations on chronic disease management?

7. How can communities be effectively involved?

Mod: What would you consider to be the roles of the communities in health care delivery for chronic disease management?

Mod: How can communities be made to play these roles?

8. Health workers, community health care workers and traditional health practitioners concerns:
These are the comments and questions that arose during the study while interviewing HCW's, CHBC's, Chronic Disease Patients and THPs.

Mod: **Can You as Provincial Manager kindly respond to the following issues?**

1. Shortage of medication for chronic disease patients
2. Lack of supervision from the district and provincial office
3. Unavailability of surveillance system for chronic diseases
4. Lack of transport for nurses to conduct home visits for chronic disease patients
5. Shortage of medical staff in clinics
6. Lack of trainings for health care workers on chronic diseases
7. Lack of updates on guidelines
8. Lack of trainings for Home Based Carers on chronic diseases
9. Lack of trainings for Traditional Healers on chronic diseases
10. The equipment's which are not of good quality
11. Non functionality of the clinic committees
12. Poor feedback mechanism at all levels
13. Lack or unavailability of funding for Traditional Healers

Conclusion:

1. If you were to suggest improvements to the health services in relation to **chronic diseases management** what would you suggest?
(PROBE FOR: HUMAN RESOURCES. MEDICAL EQUIPMENT. MEDICINES, LABORATORY SERVICES, AND POSSIBLE MECHANISMS).
2. Any questions which you need to ask?
 - _____ ?
 - _____ ?
 - _____ ?

Thanks very for your participating we will try by all means to bring feedback to you in a form of a workshop which will be held with all the relevant stakeholders and the departmental executive management to discuss the way forward