UNIVERSITY OF THE WESTERN CAPE

Faculty of Community and Health Sciences

PhD THESIS

Title: Investigating predictors of Health-Related Quality of Life and Functional Status in middle-aged to older adults with hypertension in a selected urban community

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Type of Thesis: This thesis submitted for the degree of Doctor of Philosophy, in the Community and Health Sciences Faculty, School of Public Health, University of the Western Cape.

Degree: PhD in Public Health

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Date: February 2020

Abbreviations and Acronyms:

CVD	Cardiovascular diseases
FS	Functional status
H-RQol	Health-related quality of life
MCS	Mental Component Status
NCD	Non-communicable disease
PCI	Proactive Coping Inventory
QoL	Quality of life
PCS	Physical Component Status
PURE	Prospective Urban Rural Epidemiology
SF 36 v²	Medical Outcomes Survey Short Form 36 version 2
SPF	Social production functioning
SPSS	Statistical program for the social sciences
STATS SA	Statistics South Africa
UN	United Nations
WHO	World Health Organization
WHOQOL-BREF	World Health Organization Quality of Life scale Brief

Abstract

Introduction: In this study, predictors of health-related quality of life and functional status in people with hypertension were investigated. Hypertension is the leading preventable cause of premature death.

Aims: The aims of the study were to (1) assess the relationships between socio-demographic variables, psychosocial variables and disease morbidity with health-related quality of life (H-RQoL) and functional status (FS) outcome variables, and (2) develop multivariate predictive models to predict H-RQoL (social, psychological, physical and environmental) and FS physical component summary (PCS) and mental component summary (MCS) outcomes.

Methods: A sample of 173 hypertensive participants was subjected to self-administered questionnaires to assess their levels of H-RQoL and FS. Secondary data, including anthropometric and blood pressure measurements, disability and chronic disease were used from the South African Prospective Urban Rural Epidemiology Study, University of the Western Cape. Additional data were collected using a series of questionnaires, 1.) a personal and demographic questionnaire, 2.) the World Health Organization Quality of Life – Brief, the Medical Outcomes Survey Short-Form 36 version 2 (SF 36 v2), and 3.) the Proactive Coping Inventory (PCI) questionnaire.

Using systematic data analysis, we assessed (1) relationships between socio-demographic, psychosocial and disease morbidity variables through correlational analysis (Pearson r, ANOVA), and (2) the value of socio-demographic, psychosocial and disease morbidity variables in predicting H-RQoL and FS through multivariate regression analysis yielding six separate regression models.

Results: Findings revealed demographic factors (education, marital status), psychosocial factors (coping, stress) and disability were significant predictors of H-RQoL and FS. Marital status, home, work, and financial stress was significantly associated with improved physical, social relationships and environmental quality of life. Engaging in reflective, strategic, preventive, instrumental, emotional and avoidance coping had a significant and positive effect on physical quality of life, but had significant negative effects on social relationships (and environmental quality of life. Having several disabilities negatively affected the quality of life across all subscales. For FS, the PCS was significantly associated with age, marital status and employment, and negatively with strategic, emotional support seeking and avoidance coping. Financial stress, stress at home, and religious group involvement were significantly associated with the MCS.

Predictors in the psychological QoL model explained 28% of the variance in the model. Having secondary schooling (p=0.002) and some stress at home (p=0.001) significantly predicted the psychological quality of life. Not belonging to a religious group (p=0.019) had a positive influence on social relationships QoL and having moderate financial stress (p=0.028) had a negative impact, explaining 27% of the variance in the model. Having a college or university education (p=0.039) and utilising reflective coping (p=0.006) predicted increased physical QoL significantly, whereas strategic coping predicted decreased physical QoL. Predictors in the physical QoL model explained 23% of the variance in the model. Possessing a college or university education (p=0.009) and being unemployed because of illness or old age (p=0.029) significantly predicted increased environmental QoL. Having several limitations (p=0.002) resulted in five times lower environmental QoL. The predictors in the model could explain only 19% of the variance in the model. The final model for the PCS revealed reflective coping (p=0.042) was the only predictor that increased physical FS. Being currently married (p=0.001), divorced or separated (p=0.013), having secondary schooling (p=0.003) or college or university education (p=0.004), engaging in avoidance coping (p=0.043) and having several disabilities (p=0.000) significantly decreased physical FS, explaining 40% of the variance in the model. In the MCS final model, emotional coping (p=0.053) increased mental FS. Being currently married (p=0.011), divorced or separated (p=0.006), having stopped working because of illness (p=0.008), having moderate home stress (p=0.041) and financial stress (p=0.015) predicted decreased MCS significantly. Predictors in the MCS model explained 36% of the variance in the model.

Conclusion: Through the use of a theoretical framework, the Wilson-Cleary model of health-related quality of life facilitated a fuller understanding of the several factors impacting H-RQoL and FS. Therefore, it is recommended that large-scale studies investigate the causal relationship between these factors. The study highlights the adverse impact of disability and presence of comorbid diseases on QoL and functional status. The value of the study lies in the fact that assessing how an individual perceives his or her health is necessary to develop appropriate treatment strategies which should lead to positive health outcomes.

Declaration

I declare that *Investigating predictors of Health-Related Quality of Life and Functional status in middle-aged to older adults with hypertension in a selected urban community* is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Full name. Mario Andre Clayford Date. February 2020

Signed. 

Acknowledgements

I would like to thank the following people who without this research work would not have been possible.

To Prof. Thandi Puoane and Prof. Pamela Naidoo, my thesis advisors, thank you for all your patience, guidance, and advice. Without you both this would not be possible.

To Dr Zandile Mchiza, thank you for your guidance and motivation in me pursuing this degree.

Thank you to all my colleagues from the Human Sciences Research Council (Natalie, Cheryl, Saahier, Firdous, Takura, Demetre, Janine, and others) your support, interest and encouragement are appreciated.

Thank you to Ronel Sewpaul, who assisted with the statistical analysis. To Prescious Madavhanu, Takura Kupamupindi, Lwando Kondlo and Moses Sithole who advised on statistical matters, thank you very much.

To the participants who have taken part in this study, this would not have been possible without your contribution, thank you.

This study was conducted with support of the National Research Foundation as well as the Belgian Development Cooperation, through the Institute of Tropical Medicine Antwerp (Grant Ref: FA4 DGD-ITM 2017-2020). Your assistance is greatly appreciated.

To my mom, Emily, dad Andre', Basil Jacobs, Stephen Erasmus, siblings Shawn, Shannon, Jolene and Randall, wife Ophelia, thank you for your continued support.

To Dr Jean Fourie, for the editing of this thesis, your work is simply fantastic.

To my family and friends your infinite support is appreciated.

Most of all, to our God and Heavenly Father for making all things possible, thank you!

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Definition of terms

Coping: refers to active efforts to master, reduce, or tolerate the demands created by stress.

Functional status: is defined as an individual's ability to perform regular daily activities required to meet basic needs, fulfil usual roles, and maintain health and well-being.

Hypertension: In this study, hypertension is defined as having a current average systolic blood pressure of ≥140 mmHg (millimetre of mercury) or diastolic blood pressure of ≥90 mmHG, using blood pressure medication, or have been diagnosed by a medical doctor as being hypertensive.

Non-communicable diseases: Non-communicable diseases (NCDs) are not passed from person to person. They are of long duration and generally slow progression. The four highest-burden NCDs are cardiovascular diseases (including heart disease and strokes), cancers, chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma) and diabetes. In addition to hypertension, the current study collected diagnosis of cancer, heart disease, strokes, chronic obstructive pulmonary disease, asthma, diabetes and angina NCD's.

Disability: Disability is the restriction or lack in our ability to perform an activity because of impairment. In the current disability refers to difficulties or restrictions in walking, seeing, hearing, understanding, concentrating and remembering.

Prospective urban, rural, epidemiology study (PURE): This cohort study tracks changing lifestyles, risk factors and the development of chronic diseases in 17 upper-middle and low-income countries.

Data collected included environmental factors, comprising the physical environment as well as the perception of the environment, nutrition policy and environmental factors, and psychosocial and socio-economic factors.

Health-related quality of life (H-RQoL): The World Health Organization (WHO) defines Quality of Life as an individual's perception of his/her position in life in the context of the culture and value systems in which he/she lives, and in relation to his/her goals, expectations, standards and concerns (WHO Quality of Life [WHOQOL] Group, 1994, p.43). H-RQoL is a multi-dimensional concept that includes domains related to physical, mental, emotional, and social functioning.

Social support: refers to the various types of support (i.e., assistance/help) that people receive from others. Generally, these are classified into two (sometimes three) main categories, i.e. emotional, instrumental (and sometimes informational) support defined as information leading the subject to believe that he is cared for and loved, esteemed, and a member of a network of mutual obligations.

Stress: arises when individuals perceive that they cannot adequately cope with the demands being made on them, or with threats to their well-being.

Chapter One

1.1 Background and context

Non-communicable diseases (NCDs), commonly known as diseases of lifestyle, cannot be transmitted from person-to-person. These diseases tend to last a long time and could be the result of a combination of physiological, genetic, environmental and behavioural factors (WHO, 2011). The main types of NCDs are cardiovascular diseases (CVD), cancer, diabetes, and chronic respiratory diseases such as obstructive pulmonary disease and asthma. The devastating impact of NCDs is well-documented (WHO, 2014) throughout the world. On a global level, NCDs account for nearly 71% of all deaths, killing 41 million people each year of which CVD accounts for the most (Forouzanfar *et al*., 2017).

Globally, South Africa is one of the countries with the highest burden of NCD. The condition hypertension, in particular, is a problem with more than 31.2% of individuals over age 50 being hypertensive (Gomez-Olive, Thorogood, Clark, Kahn & Tollman, 2013). This hypertension-associated risk has a devastating impact on mortality rates caused by CVD and stroke. This risk is attributed to the rapid rise in the South African population above 50 years because of successes in medical treatment access improving longevity and undergoing demographic and health transition in this age group (WHO, 2018; Mayosi & Benetar, 2014; Johnson, Mossong, Dorrington, Schomaker, Hoffmann & Keiser, 2013; Tollman *et al*., 2008). Life expectancy from birth and condition-specific or age-specific mortality rates have been used as key indicators of population health outcomes (Parrish, 2010). However, a negative aspect of these indicators is its failure to provide information and insight about the quality of the mental, physical, and social domains of life, particularly in high-risk populations such as those with hypertension and disabilities.

Quality of life (QoL) is the product of the interplay among health, social, environmental and economic conditions that affect human and social development. As a medical outcome measure that has been the subject of much psychological and sociological research, QoL is understood to be subjective and multidimensional and has widely been accepted (Hyde *et al*., 2003; Ormel, Lindenberg, Steverink & Vonkorff, 1997). Quality of life has been the subject of various research studies, specifically how it is affected by a disease. The WHO defines QoL as, *an individual's perception of his/her position in life in the context of the culture and value systems in which he/she lives, and in relation to his/her goals, expectations, standards and concerns* (World Health Organization QoL [WHOQOL] Group, 1994, p.43).

As the concept of QoL broadened, it became possible to directly measure how a person's life is affected by diverse difficulties. Various studies have shown the inter-relationship between QoL and an array of physical and mental conditions, and that a reduction in QoL and functional mobility makes one susceptible to diseases (Pillay, Lutge, & Aldous, 2016; Megari, 2013; WHO, 2005). Functional status (FS) covers the individual carrying out the activities of daily living and participating in life situations and society. When a person's capacity to carry out activities or performance of these is compromised because of a condition or injury and is not compensated by environmental factors, (physical, social and attitudinal factors), functional limitations occur[1] (NCVHS, 2000). Therefore, the impact of the health status in a person's life can be understood by measuring performance tasks and actions in the person's real-life or actual environment (Üstün, Chatterji, Bickenbach, Kostanjsek, & Schneider, 2003).

There are no known South African studies investigating predictors of QoL and functional status in people with hypertension. Therefore, in this study, the aim was to investigate the predictors of health-

[1] National Committee on Vital Health Statistics (2000). Classifying and reporting functional status.

related QoL (H-RQoL) and functional status on a sample of urban black African participants with hypertension and current disabilities residing in Langa, a Western Cape township, South Africa.

1.2 The burden associated with non-communicable diseases

A major public health challenge in the 21st century is premature deaths from NCDs. In 2016, there were 56.9 million deaths globally, of which 40.5 million, or 71% were caused by NCDs (WHO, 2017). The main NCDs attributed to these deaths were cancers, CVD, diabetes and chronic lung diseases, and have affected all countries. Deaths from NCD's are rising disproportionately among low- and middle-income countries (LMIC) and populations, and are driven by poverty, globalization of market and trade of health-harming products, rapid urbanization, and population growth (WHO, 2017). In South Africa, 48% of deaths were caused by NCDs, of which hypertension is a major contributor.

The presence of an NCD can negatively affect a person's QoL, making them more susceptible to other physical and mental ailments (Mertz, 2000) adding strain on the health system to provide treatment. Non-communicable diseases have a major economic impact on individuals, families, the medical health system and society at large, and can directly affect the workforce number in South Africa through premature death of workers or disability as the result of a stroke (WHO, 2005; Bloom, Chen & McGovern, 2018). Non-communicable diseases tend to affect the young and people in their productive years, and therefore reduce productive labour and earning capacity at a household level. Treating NCD puts much more strain on an already burdened health system because of the additional resources required (Puoane *et al*., 2008).

1.3 Risk factors for non-communicable diseases

Many risk factors are driving the NCD epidemic in South Africa. Age is a very strong risk factor and older persons at greater risk for developing NCDs. The South African population aged 60 years and

older is further projected to grow by 189% by 2025 (Joubert & Bradshaw, 2006). In part, this is because of innovations and rapid scale-up of HIV/AIDS and tuberculosis treatment care, and resulted in increased life expectancy from 53.5 years to 62.5 years in 2015 (WHO, 2013). The high levels of hypertension and associated strokes that are present in an area together with an estimated high prevalence of HIV in adults is creating what has been called the double burden of disease (Gómez-Olivé, 2010). An increase in survival in the HIV-infected population will lead to a new demand for chronic care in long-term users of antiretrovirals (Gómez-Olivé, 2010). This resultant growing population will place even more strain on the South African healthcare system.

The burden of NCDs is exacerbated by the social determinants of health. Social determinants of health are those conditions with which a person is born, grows, lives and ages. These can include poor housing, inadequate water and sanitation, a suboptimal food environment, high levels of alcohol and substance abuse, low levels of social cohesion, and an inadequate health-system response (Scott, Schaay, Schneider, & Sanders, 2017). These factors are important in the overall health of individuals, as healthcare and health outcomes are not only limited to healthcare services but the result of multidimensional and complex factors linked to the social determinants of health (Halfon, Larson & Russ, 2010; Krech, 2011).

1.4 Hypertension

1.4.1 Epidemiology of hypertension

Globally, approximately four in ten adults or 1.13 billion people over age 25 years have hypertension, and only 50% of these are aware they have the condition (WHO, 2019). Of those who are aware of the condition, only half are taking regular medication to control this condition, further exasperating the problem. The prevalence of raised blood pressure in adults age 18 years and older is 22% and ranked as the leading single risk factor for the global burden of disease in developed and developing countries

(Bromfield & Munter, 2013). Worldwide trends in blood pressure from 1975 to 2015 have shown that over the past four decades the highest levels have shifted from high-income to LMIC countries in South Asia and sub-Saharan Africa (Zhou *et al*., 2017). Hypertension is predicted to increase to 1.5 billion by 2025 (Chockalingam, 2007). Non-optimal blood pressure has globally caused 60% of strokes and 50% of ischaemic disease.

South Africa currently is one of the countries with the highest burden of hypertension rates in the world (WHO, 2012). Findings from the 2013 South African National Health and Nutrition Examination Survey reported hypertension to be present in 10.2% of participants examined and prevalent in 20% participants over age 45 years (Shisana *et al*., 2013). Approximately 53 men and 78 women die each day from the impact of hypertension (Rayner, 2010). A significant rise in hypertension has been reported to predict an increase in stroke and heart attacks, and when strokes are non-fatal, they often result in severe disability (Kwakkel, Wagenaar, Kollen, & Lankhorst, 1996). Hypertension is considered among the highest risk factors for disability (Wu, Huang, Wu, McCrone, and Lai 2007), and being diagnosed with hypertension is predictive of greater disability status for men and women (Pinsky, 1985). Furthermore, complicating the hypertension crisis in South Africa is knowledge regarding one's status and medication adherence. For instance, in a study to determine the prevalence and treatment status of hypertension among South African men and women 15 years and older, it was found that only 21% of men and 36% of women who had hypertension were taking drugs to reduce their blood pressure, leaving the rest prone to gradual organ damage or potentially life-threatening diseases such as stroke and heart disease (Steyn, Bradshaw, Norman & Laubscher, 2008).

Currently, worldwide statistics on hypertension incidence and prevalence are determined by a diagnosis of 140/90 mmHg (millimetre of mercury) and 130/139 mmHg for high normal (Seedat, Rayner & Veriava, 2014. Recently the American College of Cardiology (ACC) and the American

Heart Association (AHA) published revised guidelines for hypertension known officially as "ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guidelines for the Prevention, Detection, Evaluations and Management of High Blood Pressure in Adults" (Reboussin *et al*., 2017). The document includes new recommendations on the definition of hypertension thresholds for initiation of treatment with antihypertensive medications (Whelton *et al*., 2018). These revised guidelines recommend high blood pressure should be diagnosed and treated with medication at 130-139/80-89 mmHg rather the standard >140/90 mmHg blood pressure reading (Whelton *et al*., 2018). Blood pressure readings in this category were previously considered pre-hypertension but are now considered stage 1 hypertension. The predominant reason for adjusting the definition of high blood pressure was to account for complications that occur at lower blood pressure readings. These recent developments are not surprising. Replicable research has shown an increase in mortality begins at blood pressure levels above 115/75 mmHg (Munir, 2012). Gebreselassie and Padyab (2015) analysed data on the epidemiology of hypertension in South Africa collected by the Global Ageing and Adult Health study (SAGE) based on 2 980 respondents. They found 46% of South Africans to be hypertensive and 29.4% were pre-hypertensive. Considering the new ACC/AHA guidelines, these would effectively increase the prevalence rate of South Africans with hypertension by 63% from 46% to 75.4% being hypertensive. Because of the increase in hypertension prevalence and the associated costs of anti-hypertensive medications, this has major medical and economic implications for South Africa.

1.4.2 Hypertension and quality of life

Numerous studies have investigated the impact of hypertension on H-RQoL (Battersby, Hartley, Fletcher, Markowe, Styles, Sapper & Bulpitt, 1995; Erickson, Williams & Gruppen, 2001; Mena-Martin, Martin-Escudero, Simal-Blanco, Carretero-Ares, Arzua-Mouronte & Herreros-Fernandez, 2003; Jufar, Nuguse & Misgna, 2017; Katsi *et al*., 2017). Health-related quality of life is a multi-

dimensional concept that includes domains related to physical, mental, emotional, and social functioning (Jufar *et al*., 2017). Hypertension was found to be associated with lower levels of H-RQoL, with even more reduced levels where there is a presence of co-existent diseases, including conditions such as chronic kidney disease (CKD), CVD and diabetes mellitus (Battersby *et al*., 1995; Erickson *et al*., 2001; Waterhouse, van der Wielen, Banda, & Channon, 2017; Korhonen, Kivelä, Kautiainen, Järvenpää & Kantola, 2011; Soni, Porter, Lash, & Unruh, 2010). Bardage and Isacson (2001) investigated the relationship between hypertension and H-RQoL among 8 000 participants. In their study, they found hypertensive individuals represent a vulnerable population because of its association with lower H-RQoL, and that H-RQoL poses a risk factor for subsequent cardiovascular events or complications. Wang and colleagues (2009) linked H-RQoL to age, education level, self-management, efficacy and health literacy in patients with hypertension. In this study, it was shown that lower education levels, lower self-management efficacy, and poorer health literacy were the more worsening H-RQoL (Wang *et al*., 2009).

1.4.3 Hypertension and its impact on functional status

Functional status refers to an individual's ability to perform tasks related to paid work and household activities and covers the individual carrying out activities of daily living (ADL) and participating in life situations and society. Activities of daily living comprise the basic actions that involve caring for one's self and body, including personal care, mobility, and eating (Caskie, Sutton & Margrett, 2010). Measuring performance tasks and actions in a person's real-life or actual environment can provide important clues about the healthy state of a person's life (Ustun *et al*., 2003). Studies on functional status and hypertension are lacking (Charlesworth, Peralta, & Odden, 2016).

1.5 Problem statement

Globally and nationally, NCDs are a major cause of death and disability. Chronic conditions can restrict an individual's ability to live, resulting in limited performance, worsen general health of patients, reduce H-RQoL, disability, and increase healthcare costs (Megari, 2013; Goodman *et al*., 2013).

Currently, 30.4% of the South African adult population has hypertension (Kandala, Tigbe, Manda & Stranges, 2013). Hypertension is a major CVD risk factor and causally linked to stroke, end-stage renal disease, myocardial infarction, congestive heart failure and peripheral vascular disease. Globally, hypertension is responsible for about 60% of stroke and 50% of ischaemic heart disease (WHO, 2004). Exacerbating chronic conditions are co-morbidity and multi-morbidity. In a study by Lalkhen and Mash (2015), they evaluated the extent of multi-morbidity among patients with NCDs in South African primary healthcare facilities. Overall, they found 48.4% of patients had co-morbidity and 14.4% multi-morbidity, thus increasing the burden on the South African healthcare system.

The negative impact of hypertension on H-RQoL has been well-documented (Stewart *et al*., 1989; Bardage & Isacson, 2001; Didem, Unal, Alaettin, & Mustafa, 2008). In numerous studies, it was found that hypertensive individuals with co-existent co-morbidities tend to have lower H-RQoL than those with hypertension alone, the number of co-morbid illnesses as an independent determinant of H-RQoL was also identified (Soni *et al*., 2011).

Disease management requires the cooperation with prescribed therapy and a will to change current lifestyles and the long-term maintenance of such changes (Tothova *et al*., 2014). According to Preto *et al*. (2005), this highlights the importance of monitoring QoL in patients with a chronic disease which can provide the possibility of detecting priorities and planning purposeful health programmes to execute effective actions to improve QoL. Failure to do this has practical implications on the South

African government, as it will prompt for greater demand on health services and long-term care. Since most chronic diseases are preventable, much effort should be invested in educating communities and school learners on living healthy lifestyles. Preventing the onset of chronic diseases will lessen the burden and cost of the healthcare system.

In the present study, the focus is on determining the H-RQoL and functional status dimensions in hypertensive individuals. Specifically, in the present study, the aim is to establish how, to what extent, and in what way H-RQoL and functional status can be predicted in individuals with hypertension.

Based on the above, the following research questions were asked:

1. Are there significant relationships between demographic and psychosocial factors; and disease morbidity and QoL and functional status?
2. Can socio-demographic, psychosocial determinants, and disease morbidity predict H-RQoL and functional status in people with hypertension?

1.6 Overall aims and objectives of the study

Aims

(1) To assess the relationships between socio-demographic variables, psychosocial variables (work/home/financial stress, recent traumatic events, depression, social and religious groups' belongingness, coping) and disease morbidity (disability; co-morbid NCDs and co-morbid communicable disease) with H-RQoL and functional status outcome variables,

(2) To develop multivariate predictive models using socio-demographic, psychosocial and disease morbidity independent variables and **Health-related Quality and Life** (Social, Psychological, Physical and Environmental) and **Functional status** (physical and mental) outcomes.

1.7 Study objectives

1.7.1 Objectives in relation to the first aim

1. Using secondary data to identify hypertensive participants in the Prospective Urban Rural Epidemiology study.
2. To determine the distribution of the socio-demographic characteristics, psychosocial characteristics, disease morbidity of participants between 40 and 70 years of age.
3. To determine whether there is a relationship between the demographic, psychosocial factors, disease morbidity independent variables, and QoL, and functional status outcome variables among hypertensive individuals.

1.7.2 Objectives in relation to the second aim

1. To assess H-RQoL using the WHOQOL-BREF scale
2. To assess functional status using the SF 36 V² scale.
3. To develop multivariate statistical models using demographic, psychosocial and disease morbidity independent variables to predict H-RQoL outcomes in hypertensive individuals.
4. To develop statistical models using demographic, psychosocial and disease morbidity independent variables to predict functional status outcomes in hypertensive individuals.

1.8 Research hypotheses

1) H 0 There is no significant relationship between demographic variables (*AGE, GENDER, EMPLOYMENT, MARITAL STATUS, EDUCATION*) and **Health-Related Quality of Life in people with hypertension.**

H 1 There is a significant relationship between demographic variables (*AGE, GENDER, EMPLOYMENT, MARITAL STATUS, EDUCATION*) and **Health-Related Quality of Life in people with hypertension.**

2) H 0 There is no significant relationship between psychosocial variables (*WORK/HOME/FINANCIAL STRESS, RECENT TRAUMATIC EVENTS, DEPRESSION, SOCIAL AND RELIGIOUS GROUPS' BELONGINGNESS, and COPING)* and **Health-Related Quality of Life in people with hypertension.**

H 1 There is a significant relationship between psychosocial variables (*WORK/HOME/FINANCIAL STRESS, RECENT TRAUMATIC EVENTS, DEPRESSION, SOCIAL AND RELIGIOUS GROUPS' BELONGINGNESS, and COPING)* and **Health-Related Quality of Life in people with hypertension.**

3) H 0 There is no significant relationship between ***disease morbidity*** *(CO-MORBID/MULTI-COMORBID COMMUNICABLE/NON-COMMUNICABLE DISEASE, DISABILITY),* and **Health-Related Quality of Life in people with hypertension.**

H 1 There is a significant relationship between ***disease morbidity*** *(CO-MORBID/MULTI-COMORBID COMMUNICABLE/NON-COMMUNICABLE DISEASE, DISABILITY)* and **Health-Related Quality of Life in people with hypertension.**

4) H 0 There is no significant relationship between demographic variables (*AGE, GENDER, EMPLOYMENT, MARITAL STATUS, EDUCATION*) and **Functional status in people with hypertension.**

H 1 There is a significant relationship between demographic variables (*AGE, GENDER, EMPLOYMENT, MARITAL STATUS*) and **Functional status in people with hypertension.**

5) H 0 There is no significant relationship between psychosocial variables (*WORK/HOME/FINANCIAL STRESS, RECENT TRAUMATIC EVENTS, DEPRESSION, SOCIAL AND RELIGIOUS GROUPS' BELONGINGNESS, and COPING)* and **Functional status in people with hypertension.**

H 1 There is a significant relationship between psychosocial variables (*WORK/HOME/FINANCIAL STRESS, RECENT TRAUMATIC EVENTS, DEPRESSION, SOCIAL AND RELIGIOUS GROUPS' BELONGINGNESS, and COPING)* and **Functional status in people with hypertension.**

6) H 0 There is no significant relationship between ***disease morbidity*** *(CO-MORBID/MULTI-COMORBID COMMUNICABLE/NON-COMMUNICABLE DISEASE, DISABILITY),* and **Functional status in people with hypertension.**

H 1 There is a significant relationship between ***disease morbidity*** *(CO-MORBID/MULTI-COMORBID COMMUNICABLE/NON-COMMUNICABLE DISEASE, DISABILITY)* and **Functional status in people with hypertension.**

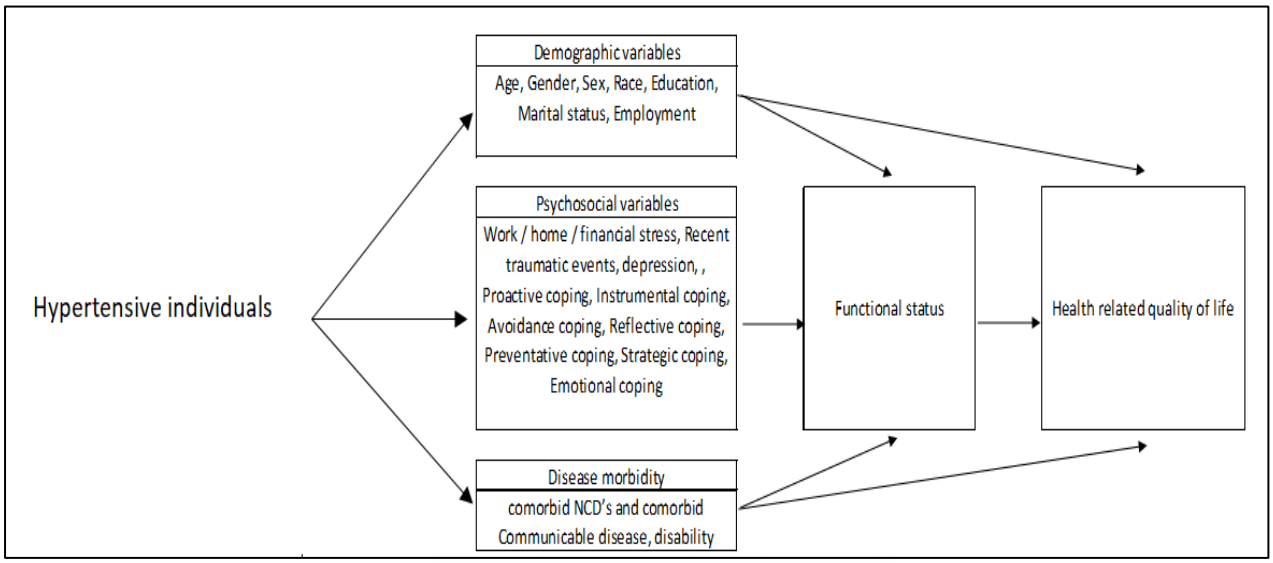

Figure 1.1 Graphic representation of the study

1.9 Significance of the study

Assessing how a person perceives his or her health is useful for determining an appropriate treatment strategy, thus providing more positive health and management outcomes. The correlation between health needs and H-RQoL might have potential benefits in routine clinical investigation and have the potential to identify specific and general health needs and can lead to improved quality of care (Asadi-Lari *et al*., 2004). There is strong causal evidence that a reduction in QoL and FS because of chronic disease or disability can make a person susceptible to other forms of disability, for instance, depression (Juenger *et al*., 2002, Boyd *et al*., 2005). This study will contribute to examining the impact of hypertension on QoL and functional status in South Africa. The study will further contribute to the

growing knowledge and interplay between H-RQoL and FS, as well as how it relates to chronic disease and disability. In the following chapters, this gap will be addressed.

1.10 Outline of the study

Chapter 1: Chapter 1 presented the background and problem statement of H-RQoL and FS in hypertensive individuals. The chapter provided a brief epidemiological perspective of the current context in South Africa. The chapter further outlined the aims, objectives, and hypothesis of the study. **Chapter 2:** The focus in this chapter will be on the literature regarding H-RQoL and functional status in people with hypertension. Hypertension is discussed as a global burden and localized to the South African context. The complex definitions of QoL and functional status are addressed as are the definitions used in the conceptualisation of the current study. Additionally, specific predictors of H-RQoL and FS will receive attention. In the remainder of the chapter, theoretical frameworks of Social Production Function theory, Maslow's theory of QoL, and Wilson and Cleary's conceptual model of H-RQoL will be discussed. **Chapter 3:** The research methods used in this study are described. The method and procedure of the pilot study will first be presented. Since the present study is housed within the PURE study incorporating its baseline and follow-up data, the methods will be two-fold. First, the methods of the PURE study will be highlighted then followed by the present study. Included in this chapter are the study population and sample, the data collection instruments used and detailed descriptions of the data analysis and model building techniques. **Chapter 4:** Chapter four present the results of the pilot study first. The results of the current study will then be interpreted, and **Chapter 5:** The discussion of the results and conclusions will be presented. In conclusion, the limitations of the current study and recommendations will be addressed in the thesis.

Chapter Two

Literature Review and Theoretical frameworks

This study aimed to determine how demographic, psychosocial and disease morbidity are related to H-RQoL and FS in hypertensive individuals, and which of these variables can predict H-RQoL and FS. To answer these questions it is necessary to determine the burden of disease, the pathophysiology and diagnosis of hypertension, and to discuss the various factors influencing H-QoL and FS.

This chapter presents the literature reviewed on the epidemiological patterns of global and national hypertension in South Africa and its associated burdens. The concepts of health-related quality of life, functional status, and related socio-demographic, psychosocial and disease morbidity predictors are also introduced in this chapter. The chapter concludes by presenting the theoretical frameworks underpinning the current study.

2.1 Global epidemiology of hypertension

Hypertension is the leading preventable cause of death worldwide (Mill *et al*., 2016). An estimated 1.13 billion people worldwide living in low-, middle-, and high-income countries have hypertension (WHO, 2019). As much as 1 in 5 women and 1 in 4 men had hypertension in 2015 (WHO, 2019).

Results conducted from a pooled analysis of prospective studies suggest the prevalence of hypertension could be even higher. Mills *et al*. (2016) examined global disparities of hypertension prevalence, awareness, treatment, and control in 2010 and compared secular changes from 2000 to 2010. The authors included 135 population-based studies of 968 419 adults from 90 countries. The results revealed 1.39 billion (31.1%) of the world's adults had hypertension, a 5.2% increase in the global prevalence between 2000 and 2010. Of this, 28.5% were in high-income countries and 31.5% in LMIC. The authors further concluded that from 2000 to 2010 the proportions of treatment (44.5%

versus 55.6%), awareness (58.2% versus 67.0%), and control (17.9% versus 28.4%) increased considerably in high-income countries. In LMIC the increases were much lower in awareness (32.3% versus 37.9%) and treatment (24.9% versus 29.0%) and decreased for control (84% versus 7.7%) (Mills *et al*., 2016). This prevalence shift in hypertension being mostly in high-income countries has now been noted predominantly in LMIC in recent decades. Worldwide trends in blood pressure from 1975 to 2015 have shown that over the past four decades the highest levels of blood pressure have shifted from high-income to LMIC in South Asia and sub-Saharan Africa (Zhou *et al*., 2017). This shift has been attributable to the ongoing nutritional transition, inadequate healthcare systems, increasing trends in a sedentary lifestyle, and other individual modifiable lifestyle risk factors, and populations in LMIC (Sarki, Nduka, Stranges, Kandala, & Uthman, 2015).

Lower-income countries, such as China and India, are increasingly carrying the largest burden of global hypertension. This burden is attributable to increases in total population size, increases in proportions within populations reaching older ages, and increases in age-specific rates of conditions such as stroke (Singh *et al*., 2000; Yusuf, Reddy, Ôunpuu, & Anand, 2001; Kearney *et al*., 2005). It is projected that hypertensive individuals in high-income countries are expected to increase by 70 million people from 2000 to 2025, whereas in lower-income regions it is expected to grow by 500 million over the same period (Kearney *et al*., 2005). In Sub-Saharan Africa alone, hypertensive individuals are expected to grow by 150 million by 2025 (Kearney *et al*., 2005).

2.2 Epidemiology of hypertension in South Africa

In Sub-Saharan Africa, hypertension is the single leading cause of morbidity and mortality, and after HIV/AIDS, is regarded as Africa's greatest health challenge (Opie, 2006). Approximately 24.4% of men and 26.1% of women in South Africa have hypertension (WHO, 2015). Hypertension is more prevalent in urban than rural areas (Jongen *et* al., 2019). Awareness and control of hypertension in

South Africa remains low despite the high prevalence rate (Berry et al., Peltzer & Phaswana-Mafuya, 2013). Data from the South African National Health and Nutrition Examination Survey (2012) Berry *et al*. (2017) quantified the unmet need for hypertension care among 25 532 individuals, age 15 years and older. They found a 35.1% prevalence of hypertension. Of the sample with hypertension, 48.7% were unscreened and undiagnosed, of which 23.1% were screened but undiagnosed, and 5.8% were diagnosed but untreated. Further findings from this study included 13.5%, who were treated but uncontrolled, and only 8.9% were controlled. In this study, 49% of those with hypertension were lost at the screening stage of which 50% never received a diagnosis. Twenty-three per cent of those who were diagnosed did not receive treatment, and 48% of those who were treated did not reach the threshold for control. (Berry *et al*., 2017). These results highlight the urgency for South Africa to prioritize cardiovascular disease management, to implement more aggressive approaches to manage NCDs in South Africa, and upscale the aggressive treatment of hypertension (Schutte, 2019).

2.2.1 The burden of hypertension at an individual and societal level

Individual and societal factors can considerably influence the onset, treatment and management of hypertension (Gupta & Guptha, 2010; Cornwell & Waite, 2012). A decrease in physical activity and increases in obesity, because of better food availability and choice, are expected to further increase mean blood pressure levels in lower-income regions (Du, Lu, Zhai, & Popkin, 2002; Shetty, 2002). Hypertension has been positively associated with ischaemic heart disease, ischaemic stroke, haemorrhagic stroke, hypertensive heart disease, cardiomyopathy, atrial fibrillation, aortic aneurysm, rheumatic heart disease, peripheral vascular disease, chronic kidney disease, and other CVD (Singh *et al*., 2013). Unhealthy diets high in saturated fats, rich in sodium, leading a sedentary lifestyle, being overweight or obese, excessive alcohol use and smoking are other modifiable behavioural risk factors for hypertension (Puoane, Bradley, & Hughes, 2006).

Medication adherence to hypertension treatment and control is vital. In randomized clinical trials, blood pressure-lowering medications that lower systolic blood pressure by 10 mmHg have shown to lower the risk for stroke and ischaemic heart disease by about one-quarter (Law, Morris & Wald, 2009). This treatment demonstrates almost complete reversibility of the excess risks for CVD associated with hypertension within a few years (Trialists' Collaboration, 2008; Lewington *et al*., 2016). Related to these individual factors concerning adherence are social settings. According to Cornwell & Waite (2012), the social context in which disease diagnosis and management takes place may, therefore, be a critical factor for health trajectories. These authors examined the role of social network ties and network-based resources in hypertension diagnosis and management in 3 005 older adults. They revealed that the risks of undiagnosed and uncontrolled hypertension were lower among those with extensive social networks, as they tended to discuss health issues with their network members.

2.2.2 Health systems: burden of hypertension

Hypertension is considered a significant health problem with numerous study trials that have shown treatment can effectively reduce the costly health implications (Alcocer & Cueto, 2008). South Africa has the highest burden of HIV/AIDS, and most of the spending is directed towards antiretroviral treatment, leaving limited financial resources available for NCDs, especially in primary healthcare (Schutte, 2019).

Le, Zhankun, Jun, & Keying (2012) estimated the economic burden of hypertension in a given year in 9 396 consenting individuals aged 18 years and older in 3 500 households in the rural Yunnan Province of China. They measured direct, indirect and intangible costs. Their measures included mean unit direct medical costs, direct non-medical costs, morbidity costs, mortality costs, intangible costs and cost of illness. Their results revealed that the total cost of hypertension was estimated to be $231.7

million. Similarly, in the United States of America, the economic cost of productivity lost by NCDs, hypertension amounted for the highest expenditure, $280 billion. Davies & Wagner (2019) estimated that treating the extreme consequences of diabetes, hypertension and hypercholesterolaemia in South Africa would be $34.2 billion a year, roughly 10% of South Africa's GDP in 2017.

People in lower-income countries suffer blood pressure-related diseases which cause many deaths and disability. Although this burden threatens already fragile health systems as well as social and economic development, few people are receiving blood pressure-lowering medication in these regions (Perkovic, Huxley, Wu, Prabhakaran, & MacMahon, 2007). Low-tech, cost-effective, and feasibly implemented primary care interventions in low-resource settings can manage hypertension (Mendis *et al*., 2010; WHO, 2013). According to the WHO (2007), efforts should be coordinated in strengthening a country's governance structure concerning health. The suggested health structure includes human resources, information, service delivery, financing, and medicines and technologies from a system perspective to provide universal essential healthcare (WHO, 2007).

2.3 The pathophysiology of hypertension

Hypertension is a chronic disease caused by an elevation in blood pressure occurring when the body's smaller blood vessels narrow, causing extreme pressure against the vessel walls, obliging the heart to work harder to maintain it. Blood pressure is the product of cardiac output and systemic vascular resistance, and is a measure of two pressures, those of systolic and diastolic (Foex & Sear, 2004). The force that blood exerts on the artery wall, as the heart contracts to pump the blood to the outlying organs and tissues, is the systolic pressure. The diastolic pressure is the residual pressure exerted on the arteries as the heart relaxes between beats. Even though the heart and blood vessels can tolerate the increased blood pressure for years, the heart will eventually enlarge and become weakened to the

point of failure. In the long-term hypertension is a major risk factor for stroke, coronary artery disease, heart failure and peripheral vascular disease.

Hypertension is classified into two causes, either primary (essential or idiopathic) or secondary. Most of the hypertension cases are primary, while a small number of hypertension cases are classified as having no cause. As much as 90–95% of hypertensive cases are primary and caused by nonspecific lifestyle factors (overconsumption of sodium or a lack of potassium, obesity or excess body weight, excessive alcohol use, and smoking) or genetic factors.

Primary hypertension is caused by the complex interaction between genes and the environment. Many interrelated factors have been shown to contribute to hypertension, and their relative roles may differ between individuals (Beevers, Lip & O'Brien, 2001). People who present with arterial hypertension have an increase in cardiac output, an increase in systemic vascular resistance, or both (Beevers, Lip & O'Brien, 2001). Younger individuals often present with elevated cardiac output, while the older population presents with increased systemic vascular resistance and increased stiffness of the vasculature blood vessels. Pulse pressure is the difference between systolic and diastolic blood pressure. As a person ages, there is a stiffening of the aorta, and elastic arteries increase the pulse rate leading to left ventricular afterload and contributing to left ventricular hypertrophy (Foex & Sear, 2004).

Secondary hypertension refers to arterial hypertension through an identifiable cause and affects 5–10% of the hypertensive population (Rimoldi, Scherrer & Messerli, 2014). Secondary hypertension results from a specific underlying condition such as kidney and adrenal disease, hyperparathyroidism, narrowing of the kidney or aorta arteries, and endocrine disorders.

2.3.1 Diagnosis of hypertension

The medical criteria for diagnosing hypertension are displayed in Table 2.1. A diagnosis of hypertension is given when a blood pressure reading administered by a health professional yields the same or higher reading as 'grade 1', as depicted in Table 2.1. This diagnosis is widely accepted and used in most studies as a criterion of hypertension (WHO, 2001).

Table 2.1 Hypertension diagnosis guidelines, South African Hypertension Society, Joint National Commission 7 (JNC), American College of Cardiology (ACC), American Heart Association (AHA).

Stage	***Systolic BP (mmHG)***	***Diastolic BP (mmHG)***
Normal	<120	<80
Optimal	120 – 129	80 – 84
High normal	130 – 139	85 – 89
Grade 1 (Mild hypertension)	140 – 159	90 – 99
Grade 2 (Moderate hypertension)	160 – 179	100 – 109
Grade 3 (Severe hypertension)	≥ 180	≥ 110
Isolated systolic	≥ 140	≥ 90

SBP		**DBP**	**JNC 7**	**2017 ACC/AHA**
<120	and	<80	Normal BP	Normal BP
120 – 129	and	<80	Prehypertension	Elevated BP
130 – 139	and	80 – 89	Prehypertension	Stage 1 hypertension
140 – 159	and	90 – 99	Stage 1 hypertension	Stage 2 hypertension
>160	and	>100	Stage 2 hypertension	Stage 3 hypertension

In Table 2.1, the most recent hypertension guidelines by the American College of Cardiology (ACC), American Heart Association (AHA) compared with the older JNC 7 (Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure) are indicated. The ACC/AHA includes new recommendations on the definition of hypertension thresholds for initiation of treatment with antihypertensive medications (Whelton *et al*., 2018). The revised guidelines recommend high blood pressure should be diagnosed and treated with medication at 130–139/80–89 mmHg rather than the standard >140/90 mmHg blood pressure reading (Whelton *et al*.,

2018). Blood pressure readings in this category were previously considered prehypertension but are now considered stage 1 hypertension. The predominant reason for adjusting the definition of high blood pressure was to account for complications that occur at lower blood pressure readings.

The hypertension definition used in the current study are individuals who had a medical diagnosis of hypertension (awareness), or who were receiving blood pressure-lowering medications (treatment). The definition further included individuals who had an average systolic blood pressure (SBP) of at least 140 mmHg, an average diastolic blood pressure (DBP) of at least 90 mmHg (categorised as stage 1), or both SBP and DBP that exceeded the earlier shown levels.

2.3.2 Risk factors for hypertension

Risk factors for hypertension are separated into biological and non-biological risk factors. Certain factors are related to who you are as an individual, whereas others are considered modifiable and can prevent or delay the onset of hypertension if implemented.

Biological risk factors for hypertension include a family history of hypertension (Ranasinghe, Cooray, Jayawardena, & Katulanda, 2015; Goldstein, Shapiro, & Weiss, 2008) and age (Thawornchaisit, de Looze, Reid, Seubsman, & Sleigh, 2013; Singh, Shankar, & Singh, 2017). Research has further shown different prevalence and incidence rates between race and hypertension, highlighting race as a biological risk factor. Hypertension is more prevalent in black African populations (Maepe, & Outhoff, 2012; Fray, & Douglas, 2013). The black South African population is of particular concern because of the current obesity epidemic. Breet *et al*. (2019), in a study, compared the males and females from three studies in America and one study in South Africa to determine differences between African Americans and black South Africans. Although they found hypertension was lower in African Americans from the 1960s, the incidence and prevalence rate of hypertension in South African is expected to rise as obesity in women escalates. Similar results were found by Peer, Balakrishna, de

Villiers and Naidoo (2018) who investigated the differential associations of cardio-metabolic diseases by population group, gender and adiposity among 2 488 men and 5 223 South African women. They found the odds of hypertension were significantly higher only in men from mixed ancestry compared with whites. Hypertension was also significantly higher in black African and Indian women and those of mixed ancestry compared with white women (Peer, Balakrishna, de Villiers and Naidoo 2018).

Obesity is considered an important risk factor for hypertension and other associated conditions in South Africa (Puoane *et al*., 2002). Driving this upsurge is the accessibility to cheap, unhealthy food, and diets, based on high fat and sugar contents (Kruger, Puoane, Senekal & van der Merwe, 2005; Puoane, Hughes & Bradley, 2005). Obesity is further worsened by other non-biological risk factors such as a lack of physical activity (Kruger, Puoane, Senekal & van der Merwe, 2005; Puoane, Hughes & Bradley, 2005), a high sodium diet, excessive alcohol use (Seedat, Rayner, & Veriava, 2014; Bernabe-Ortiz *et al*., 2015; Singh, Shankar, & Singh, 2017), and heavy smoking (Bernabe-Ortiz *et al*., 2015; Singh, Shankar, & Singh, 2017). Other risk factors are high cholesterol, impaired glucose tolerance, electrocardiographic (ECG) abnormalities, hyperuricaemia (Kannel, 1989; Laurenzi, 1990; Thawornchaisit *et al*., 2013), and stress (Spruill, 2010; Hu, Liu, Yin, Fan, Feng & Yuan, 2015).

2.3.3 Interventions to prevent and control hypertension

Numerous studies have focused on research interventions aimed at preventing or controlling hypertension (Whelton *et al*., 2016). Interventions can be aimed at the broader community or individually focused or can be non-pharmacological focusing more on lifestyle changes. In community-based interventions, interactive educational workshops have shown to be the most effective strategy by promoting health promotion education programmes (Lu, Tang, Lei, Zhang, Lin, Ding & Wang *et al*., 2015).

Research has shown no support for interventions such as the use of relaxation therapies, potassium or magnesium supplements and calcium supplements to reduce blood pressure (Dickinson *et al*., 2006). These authors have recommended that following a strict weight-reducing diet, engaging in regular exercise, and restricting alcohol and salt intake would be most effective (Dickinson *et al*., 2006).

The most effective interventions employed multiple components, as found in meta-analysis and reviews of hypertension control interventions (Conn, Ruppar, Chase, Enriquez, & Cooper, 2015). These interventions linked adherence behaviour with habits such as self-monitoring blood pressure, giving adherence feedback to patients, using pillboxes and other special packaging, mobile phone-based interventions, and motivational interviewing (Conn, Ruppar, Chase, Enriquez, & Cooper, 2015; Andre, Wibawanti, & Siswanto, 2019).

The South African Hypertension Society (SAHS) has published recommendations for routine investigations to monitor, detect and identify possible hypertension cases (Seedat, Rayner, & Veriava, 2014). These include measuring height and weight to determine the ideal body mass index (BMI) (<25 kg/m^2), waist circumference (ideal men <102 cm; women <88 cm, electrolytes, abnormal ECG, fasting glucose, cholesterol, creatinine in the urine, and uric acid (Seedat, Rayner, & Veriava, 2014). The SAHS further recommends lifestyle changes aimed at weight reduction (BMI 18.5–24.9 kg/m^2), using the DASH diet (less saturated fat and more fruit and vegetables), increase physical activity, moderate alcohol use and total smoking cessation (Seedat, Rayner, & Veriava, 2014).

2.3.4 Public health interventions and policies for hypertension

The reduction of hypertension prevalence and increase in the control rate can be managed by effective measures through population-based health education, dietary and lifestyle modification and pharmacological interventions (Shrivastava, Shrivastava & Ramasamy, 2014). The Pan-African Society of Cardiology (PASCAR) has identified hypertension as the highest area of priority for action to reduce heart disease and stroke on the continent. PASCAR aimed to provide a roadmap on hypertension by developing practical guidance on how to implement strategies that translate existing knowledge into effective action and improve detection, treatment and control of hypertension and cardiovascular health in sub-Saharan Africa by the year 2025. (Dzudie *et al*., 2018). The PASCAR hypertension task force identified a 10-point action plan, to be implemented by African ministries of health to achieve 25% control of hypertension in Africa by 2025, as indicated below.

1. Hypertension should be included in all national NCD programmes.
2. Special funding and resources for hypertension should be dedicated to hypertension activities/actions.
3. Clear, simple, practical and clinical evidence-based hypertension management guidelines are needed.
4. The WHO STEP-wise surveillance should be used to annually monitor treatment and control rates of hypertension in all countries.
5. Existing health services should integrate hypertension detection, treatment and control in vertical programmes (e.g. HIV, TB).
6. A task-sharing approach using suitably trained community health workers should be promoted.
7. To effectively manage hypertension at all healthcare levels, the availability of essential medicines and equipment must be ensured.
8. Universal access and publicity to detect, treat and control hypertension should be provided.
9. High-quality research should be supported to provide evidence for guiding interventions.
10. Investment in population-level lifestyle behaviour interventions is needed to prevent hypertension.

The South African government further adopted a policy to increase accessibility to health care service and effective management at a primary level for hypertensive individuals. This policy was based on

three goals, namely; 1) using intergrated measures through the adoption of healthy lifestyles to prevent hypertension, 2) comprehensive and cost-effective management of hypertension, and 3), secondary prevention through the reduction of CVD disease, retinal and renal damage associated with hypertension, and cerebrovascular disease (DOH, 1998).

Additional public health measures such as improving the socio-economic/literacy status (Huisman *et al*., 2005); advocating regular screening activities (Levy & Flack, 2012); creating enabling environments where communities are educated about risk factors (Ma *et al*., 2012); encouraging adults to get tested for blood pressure (WHO, 2013); and developing strategies and community-based interventions as part of primary prevention measures (WHO, 2013; Plescia & Groblewski, 2004; Gettleman & Winkleby, 2000; Prabhakaran & Singh, 2011) are considered suitable measures. Interventions aimed at community levels may include secondary prevention and targeted interventions towards high-risk groups (Zhao *et al*., 2012); facilitating active involvement of community healthcare workers (Bradley & Puoane, 2007; Puoane, Tsolekile, Igumbor & Fourie, 2012; WHO, 2013); encouraging early detection of clinical cases and timely implementation of cost-effective secondary prevention measures to prevent long-term complications (Prabhakaran & Singh, 2011; Shillinglaw, Viera, Edwards, Simpson, & Sheridan, 2012); positioning private practitioners through a health professional education program (Shillinglaw *et al*., 2012); involving voluntary organizations and multiple sectors (Shillinglaw *et al*., 2012); and advocating lifestyle modification measures like increased physical activity, limited alcohol intake, weight control, tobacco cessation, and reduced dietary saturated fat and salt intake (Puoane, Bradley & Hughes, 2006; Puoane, Tsolekile, Sanders & Parker, 2008; Sacks *et al*., 2013) are considered key to preventing and controlling hypertension.

2.3.5 Effect of hypertension diagnosis

Researchers studying the psychological effects of disease diagnosis have often considered the effect of 'labelling' (Macdonald, Sackett, Haynes, & Taylor, 1984; Moum, Næss, Sørensen, Tambs, & Holmen, 1990; Hamer *et al*., 2010). The negative effect associated with labelling was first introduced by Sir George Pickering as the feeling of fear of the affliction of a serious disease in a patient (Pickering, Keen, Rose, & Smith, 1959). Pickering *et al*. (1959) suggested a person labelled as hypertensive might adopt a sick role.

Once a person is labelled as hypertensive or prehypertensive, there is a severe negative impact on the social, personal, and family life of a person (Yavagal *et al*., 2011). In various studies, even controlled hypertension has shown to negatively impact QoL (Yavagal *et al*., 2011; Mossey, 1981; Haynes, Sackett, Taylor, Gibson & Johnson 1978). Behavioural consequences of individuals labelled as hypertensive include psychological distress and absenteeism from work (Birkenhager, 2003; Mossey, 1981). In a study by Hamer, Batty, Stamatakis and Kivimaki (2010), they measured psychological distress, blood pressure, history of hypertension diagnosis and medication use in 33 105 adults. The results suggest distressed participants were more likely to have low or highly elevated blood pressure. It was further found that labelling individuals as hypertensive may partially explain the higher levels of distress in patients treated for hypertension.

2.3.6 Impact on families

In various studies, the impact of NCDs on families, particularly how families influence medication adherence has been investigated (Opara & Jaracz, 2010; Gillespie & Campbell, 2011; Maslakpak, Rezaei, & Parizad, 2018). Empirical evidence showed that social support from family could help patients take their medicines correctly (Shen *et al*., 2017). An example is a study that evaluated the role of a family member-based supervision package in the management of hypertension among a

control group (n=288) and an intervention group (n=266). The family member-based supervision package was applied to the intervention group and the normal service package to the controls. The results revealed a significant decrease in blood pressure in the intervention group, indicating family support is beneficial to the management of hypertension (Shen *et al*., 2017).

Similar findings were reported in a study to evaluate the effectiveness of family involvement in patient education on hypertension management. The study revealed that family involvement in patient education has a beneficial effect on treatment compliance and patient outcomes (Maslakpak, Rezaei, & Parizad, 2018).

Hypertension is mostly asymptomatic, and symptoms occur after years as a result of organ damage from the condition. Hypertension, however, is a major risk for stroke and myocardial infarction, which can result in severe disability and negatively affect the family. According to Singer (1987), a myocardial infarction is an attack on the emotional and physical integrity of the patient and family. Even more debilitating, after a stroke episode, the family may struggle to adapt to a caregiving role and relationships between the stroke survivor and closest family members are often altered by the disease (Gillespie & Campbell, 2011).

2.3.7 Medication versus no medication

Although hypertension does not present with initial symptoms, in cases where hypertension is severely high symptoms have been reported. Various studies have attributed symptoms such as headaches, dizziness and mood alterations to hypertension medication (Kjellgren *et al*., 1998; Battersby *et al*., 1995; Müller, Montoya, Schandry & Hartl, 1994). As much as 20% of those on treatment can report adverse side effects (Schoenberger, Croog, Sudilovsky, Levine & Baume, 1990). Patients have presented with side effects such as dry mouth, blurred vision, insomnia, bloating, breathing problems, nausea, thirst, skin and sexual problems, weariness, depression and fatigue (Schoenberger *et al*., 1990).

A link between hypertension symptoms and impaired quality of life has been illustrated in various studies (Travisol, Moreira, Fuchs & Fuchs, 2012; Erickson *et al*., 2001; Battersby *et al*., 1995). Schoenbeerger *et al*. (1990) found that treated hypertensive individuals whose systolic blood pressure exceeded 140/90 mmHg reported more symptoms and lower health-related quality of life than controlled hypertensive individuals. Erickson, Williams and Gruppen (2001) replicated these results by comparing the prevalence and intensity of symptoms and H-RQoL of people taking antihypertensive medication to those without. They found hypertensive people reported significantly more symptoms and related distress as well as lower QoL. In a similar study, Battersby *et al*. (1995) found that hypertensive subjects showed impairment in well-being, had a lower health status index, had higher sickness and absenteeism from work, and presented with more symptomatic complaints.

2.4 Quality of life versus health-related quality of life

There are various definitions of quality of life, having transformed and taken on additional aspects over the years. The definitions vary to such an extent that it was thought there is one definition of quality of life per study (Skevington, 2002). The notion of quality of life sparked significant academic interest in the 1960s, with one of the earliest publications by Elkinton (1966) in the Annals of Internal Medicine. In this paper, Elkinton addressed the ethical issues associated with the increase of treatment success with sometimes adverse effects for the patients involved (Post, 2014).

> *What every physician wants for every one of his patients old or young, is not just the absence of death but life with a vibrant quality that we associate with a vigorous youth. (p714).*

In 1947, the WHO (1958) defined health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." The term, 'well-being' became conceptually associated with quality of life and subsequent definitions tried to embrace the spirit of the WHO

definition of health by including both personal health status and social well-being when assessing health. Many authors have used this definition of health widely, as it separates health as being medically isolated, and incorporates aspects pertinent to an individual's overall health. Health, according to the WHO principles, is the enjoyment of the highest attainable standards and is a fundamental right of every human being without distinction of race, religion, and political belief, economic or social condition. Quality of life is defined as an individual's perceptions of their position in life and in the context of the culture and value systems in which they live and concerning their goals, expectations, standards, and concerns (WHO, 1996). According to Oort (2005), this is a broad-ranging concept affected in a complex way by the person's psychological state, physical health, level of independence, social relationships, their personal beliefs and their relationship salient to their environment, for instance, their environment and living conditions.

The WHO definition had similar aspects to that of Ware (1987) who conceptualised health as encompassing how well a person functions in everyday life and their personal evaluations of well-being. The term, 'health-related quality of life' made its first appearance in the 1980s. Torrance (1987), according to Post (2014), was one of the first such authors. Health-related quality of life was defined as the subset of QoL and related to the health domain. A more acceptable definition of H-RQoL is put forth by Schipper, Clinch and Olweny (1996:p137) who asserted "there is broad agreement that H-RQoL is the functional effect of a medical condition and/or its consequent therapy upon a person. Health-related quality of life was thus considered subjective and multidimensional, encompassing physical and occupational function, psychological state, social interaction and somatic sensation".

Quality of life refers to the conceptions of the goodness of life and is an amorphous concept (Campbell, Converse & Rogers, 1976). Harrison, Juniper, and Mitchell-DiCenso (1996) view QoL as a global measure, which is broader than health status, inherently subjective and pertains to all aspects of life

important to the person. Patrick and Erickson (1993:p22) defined QoL as "…the value assigned to duration of life as modified by experiment, functional status, perception and opportunity influenced by disease, injury, treatment and policy." This broad definition contains many aspects that extend beyond the individual to treatment and policy. Wilson and Cleary (1995) conceptualised QoL as interactions between the characteristics of the environment and the individual about their biological function, symptoms, functional status, their general health perceptions and their overall quality of life.

In defining quality of life, there are two fundamental sets of components and processes, i.e. 1) the internal psychological-physiological mechanism producing a sense of satisfaction or gratification with life, either at an individual level or collectively for communities, and 2) other conditions which trigger the internal mechanism (Rogerson, 1995). Rogerson (1995) defined a framework for QoL that distinguished between environmental and health-related quality of life. In the environmental QoL, an interaction between the environment and people exists, employing a distinction between external conditions of things (shown as the material life arena) and internal personal factors of people (shown as the personal life arena). A series of goods, services and other characteristics associated with the physical, social and economic environment in the geographic space where people live comprises the material life. The personal life arena consist of the characteristics of people which includes factors such as personal attributes (social class, age, gender, past and current experiences and the influence of relationships) with other people, all of which are significant in determining value systems and preferences. (Rogerson, 1995).

According to Bowling and Gabriel (2007), the focus among psychologists has increasingly been on the possession of psychological resources (selection, optimization, compensation) for meeting the challenges people face. It has become the endpoint in various taxonomies of patient outcomes in which relationships are modelled against biological abnormalities, symptom status, functional status,

disability, health perceptions and QoL (Ormel *et al*., 1997). The effects flowing from biological abnormalities via symptoms and functional limitations to QoL are mediated and modified by psychological, social and cultural factors (Ormel *et al*., 1997).

Health-related QoL emerged from a broader concept of general QoL and focuses more on aspects of life quality that are directly influenced by a person's health status (Peterman, Rothrock, Cella, & Arnold, 2016). These aspects can include symptoms of the disease, treatment side-effects, treatment satisfaction, social functioning and life satisfaction, physical functioning and well-being, and mental health (Peterman *et al*., 2016).

Several studies have confirmed that awareness of having a chronic disease can affect health-related QoL and that it may have a greater impact on mental health than having the disease itself (Lyons, Lo, & Littlepage, 1994; Alonso *et al*., 2004). Furthermore, quality of life is significantly decreased in the presence of co-morbidities (Wang *et al*., 2009).

Results from studies investigating the relationship between hypertension and H-RQoL have reported inconsistent findings (Trevisol, Moreira, Kerkhoff, Fuchs, & Fuchs, 2011). Lower QoL among hypertensive patients have been shown in various studies (Mena-Martin *et al*., 2003; Alonso *et al*., 2004; Jayashinghe *et al*., 2009; Gonçalves, de Souza Vale, Barata, Varejão, & Dantas, 2011; Korhonen *et al*., 2011). In a systematic review and a meta-analysis of cross-sectional studies summarising the estimates of the association between QoL and hypertension, individuals with hypertension had worse QoL than that of normotensive individuals (Trevisol *et al*., 2011). Yet, in another study no associations were found between QoL and hypertension (Katsi *et al*., 2017). A possible reason for failing to find an association between hypertension and QoL in studies is that hypertension is mostly asymptomatic, therefore the presence of a co-morbid condition or medication adherence could be possible mediators between this relationship.

2.5 Functional status

Functional ability is activities and tasks people do daily. Functional status is directly influenced by health conditions, particularly in the context of an older person's environment and social support network (Ward, Reuben & Schmader, 2011). Functional ability decreases as people age and is related to various other factors such as gender, education, income level, socio-economic status, and NCDs such as arthritis, diabetes, heart disease and hypertension, and lower levels of psychological resources (Gomez-Olive, Thorogood, Clark, Kahn, & Tollman, 2010). In the following section, I will discuss the socio-economic, psychosocial, and disease morbidity factors associated with hypertension, QoL, and functional status.

2.6 Demographic predictors of quality of life and functional status

Individuals are affected by their circumstances and interactions with the environment (Ashford, & LeCroy, 2012). An individual's age, gender, education level, employment and marital status have significant effects on how they cope, interact, and perceive stressors.

2.6.1 Age

While living longer or ageing represents success in medical, economic and social advances over disease, the other side of the coin is also true, i.e. population ageing has adverse consequences on the health, economic and social spheres. As a person's age increases, so do their chance of developing non-communicable diseases or disability. For instance, House, Kessler and Herzog (1990) have found age and socio-economic status to be significant predictors of self-reported physical health.

Gebreselassie and Padyab (2015) examined the socio-demographic, biological, and health behaviour characteristics associated with different stages of hypertension in 4 565 respondents from Ghana and

2 980 participants from South Africa, highlighting age as a significant independent predictor of stage 1 hypertension.

In a national population-based study, SAGE, information on the social and health determinants of gender differences in disability among older adults was collected (Phaswana-Mafuya, Peltzer, Ramlagan, Chirinda & Kose, 2013). The aim was to investigate the prevalence and predictors of functional status and disability among 3 840 South Africans over 50 years old. In this study, 77.3% of the sample was found to be hypertensive, with very few individuals who were aware, treated, and controlled. Other factors associated with functional disability were being male, having a primary education, chronic conditions, lower QoL, and being physically inactive. Interestingly, the investigators also found that individuals, age 50 years and older, had a greater awareness of their hypertension and medication adherence compared to younger people, attributing these to the more frequent check-ups among older people. (Phaswana-Mafuya *et al*., 2013).

Risk factors, which are related to a person's psychological development in, and interaction with the social environment, are robust indicators of functional decline, particularly with increasing age (Ormel *et al*., 1997). A strong predictor of illness onset and susceptibility to other prone disabilities is age. For instance, in a prospective cohort study in 25 countries collected data on social, environmental, and individual risk factors and chronic diseases among rural and urban residents. The study found a high prevalence of hypertension (72.5%) in the 50-70-year-age group. A high prevalence of stroke (66.7%) and diagnosis with angina, history of heart attack and coronary artery disease (80%) were found in the same age group. (Teo, Chow, Vaz, Rangarajan & Yusuf, 2009).

Age is a significant factor when considering health disability and mortality (Banks, Keynes & Smith, 2016). The life expectancy for South African males and females is 61.7 and 67.0 years, respectively (Statstistics South Africa, 2017). While this is evidence that health access and medical advancements

are improving, age increases can result in escalating disability and NCD onset. Older people have a higher risk of disability which is compounded by a global increase in chronic health conditions associated with other disabilities such as diabetes, CVD, and mental illness (WHO, 2012). Research has shown that people who age positively (feeling good about yourself, keeping fit and healthy, and engaging fully in life) have greater satisfaction with life and make fewer demands on the healthcare system, whereas older individuals with fewer resources are at risk for developing a disability (Kempton *et al*., 1999). As the South African population increases and South African life expectancy increases because of improved medical services prolonging life, this especially is a cause for concern. People with disabilities experience poorer levels of health than the general population, especially people from the poorest wealth quintile, which are women, and older people (WHO, 2012). The incidence of chronic illness and disability increases with age. Therefore, living longer will increase the likelihood of one experiencing illness and disability. As a result, this will increase the probability that many older people will no longer be able to live independently but require care (Ramashala, 2002). An appropriate response to this situation is to devise and implement strategies for the preventing or delaying the onset of disability (Fries, Nesse, Schneider & Brody, 1984; Katz *et al*., 1983).

2.6.2 Gender

Varying results have been found in studies examining the differences in QoL and functional status between men and women (Hajian-Tilaki, Heidari & Hajian-Tilaki, 2017; Laguardia et al., 2011; van Esch, Oudsten & de Vries, 2011). Campos, e Ferreira, Vargas and Albala (2014) examined the factors associated with better H-RQoL among gender, physical and psychological health on 2 052 individuals. They found women with good physical and psychological health had better H-RQoL. For men, better H-RQoL was associated with higher socio-economic conditions and good psychological and physical health.

Hajian-Tilaki *et al*. (2017) conducted a study to determine the gender differences in H-RQoL and how it is affected by demographic and chronic disease conditions. They found women had significantly lower scores in H-RQoL than men mainly caused by the higher rate of chronic conditions and disability in women.

2.6.3 Education

Education levels have been a prominent factor in understanding health outcomes in public health research. In South Africa, only 29.2% of adults above 20 years possess a National Senior Certificate or equivalent. The largest share of South Africans in this age group have some secondary schooling (38.2%), and 18.2% have less than secondary schooling (Statstistics South Africa, 2017). Education is a critical factor in social and economic development and has a profound impact on health (Zimmerman, Woolf & Haley, 2015). Many studies have reported a positive link between better education and QoL. Amaducci *et al*. (1998) studied the association of education level between physical disability and mortality among 3 460 men and women, age 65–84 years. Those with higher education enjoyed better health and longer life, as found in this study. In similar studies on the prevalence and associated risk factors of hypertension among adults, higher levels of education were found to be strongly associated with a decreased risk of mortality (Cristenson & Johnson, 1995; Queen, Pappas, Hadden & Fisher, 1994; Reijneveld & Gunning-Schepers, 1994; Sorlie, Rogot, Anderson, Johnson & Backlund, 1992), and lower prevalence of hypertension (Ntuli *et al*., 2015).

2.6.4 Marital status

In several studies on chronic disease and health, the extent of marriage selection has been explored. It was found that healthier persons are selected into marital unions and less healthy individuals remain single or are more likely to become divorced, separated or widowed (Robards, Evandrou, Falkingham & Vlachantoni, 2012; Mein, Martikainen, Hemingway, Stansfeld & Marmot, 2003; Joung *et al*., 1998).

Marriage has been considered to influence health through several pathways, such as enhancing the flow of health-related information (Cohen, 2004), through the process of buffering stress, economic well-being, healthier lifestyles, and social support (Galanakis, Anastasios, Kallia, Karagianni & Karela, 2009; Holt-Lundstad, Birmingham & Jones, 2008). Also, by shaping resources available, increasing motivation and social pressure to behave in health-promoting ways, and providing a sense of purpose (Coyne *et al*., 2001; Berkman & Glass, 2000; Umberson, 1992).

Various studies on mortality, morbidity and health by martial status demonstrated higher mortality rates of single, widowed and divorced people than those who are married (Hu & Goldman, 1990; Ortmeyer, 1974; Carter & Glick, 1970). There have been two theories put forth to explain these observations. The first theory points to a possible form of a selection of less healthy individuals into non-marital states whether via singlehood, separation or divorce (Robards, Evandrou, Falkingham & Vlachantoni, 2012; Mein *et al*., 2003). The second assertion is that marriage offers a beneficial protective effect on health based on social, psychological and environmental factors that make the married state healthier than the unmarried one (Hu & Goldman, 1990). Being married is associated with a lower risk of mortality (Zheng & Thomas, 2013; Johnson, Backlund, Sorlie & Loveless, 2000). Pecholdova and Samanova (2013) found a gap in life expectancy between married and unmarried men and women, with never-married men having a life expectancy of 9.6 years less and women 7.7 years less than married people. Unmarried individuals were found to have poorer QoL. Han, Park, Kim, Kim, and Park (2014) studied the relationship between marital status and QoL in 594 202 Koreans. They found single men had significantly worse QoL than married men.

Individuals who are married have lower risks for depression, have better life satisfaction, and are happier (Gove, Huhges & Style, 1983). These findings were confirmed by Holt-Lundstad and Birmingham (2008), who examined the influence of marital status, relationship quality and network

support on measures of psychological health and cardiovascular (ambulatory) health. They found marital status and marital quality to be important factors. Married individuals had better life satisfaction and improved blood pressure readings than unmarried people (Arber, 2004; Horwitz, White & Howell-White, 1996). Marriage quality too was a significant factor. Higher marital quality, defined as marital happiness, integration, and a high degree of satisfaction with the relationship was associated with lower blood pressure, lower stress, less depression, and higher satisfaction with life (Holt-Lundstad & Birmingham, 2008).

2.6.5 Employment status

Socio-economic status is an important factor when considering health outcomes. Ataguba, Akazili and McIntyre (2011) examined the socio-economic-related health inequality based on four population-based South African General Household Surveys from 2002–2008. They found that economically deprived individuals were more likely to experience the worst health outcomes. Socio-economic status has been attributable to CVD. For instance, low socio-economic status is associated with an increased incidence of coronary heart disease and was found to be an important factor in predicting QoL in multiple sclerosis.

2.7 Psychosocial predictors of quality of life and functional status

Psychosocial factors in the current study include work/home and financial stress, trauma, depression and coping, and can affect an individual's physical health outcome through a psychological mechanism (Rosengren *et al*., 2015). Psychosocial risk factors do not occur in isolation from one another, but cluster in the same individuals and groups, such as in low socio-economic status groups (Graham *et al*., 2007).

2.7.1 Depression

Depression is the most common mental disorder that can affect all societies and age groups (Geraei, Shakibaei & Mazaheri, 2018). Depression is a mood characterised by an aversion to activity that can affect a person's thoughts, behaviour, feelings and sense of well-being. This mood can cause people to feel sad, empty or alone, anxious, hopeless, worthless or restless. Symptomology of depression may manifest itself in a loss of interest in activities that were once enjoyable, experiencing loss of appetite and concentration, loss of energy, insomnia or oversleeping, having problems with decision making, and feelings of persistent fatigue.

There is strong evidence supporting the association between QoL and depressive symptoms (Bardage & Isacson, 2001; Burström, Johannesson & Diderichsen, 2001; Barger & Muldoon, 2006; Trentini, Chachamovich, Wagner, Müller, Hirakata & de Almeida Fleck, 2011; Phaswana-Mafuya *et al*., 2013; Renaud & Bédard, 2013; Campbell, Huang, Dale, Parker, John, Young & Karter, 2013).

The presence of illness can greatly affect those afflicted on various levels including physical, mental, and social aspects of one's life. The presence of depression has been shown to exacerbate the effects of medical illness and could be an independent source of suffering and disability (Gaynes, Burns, Tweed & Erickson, 2002). An analysis of almost 3 000 subjects who were followed up for 7 to 16 years showed that high depressive and anxious symptoms were significant predictors of hypertension onset (Davidson, Pizzagalli, Nitschke & Putnam, 2002; Jonas, Franks & Ingram, 1997). Hypertensive patients with depression reported more functional disability, lower H-RQoL, impaired cognitive functions, reduced well-being and reduced life satisfaction (Scuteri *et al*., 2011). In a sample of 3 343 adults from four urban areas stratified for race, Davidson *et al*. (2000) investigated whether depressive symptoms independently predict hypertension incidence. They found high depressive symptoms in black populations predicted hypertension onset better than any other potential risk factor for

hypertension. Another study by Jonas *et al*. (1997), investigated whether symptoms of anxiety and depression are risk factors for hypertension among 2 992 American men and women without evidence of hypertension over 7 to 16 years. In this study, the investigators found that white participants, age 45–64 years, who had high depressive symptoms, had an increased risk of experiencing hypertension (Jonas *et al*., 1997). This finding is not surprising, as depression is found to be the most disabling disease and had a significant impact on H-RQoL than many other chronic diseases (Cheung *et al*., 2005; Lam & Lauder, 2000).

Everson, Roberts, Goldberg and Kaplan, (1998) examined the association between depressive symptoms and stroke in a prospective study of behavioural, social, and psychological factors related to health and mortality among 6 676 initially stroke-free Californian adults. They found that reporting five or more depressive symptoms at baseline was associated with an increased risk of stroke mortality. Similar results were found in other studies where depressive symptoms over 4.5 years were associated with excess risk of mortality, stroke, and myocardial infarction in more than 4 300 participants (Coantino & Kasi, 1992; Wasserthell-Smoller *et al*., 1996; Scalco, Scalco, Azul & Lotufo Neto, 2005).

Symptoms of anxiety and depression increase the risk of experiencing hypertension, and higher levels of depression were associated with lower levels of H-RQoL (Johansen, Holmen, Stewart & Bjerkeset, 2012; Katsi *et al*., 2017; Zhang, Guo, Zhang, Chen, Zhou, Ge & Qian, 2017). Similarly, depression in people over 50 years contributed to functional disability among older men and women (Phaswana-Mafuya *et al*., 2013).

2.7.2 Stress

Cohen, Janicki-Deverts and Miller, (2007) defined stress as the perception of environmental demands that are believed to exceed one's resources for adapting to the situation. When environmental stresses tax or exceed the adaptive capacity of an organism, the resulting psychological or biological changes

place persons at risk for disease. Stressful situations are often exacerbated by daily hassles. Losses of a spouse, retirement or forced relocation are some of the stressful life changes (Fiksembaum, Greenglass & Eaton 2006). Extreme stressors such as the death of a child, business failure, severe intra-familial conflict, death of a spouse, job loss and violence were associated with increased risk of myocardial infarction (Li, Hansen, Mortensen & Olsen, 2002; Rosengren *et al*., 2004). Other common stressful daily hassles included not having enough money for personal needs or necessities, worries about health and well-being, feeling lonely, and problems with grandchildren (Fiksembaum *et al*., 2006), particularly in the elderly. Stressors will steadily accumulate, resulting in significant frustration in people's aspiration to maintain a normal adult lifestyle and increases their dependence on others (Fiksembaum *et al*., 2006). Chronic NCDs are etiologically linked with excessive stress, which, in turn, is a product of specific socially structured situations inherent in the organisation of modern technical societies. Therefore, socially induced stress is viewed as a precipitating factor in chronic diseases and can be one of the components of any disease. (Rabkin & Struening, 1976).

Stress does not directly cause hypertension but can effect its development (Kulkarni, O'Farrell, Erasi & Kochar, 1998). Ames, Jones, Howe and Brantley (2001) conducted a prospective study on the impact of stress on the QoL in 183 respondents and focused on people with hypertension and treated hypertension. The study revealed that major and minor stress were significant predictors of QoL and minor stress was particularly considered a better predictor, giving evidence to the growing body of research that lower levels of stress enhanced QoL (Baune, Aljeesh & Adrian, 2005).

2.7.3 Occupational stress

Working adults often spend a significant amount of their lives at work, which can result in chronic job stress which can negatively impact their health (Spruill, 2010). Karasek, Baker, Marxer, Ahlbom and Theorell (1981) proposed the job strain model which focuses on two characteristics of the work

environment; i.e. workload or job demands, and decision latitude or the degree of control an employee has in performing his or her work. This model postulates that high strain, a combination of high demand and low control produces the most stress and has been associated with increased blood pressure at work, home, during sleep, including increased left ventricular mass consistent with the anticipated effects of sustained blood pressure elevation (Schwartz, Pickering & Landsbergis, 1996).

In a prospective study, involving 8 395 Canadian white-collar workers, Guimont *et al*. (2006) evaluated whether cumulative job strain increased blood pressure. At 7.5 years follow-up, they found that men with cumulative job strain exposure showed significant systolic blood pressure increases. The investigators concluded that men and women with low levels of social support at work appeared to be at higher risk for increases in blood pressure. In a similar study, Markovitz *et al*. (2004) followed 3 200 employed normotensive participants, age 20 to 32, for eight years to determine whether changes in job strain during young adulthood was associated with the development of hypertension. It was found that job strain was associated with hypertension incidence for the entire cohort, particularly in white men and women.

2.7.4 Social support

Previously, it has been established that H-RQoL is a multidimensional concept (Chapter 1) and that social relationships are important to an individual's perception of their position in life. Social support in individuals involves a complex system of networks (Berkman & Syme, 1979; Reed *et al*., 1983).

The positive effect of social support on H-RQoL has been documented in studies including metastatic prostate cancer (Colloca & Colloca, 2016), epilepsy (Charyten, Elliott, Lu & Moore 2009), and hypertension (Xu *et al*., 2016). Xu *et al*. (2016) investigated hypertension impact on H-RQoL in 1 224 middle-aged adults and found that positive relationships with family had better H-RQoL.

Social support is an important protective factor in preventing and reducing mental health and also a major contributor to increased levels of QoL (Tippold & Burns, 2009). It affects the adoptive outcomes through several physiological, emotional and cognitive pathways (Wills & Fegan, 2001). House, Umberson and Landis (1988) distinguished between two mechanisms of support, i.e. biological and psychological support. Psychological health and physical health depends on purposeful social interaction to support and reaffirm the consistency of the individual's values and assumptions about the world (House *et al*., 1988). Social support recipients use much more effective coping strategies, thereby having a better understanding of the problem and increasing their motivation to take action (Wills & Fegan, 2001). Social support also encourages positive health behaviours to minimise risky behaviours and diminish physiological reactivity to stress (Stanton, Revenson & Tennen, 2007) and is associated with fewer daily hassles (Fiksembaum, 2006, Vezina & Giroux, 1988), hence, decreasing the risk factor for disability (Hays, 2001).

In a study, Hu, Li and Arao (2015) investigated the association of family social support, depression, anxiety and self-efficacy with hypertension self-care behaviours in a Chinese community. They found family social support was positively associated with hypertension medication adherence and regular blood pressure measurement. Similar results were found by Osamor (2015), who concluded that compliance with hypertension treatment regimens was significantly higher among hypertensive individuals who had more social support.

2.8 Disease morbidity: Disability

An additional public health problem is a disability (Hajjir, Lackland, Cupples & Lipsitz, 2007). The WHO (2011) estimated as much as 1 billion (15%) people of the world's population had some form of disability. Population ageing and increases in chronic health conditions are considered causes on the increasing rates of disability (Hyde, Higgs & Newman, 2009). While studies are increasingly

focusing on the role of hypertension and disability (Elias & Elias, 2007, Hajjir *et al*., 2007; Stuck *et al*., 1999; Hubert & Fries, 1994), the more specific role of chronic conditions impacting significantly on QoL, disability, and functional status are starting to emerge (Zhang *et al*., 2017; Windham *et al*., 2017; Garin, Olaya, Moneta, Miret, Lobo, Ayuso-Mateos & Haro, 2014). Naidoo *et al*. (2017) investigated the association between biopsychosocial factors and disability among 4 974 South Africans. They found disability was significantly associated with age, history of stroke, and other heart-related conditions. Also, psychological distress was negatively associated with increased disability.

Approximately 15% of the world's population lives with some form of disability, with 2–4% experiencing significant difficulties in functioning (WHO, 2011). The disability prevalence is increasing as a result of ageing populations and the rise in chronic diseases. The most recent 2011 South African census reported a disability prevalence rate of 7.5% in South Africa. Of this, 11% of persons, age five years and older, had difficulties seeing, 4,2% had cognitive difficulties (remembering/concentrating), 3,6% had hearing problems, and about 2% had communication, self-care, and walking difficulties. Disability was found to be more prevalent among females compared to males (8.3% and 6.5% respectively), with disability prevalence increasing with age. More than half (5.2%) of the persons, age 85 years and older, reported having a disability.

Treatment of hypertension has clearly been shown to prevent severely disabling cardiovascular events such as stroke (Di Bari *et al*., 2001), and those with hypertension or untreated hypertension have an increased risk of developing a new disability (Hajjar *et al*., 2007). For instance, stroke, severe resultant disability of hypertension, has a substantial impact on psychological and physical well-being. Further studies found lower levels of QoL in those with hypertension than those without (Gonçalves, Moreira, Gus & Fuchs, 2007).

Theorists have for decades conjectured about why some people who face the enduring stress of a chronic illness adjust well whereas others demonstrate significant emotional and interpersonal decline. (Stanton, Revenson & Tennen, 2007). QoL and FS are established as important outcomes for evaluating the impact of disease and assessing the efficacy of treatments (Ring *et al.,* 2005). Knowing QOL and FS levels is beneficial to clinical and physiological evaluations in many chronic diseases. Therefore, the benefits of assessing how a person perceives his or her health will be useful in determining a treatment strategy. Based on this, it will be useful to determine how demographic, psychosocial and disease morbidity are related to H-RQoL and FS in hypertensive individuals. More interestingly, which of these variables can predict H-RQoL and FS.

2.9 Theoretical considerations applicable to the study

The following section will introduce three relevant theoretical considerations of the study, i.e. the Social Production Function theory, Maslow's QoL theory, and finally the theory most relevant to the study, the Wilson-Cleary model of Health-Related Quality of Life. The Wilson-Cleary model puts forth concepts with their definitions and reference that guided the current study to explain the meaning, nature, and challenges associated with predicting H-RQoL and functional status in hypertensive individuals.

2.9.1 The Social Production Function theory

The Social Production Function (SPF) theory provides a mechanism for linking ill health, behaviour, and QoL by relating the effects of ill health and the activities that people engage in to maintain QoL (Ormel, Lindenberg, Steverink & Vonkorff, 1997). "Social production function theory assumes that people produce their own well-being by trying to optimize the achievement of universal needs within the constraints they are facing" (Ormel *et al*., 1997, p1053). This theory agrees with the economic and

psychological theory where humans are seen as active agents who choose cost-effective ways to produce well-being (Juster & Stafford, 1985).

The SPF theory identifies two ultimate goals that all humans seek to optimise (physical well-being and social well-being) and five instrumental goals by which they are achieved (stimulation, comfort, status, behavioural confirmation, affection), see figure 2.1. The two universal goals identified by the SPF theory, i.e. *physical* and *social* well-being determine the level of psychological or emotional well-being (Ormel *et al*., 1997). The SPF theory views humans as actively reshaping their activities to attain goals, which is done by using all personality and environmental resources at hand (Ormel *et al*., 1997). There are three important notions of SPF theory, i.e. 1) *the linkages between goals, needs, and well-being; 2) a distinction between universal needs and instrumental goals; and 3) substitution among instrumental goals, activities and endowments according to cost-benefit considerations* whereby costs refer to scarce resources such as functional capacity, time, effort and money (Ormel *et al*., 1997). All the goals involved in this theory are displayed in figure 2.1.

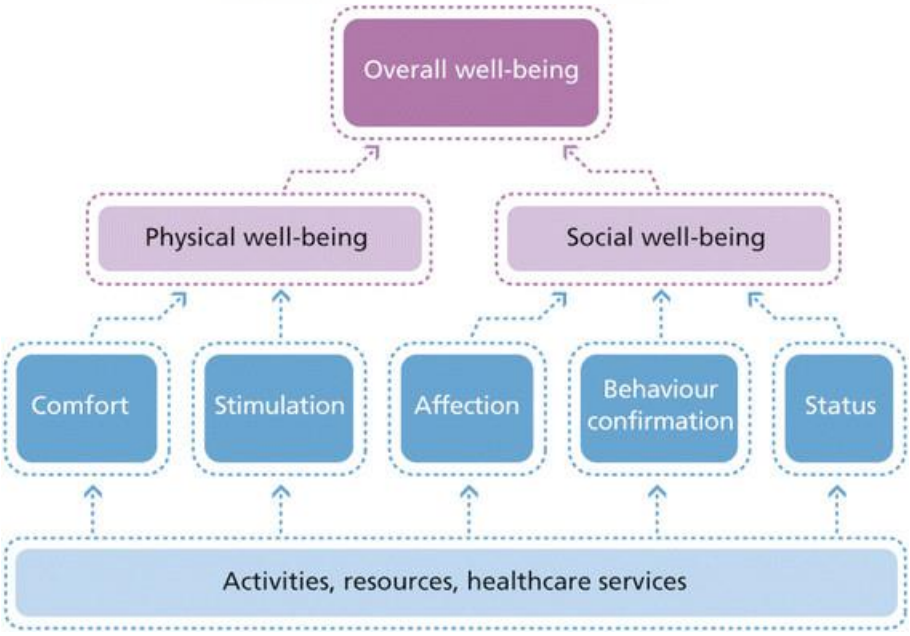

Figure 2. 1 Hierarchy of the Social Production Functions

Physical well-being is attained by two instrumental goals, *stimulation* (also called activation) and *comfort* (Figure 2.1). Stimulation refers to activities that produce arousal, including mental and sensory stimulation, physical effort, and sports. *Social well-being* relates to one's ability to participate successfully in fulfilling various roles in society, including a family member, worker, friend, and engaging with others. *Behavioural confirmation, affection*, and *status* are the instrumental goals of social well-being. Behavioural confirmation is defined as the positive feedback on behaviour by others (the feeling of having done 'the right thing'). Status refers to a relative ranking (mainly based on control over scarce resources). Affection includes love, friendship, and emotional support. All three instrumental goals are assumed to have decreasing marginal value for the production of social approval (Lindenberg, 1996; Ormel *et al*., 1997).

Social of subjective well-being refers to an individual's appraisal of his or her life situation overall the totality of pleasures and pains, or QoL (Bradburn, 1969; Campbell *et al*., 1976; Diener, 1984; Omodei & Wearing, 1990; Watson, 1988). The SPF theory views ill health as only one of the determinants of QoL and other non-health factors in the psychological, social, economic and cultural domains in life. Quality of life in the SPF theory is seen as psychological well-being, which exists to the extent that universal needs such as physical and social well-being are met (Ormel *et al*., 1997; Steverink, Lindenberg & Ormel, 1998). Physical well-being emerges from activities, which provide stimulation, internal and external comfort, whereas social well-being originates from activities yielding affection, status and behavioural confirmation (Ormel *et al*., 1997).

2.9.2 Maslow's Quality of Life theory

The notion of Maslow's theory of QoL was first introduced in his book, Towards a Psychology of Being, published in 1962. He based his theory for development towards happiness and true being on the concept of human needs. According to Maslow, happiness, health and ability to function, occurs

when you take responsibility for fulfilling all your needs. Much of this theory is predicated in Maslow's 1954 publication, Motivation and Personality. In this work, he introduces a theory based on how people satisfy various personal needs in the context of their work (Gawel, 1997). Maslow's theory of QoL posits that when we take responsibility for our own life, we utilise more of the good qualities that we have and as a result become freer, happier, more powerful and healthy (Ventegodt, Merrick & Andersen, 2003). According to Maslow, human striving is classified into five needs, i.e. 1) physiological, 2) safety, 3) belongingness and love, 4) esteem, and 5), self-actualisation (see figure 2.2, highlighted in orange). Maslow postulated that these levels are pursued in sequence and that a person could not proceed to a higher level until the current one is substantially or completely satisfied, a concept labelled prepotency.

In recent years, three more needs were included in the pyramid, i.e. cognitive needs, aesthetic needs, and the last need, transcendence.

Maslow referred to the bottom four levels as 'deficiency needs'. A person does not feel anything when these needs are met. However, when they are not met, they become anxious. Maslow referred to the fifth level as a 'growth need', which is when a person begins to 'self-actualise' or reach their fullest potential as human beings.

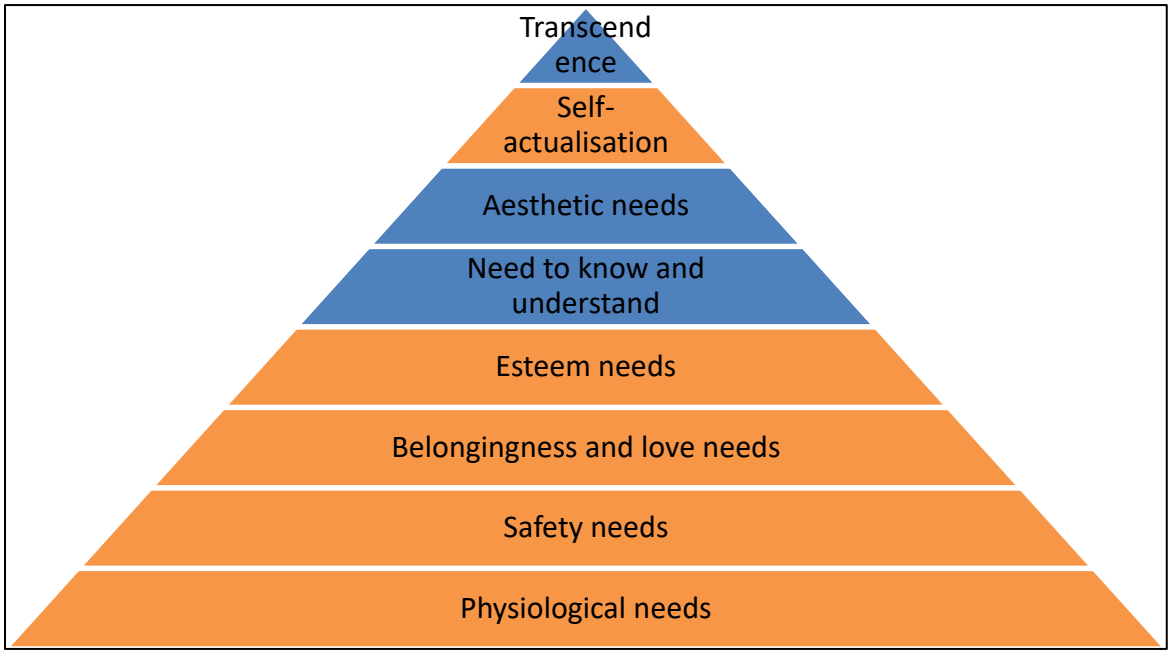

Figure 2. 2 Maslow's hierarchy of needs

Maslow's hierarchy of needs specifies the most basic needs of the human being, as illustrated in figure 2.2. This hierarchy of needs is often depicted as a pyramid showing the most important 'survival need' at the broad-based bottom and the 'transcendence' need at the narrow top (Susniene & Jurkauskas 2009; Ventegodt, Merrick & Andersen, 2003).

- The first physiological need depicts the foundation for motivation or survival, which includes thirst, sex, hunger, food, bodily comforts, shelter and sleep. Physiological needs are considered universal needs, and a failure to satisfy these needs would result in non-achievement of the safety, belongingness, esteem and self-actualisation needs (Hagerty, 1998).
- The second need is based on personal and financial security, safety from assault and chaos, stability, and freedom of fear.
- The third need, love and belongingness, is social and involves feelings of belongingness. These needs include intimacy, trust, acceptance, friendship, receiving and reciprocating affection and love, and being affiliated to various groups (social clubs, religious organisations, and work).

- Maslow classified the fourth need, esteem, into two categories. The first is esteem for oneself (self-esteem, achievement, dignity, mastery and independence). The second need relies on recognition from others in the form of respect and the desire for reputation or prestige. The self-actualisation need is based on realising personal potential, self-fulfilment and personal growth.

In the middle of the hierarchy are two more advanced needs

- The need for knowledge and understanding through which we come to know ourselves and to understand our world through curiosity, exploration, and the search for meaning.
- The need for creativity and aesthetics, through which we use our knowledge and talents to create balance, beauty and form.

At the top of the hierarchy are the two most abstract needs

- The need for self-actualisation based on realising personal potential, self-fulfilment and personal growth and our meaning of life.
- The need for transcendence through which we become an integrated and valuable part of the world.

Quality of life is conceptualised as progressing through these needs ultimately pursuing happiness, love and care, respect, knowledge, creativity, and finally a sense of meaning (Ventegodt, Merrick & Andersen, 2003). Quality of life involves a dimension of hierarchical goals varying from lower-order physiological and safety-related goals to higher-order psychological goals (Sirgy, 1986).

Maslow's QoL theory has been considered in relation to disease. In medical instances, chronic disease does not disappear because of biomedical treatments. Hence, the real change needed by patients is a

holistic understanding and living the noble path of personal development (Ventegodt, Merrick & Andersen, 2003).

2.9.3 The Wilson-Cleary model of Health-Related Quality of Life

The Wilson and Cleary (1995) model is a conceptual model which focuses on relationships among aspects of health. For H-RQoL, a comprehensive conceptual model is proposed that would merge the biomedical and social science paradigms. Thereby, it would move from a descriptive model to an explanatory model where the causal relationships among the components of H-RQoL are explained (Wilson & Cleary, 1995).

In this model, the aim was to assess the overall QoL by linking symptom status, physiological variables, functional health, and general health perceptions (Wilson & Cleary, 1995). The important connection between QoL and health based on an increasingly complex continuum is stressed in this model, thus making it ideal for the current study. The Wilson Cleary model has been the most widely used and cited conceptual model of H-RQoL (Ojelabi, Graham, Haighton & Ling, 2017; Bakas *et al*., 2012).

Ferrans *et al*. (2005) adapted the Wilson and Cleary H-RQoL model by creating a revised version. Although they considered similar proposed causal paths, their model replaced biological and physiological functions. In this revised model, the components include biological function, symptoms, functional status, general health perceptions, characteristics of the individual, characteristics of the environment, and overall QoL (represented in Figure 2.3).

According to Sousa and Kwok (2006), the potential use of the Wilson and Cleary H-RQoL conceptual model could be used to unify the social science and biomedical paradigms. The biomedical paradigm focuses on biological, pathological and physiological aspects, aimed at understanding causal

relationships, whereas the social science paradigm assesses the contributing factors to illness. In this model, a taxonomy of outcomes is presented for patients categorised into five underlying health concepts and specific causal links between these health concepts proposed (Ojelabi, Graham, Haighton, & Ling, 2017). Figure 2.3 depicts the various levels in the model.

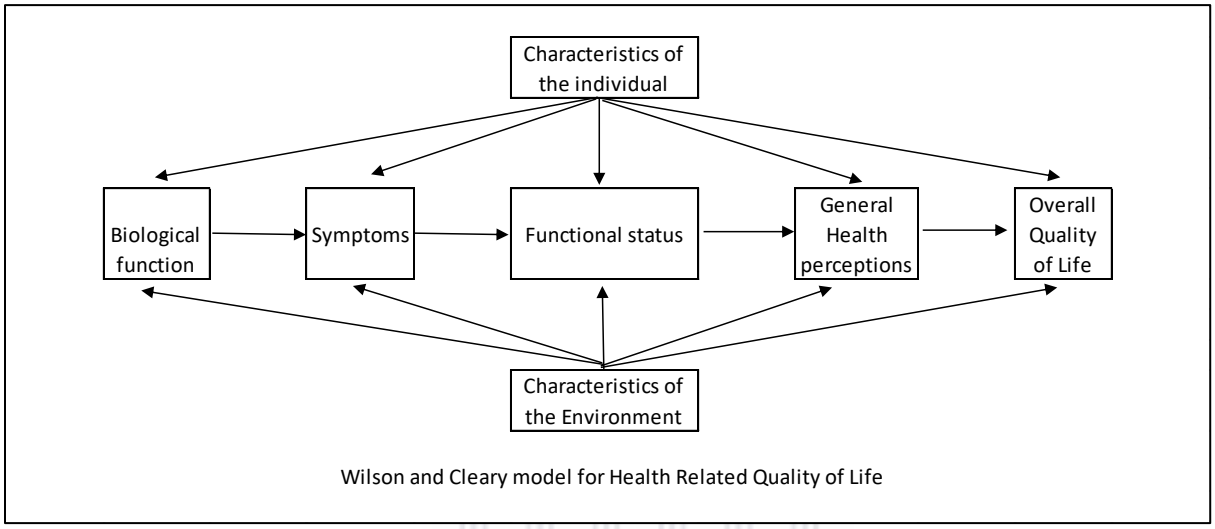

Figure 2. 3 The revised Wilson and Cleary model of Health-Related Quality of Life (Ferrans *et al.*, 2005)

2.9.3.1 Biological and physiological factors

Level one involves the physiological and biological factors, which focus on the cells, organs and organ systems. Clinical factors include those that generally affect health but are mediated by changes in cells, organs or organ system functions (Ojelabi, Graham, Haighton & Ling, 2017). Examples of biological and physical factors include diagnosis-related laboratory test values such as systolic and diastolic pressure readings. In the current study, a nurse took two electronic blood pressure readings from participants. Hypertension was defined as having a current average systolic blood pressure of ≥140 mmHg or their diastolic blood pressure ≥90 mmHg, using blood pressure medication, or have been diagnosed by a medical doctor as being hypertensive.

2.9.3.2 Symptom status

Level two on the continuum involves symptom status, which describes a patient's perception of an abnormal emotional, physical or cognitive state (Wilson & Cleary, 1995). According to them, symptom status is "a patient's perception of an abnormal physical, emotional, or cognitive state." They classified symptoms into (1) psychological symptoms, (2) physical symptoms, and (3) symptoms that are not physical or psychological in origin, such as fear, emotional distress, frustration, and worry. For the current study, we used depressive symptoms based on an adaptation of the short form Diagnostic and Statistical Manual Disorders-IV Composite International Diagnostic Interview (CIDI) questionnaire. Further assessments included recent traumatic experiences that had occurred in the past twelve months and stress levels at home, work, and financial stress.

2.9.3.3 Functional status

The next level on the continuum is functional status, which is reflected in the ability of the individual to perform everyday tasks. In this model, functional status is characterised as the ability of the individual to perform defined tasks and adjust to his/her environment (Chapter 2, Section 2.5). Functional status in the current study will be assessed using the Medical Outcome Survey Short Form 36 version 2 (SF 36 v2) and disability based on the Washington Group on Disability questions. The SF 36 v2 consists of eight subscales which produce a Mental and Physical Component Summary (MCS, PCS) score to assess functional status. Disability consists of seven questions about difficulties walking, communicating, vision, concentrating and sight.

2.9.3.4 General health perceptions

Level four on the continuum is general perceptions, which are a subjective rating that integrates all the previously mentioned health concepts. This concept refers to a subjective self-rating of one's overall

general health and is directly related to functional status and indirectly related to symptom status and biological and physiological factors (Wilson & Cleary, 1995). The general health subscale of the SF 36 v2 to assess general health perceptions was used in the current study.

2.9.3.5 Overall quality of life

The last level on the continuum is the overall QoL, which has been described as the discrepancy between a person's expectations or hopes and his present experiences (Megari, 2013; Sousa & Kwok, 2006). The arrows shown in figure 2.3 depict dominant causal associations and the hypothesised linkages between the dimensions. The current study assessed overall QoL, using the WHO QoL Brief scale (WHOQOL-BREF) which measures physical, social relationship, environmental and psychological QoL.

2.9.3.6 Characteristics of the individual and environment

Characteristics of the individual (for example, values and patient preferences) and environment (for example, social, economic, and psychological support), are considered as contributors to functional status, general health perceptions, and overall QoL (Ferrans *et al*., 2005; Wilson & Cleary, 1995). In most regression models, characteristics of the individual and environment are both conceptualised as demographic variables (Heo, Moser, Riegel, Hall & Christman, 2005; Luo, Edwards, Richardson & Hey, 2004). In this study, age, gender, formal education and employment status were used as 'individual' variables and marital status for 'environmental' variables. Figure 3.4 contains the theoretical path model listing the variables tested in this study.

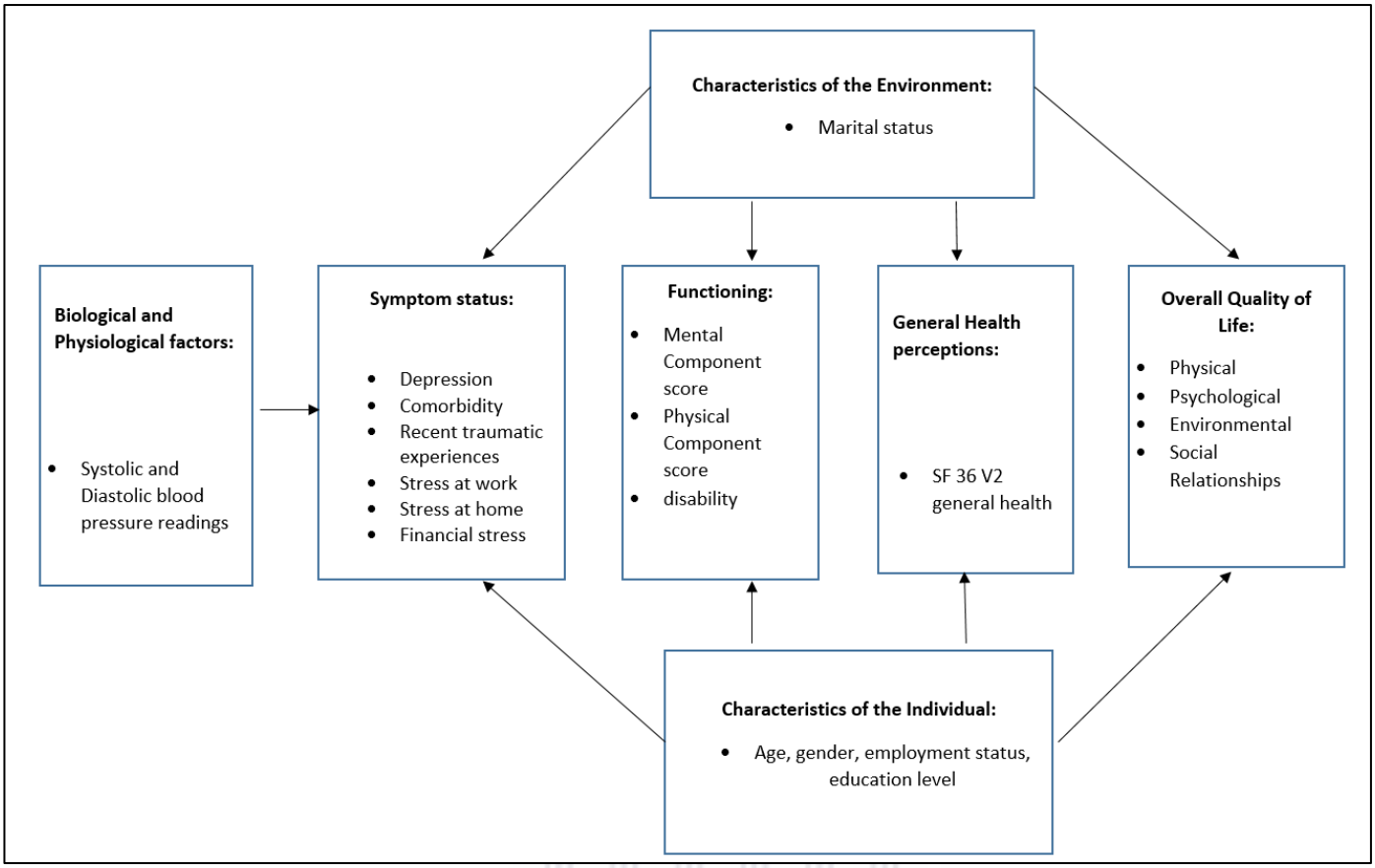

Figure 2. 4 Ferrans Revised Wilson and Cleary model with variables

Health-related quality of life is often an outcome in many studies, however, there continues to be a limited understanding of its determinants. The current study investigated the predictors of H-RQoL and can, therefore, fit these predictors into the revised Wilson and Cleary model. The Wilson and Cleary model is an example of a disease-based, physiological framework that emphasises the impact of disease and health on QoL, in this study, hypertension. The model provides a direct causal path of the following, biological function, an assessment of functional status, symptoms, an individual's perception of her general health, characteristics of the individual and environment, and H-RQoL as the outcome variable (Ferrans et al., 2005). Furthermore, the model has guided similar research studies among H-RQoL and heart failure (Bennett, Perkins, Lane, Deer, Brater & Murray, 2001), diabetes (Maddigan, Feeny & Johnson, 2005; Rejeski *et al*., 2006; Thommasen & Zhang, 2006), HIV/AIDS

(Cosby, Holzemer, Henry & Portillo, 2000; Nokes *et al*., 2000; Phaladze *et al*., 2005), and stroke and disability (Otiniano, Du, Ottenbacher & Markides, 2003).

2.10 Conclusion

In this chapter, the literature was reviewed to gain an understanding of the pathophysiology of hypertension, its risk factors, and epidemiological states nationally and globally. The concepts of QoL, health-related QoL and functional status were then clarified and discussed. Furthermore, the relationship between socio-demographic, psychosocial and disease morbidity predictors variables concerning health-related QoL and functional status was reviewed. In describing the above, an attempt was made to highlight the gap which is lacking in studies such as the current one in the South African context.

The chapter further outlined three theoretical frameworks. The Social Production Function theory provides a mechanism for linking ill health and QoL. The theory explains how people engage in activities to maintain their QoL. Maslow's theory of QoL was discussed, which suggests that when people take responsibility for their own life, they become happier. The theory suggests seven needs that people pursue in sequence until a higher level is substantially completed or satisfied. The Wilson-Cleary theoretical framework, focussing on relationships on aspects of health by linking symptom status, physiological variables, functional status, and general health perceptions to assess overall QoL was the third to be discussed. For the current study, the Wilson-Cleary theoretical framework, as discussed earlier, is the most applicable theory.

Information in this chapter was obtained through a variety of sources including journal articles, unpublished masters' and doctoral dissertations, textbooks, online published conference presentations and electronic newspaper sources.

A further attempt in this chapter was to establish disability and chronic disease as strong mediators between demographic and psychosocial predictor variables. To achieve these findings, various studies were highlighted and their strengths and weaknesses identified where necessary. In the following chapter, I will outline the methods used to answer the overall aims and specific research hypothesis highlighted in Chapter 1.

Chapter Three

Methods

Introduction

In this chapter, various research methods used to generate the data in this study are described. A small pilot study was conducted to test the reliability of the collection tools as well as the data collection strategy. The procedures and outcomes of the pilot study, including the reliability analysis of the different outcome measures are described briefly in this chapter.

For the main study, participants and data from the PURE-UWC-SA study were used. Therefore, in this chapter, a brief overview is given regarding the context and background of the PURE study, including the study locations, study population and sampling strategies. Then follows the description of data collection procedures and data analysis for the main study.

Data collection for the current study was supplemented from secondary data collected in a prospective study. In the following sections, I will describe 1) the background of the study from which secondary data were used, 2) the research design and data collection strategy, followed by the pilot study, and 3) the data analysis techniques used to answer the research questions.

3.1 The pilot study

The main purpose of the pilot study was to assess the translated instruments (WHOQOL-BREF, PCI) in terms of reliability, and to assess the data collection strategy in terms of procedure, time, and identifying difficult questions or instruction.

3.1.1 Pilot sample size considerations

The sample size for the current study was calculated using G-Power version 3.0.10, an open-source software tool used to compute statistical power analysis for different types of tests (Faul, Erdfelder, Buchner & Lang, 2009). An Alpha parameter, which is the probability of finding significance where there is none, was set to 0.05, power was set at 0.95 with medium effect size and yielded a sample size requirement of 107 participants. Based on this, a total sample size of 40 participants was chosen for the pilot study.

3.1.2 Pilot research setting and selection of participants

To avoid possible contamination where data from the pilot study are included in the main results, two different communities sharing similar socio-demographic characteristics were chosen, i.e. Khayelitsha and Mandalay. Pilot studies should preferably be executed using subjects from a population that is different from those recruited in the main study (Hassan, Schattner & Mazza, 2006). Mandalay is a Cape Town community in the greater Mitchells Plain region and has an area of 2.25 km² and a population of 8 839, mostly black African people (Census, 2011). Khayelitsha is a partially informal township located on the Cape Flats in Cape Town, with an area of 43.5 km² and a total population of 2.7 million people. Most are black African (99.5%) and 96.8% speak isiXhosa. The Village 2 North area was chosen as the second sight in Khayelitsha. Village 2 North is similar to Mandalay. These two areas shared similar demographics, educational profiles, and economic characteristics as that of Langa, the research setting for the main study. Both areas further share a common socio-political background, being allocated to disadvantaged communities during the Apartheid system.

A total of 40 participants were approached for the pilot study, 20 participants from each community. They were purposely chosen by fieldworkers. Purposive sampling is a non-probability sampling

technique where participants are selected because of their accessibility and proximity to the researcher and occasionally used in exploratory research (Van Vuuren & Maree, 1999).

3.1.3 Pilot data collection process

Data collection commenced after the University of the Western Cape approved ethical clearance of the study. Fieldworkers who had experience in undertaking surveys were trained by the researcher in understanding and explaining the constructs of the questionnaire of the current study. Fieldworkers approached participants at the household level and explained the study to them. Participants were informed that it was a pilot study, and the purpose was to evaluate and highlight any difficulties in the interview process. Upon agreeing to participate, respondents were required to sign a consent form. Each participant received a copy of the information leaflet detailing the particulars of the study and contact details of the researcher in English and isiXhosa. Participants' rights to confidentiality and anonymity, and their right to withdraw at any time during the interview process were explained.

Upon entering the household and completing the interview, fieldworkers were required to note the time, which was necessary for noting how long the interview process took place. Each question in the questionnaire apart from the demographic questions were numbered, totalling 156 questions. Fieldworkers were required to circle the number of each question the respondent had difficulty understanding, or which required further explanation from the fieldworker. Any questions the respondent did not want to answer or felt uneasy about was noted by the fieldworker.

The results of the pilot study are presented in Chapter four, Results.

3.2 Context and background to this study – Secondary data

In 2009, the School of Public Health at the University of the Western Cape led the Prospective Urban Rural Epidemiology study South Africa (PURE-UWC-SA) in collaboration with the Medical Research

Council and the University of Cape Town. The PURE-UWC-SA is a cohort study that tracks changing lifestyles, risk factors and the development of chronic disease in 17 upper-middle and low income countries. Data collected included environmental factors, consisting of the physical environment (buildings, land use, transport system) as well as the perception of the environment (how conducive a community is for walking and physical activity); nutrition policy and environmental factors, which includes issues such as food affordability and availability; psychosocial and socioeconomic factors, which includes issues such as income inequality, literacy, level of perceived stress and social networks; and tobacco and alcohol use. Study sites included one rural and one urban community Communities had to show migration stability based on the longitudinal study design. Urban areas had to reflect a true representation of urbanisation. In South Africa there are two study sites, one led by the University of the North West and one by the School of Public Health at the University of the Western Cape.

For the PURE-UWC baseline study, data was collected from approximately 2000 urban and rural participants in 2009 and 2010. Participants were men and women aged 35 to 70 years. These individuals were then followed up every year by local health care workers familiar with the communities. Deaths were recorded and their causes ascertained by validated verbal autopsy. Follow up events of new diagnosis were recorded for every respondent.

The current study is nested in the PURE-UWC-SA study, which aimed to examine the overarching relationships of societal influence on human lifestyle behaviours, CVD risk factors, and the incidence of chronic disease (Teo, Chow, Vaz, Rangarajan & Yusuf, 2009). The principal investigating institution, the Population Health Research Institute, Hamilton in Canada, implemented the PURE study in 23 low-, middle-, and high-income countries.

In the main PURE study, data was collected from 382 341 women and men from 107 599 households in 628 communities in 17 countries and on five continents (Teo *et al*., 2009). Participants have been followed for more than ten years. Countries were classified according to the World Bank Classification

of high, upper-middle, lower-middle, and low income countries. Information was collected based on medical history, lifestyle behaviours, current diagnosis, and various anthropometric, blood, and electrocardiogram (ECG) data. The data collected were centred on four domains, i.e. the built environment, nutrition and food policy, psychosocial and socio-economic factors, and tobacco and alcohol.

3.2.1 PURE-UWC-SA study locations

The PURE study was based at two universities in the country, i.e. in the university of theWestern Cape and North West university. Study sites included a rural and urban community sites. Urban areas had to reflect a true representation of urbanisation. The PURE-UWC-SA study included participants selected from two black South African communities. These were Langa, an urban settlement located close to Cape Town in the Western Cape, and Mount Frere, a rural community located in the Eastern Cape. Both sites consist of Xhosa-speaking people, with low socio-economic levels. For this current study, the research component is based in the urban, Langa community.

3.2.2 PURE-UWC-SA study population and sampling strategy

A cross-sectional sample of 2 026 female and male participants between 35 and 70 years were randomly drawn to be representative of the adult population residing in the urban and rural communities. The study population included both rural and urban communities since they exhibited distinct characteristics in the physical and social environment. The two communities were purposively selected based on having a relatively stable black population allowing for the feasibility of follow-up in a prospective cohort study. For the current study, we used participants and secondary data (diagnosis of NCDs and new events, blood pressure readings and hypertension diagnosis) from the PURE-UWC-SA study.

3.3 Research design of the current study

A cross-sectional quantitative study design was used for the study. This design is best suited to studies aimed at determining the prevalence of a phenomenon, problem or situation by taking a cross-section of the population (Kumar, 1999).

The study location is situated in the community of Langa, with an estimated population of 53 276 people. The average monthly household income is R2 103 (Stats SA, 2011). The Langa community is grouped into three developmental areas mirroring the socio-economic status of the residents, i.e. the 'Zones', 'Hostels', and 'old' Langa. The 'old' Langa is considered to have a higher socio-economic status with improved and established amenities, whereas the 'hostel' represents a lower socio-economic status. Streets were randomly selected from a street map obtained from the City of Cape Town. Once the random selection of a street was made in each designated area, every second house was approached for inclusion. Participants were recruited between 2009 and 2010 and were between the ages 35 and 70 years.

3.3.1 Eligibility of sample for the current study

All participants in the PURE study between 40 and 70 years old from the urban township of Langa in the Western Cape who were hypertensive met the criteria for inclusion in the current study. An initial sample of participants was identified from the 2009 PURE baseline cohort. This list was further supplemented based on results on new hypertensive diagnosis determined during the six-year follow-up phase. Only participants who older than 70 years of age were excluded and not approached to participate in the study.

3.3.2 Sample size considerations

A probability or significance level of 0.05 has been established as a generally acceptable level of error (Hill, 1998). The sample size for the current study was calculated using G-Power version 3.0.10, an open-source software tool used to compute statistical power analysis for different types of tests (Faul, Erdfelder, Buchner & Lang, 2009). An Alpha parameter, which is the probability of finding significance where there is none, was set to 0.05; power was set at 0.95 with medium effect size. This probability yielded a minimum sample size requirement of 107 participants. All the participants in the PURE study identified as hypertensive were approached for inclusion to prevent achieving a lower sample, which would allow additional independent variables to be included in the statistical models for the second aim. Based on the latest data received from the PURE research team, which included addresses and telephone numbers of respondents, 234 homes were identified and visited for inclusion in the study. Thirty-seven (37) participants had relocated homes or migrated to another province, and seventeen people had died, which left a total of 197 participants who agreed to participate in the study.

3.3.3 Use of secondary data

3.3.3.1 Data collected at baseline

Baseline data of participants included self-reported diagnosis of hypertension, confirmation that they had been diagnosed as being hypertensive by a health professional, or those who were currently on anti-hypertensive medication. Individuals with hypertension were also included where blood pressure readings exceeded 140/100 mmHg (WHO, 2011). All participants who met these criteria were identified and targeted for inclusion in the study. An Omron model HEM-757 automatic electronic monitor was used to measure blood pressure, which was taken in two intervals ten minutes apart.

3.3.3.2 Data collected at six years follow-up

The PURE-UWC-SA study provided secondary data for the current one. The same standardized methods that were developed and tested in more than 20 000 people in 10 countries were used in the PURE-SA-UWC study (Yusuf et al, 2005). Face to face interviews were used to collect data by trained staff with the use of standardised protocols. Various psychosocial factors such as attitudes and beliefs, social capital, social support, club membership, levels of role strain, trust, depressive symptomology, and stressful life events were included in the questionnaire. Blood pressure measurements were collected at baseline using a standard protocol to diagnose hypertension, and during the subsequent years (year 1 and year 2 of the study, Hypertension was assessed by self-report and blood pressure measurement. Physical disability was assessing difficulties in executing activities such as seeing or reading, grasping, walking with assistance, bending, hearing, and being understood.

Data was in the current study was collected by trained staff using standardised protocols manuals. Key staff consisting of the principal investigator, coordinator and a nutritionist from each centre attended training sessions. They in turn trained the local staff using centrally created manuals and training videotapes.

Using PURE-UWC-SA secondary data provided several advantages. First, it produced a longer respondent list, which captured new events such as hypertensive diagnosis, disability, and other NCD onset to create a co-morbidity variable for the main study. Second, trained nurses obtained objective blood pressure readings. Third, eligible participants were identified based on newly diagnosed hypertensive individuals for inclusion in the main study. Fourth, the follow-up visits identified participant deaths and migration to other areas. This identified people who were not included in the main study. These secondary data significantly reduced resources in terms of time and costs.

Secondary data used from the PURE-UWC-SA at baseline and follow-up and additional data collected as part of the main study are shown in Figure 3.5.

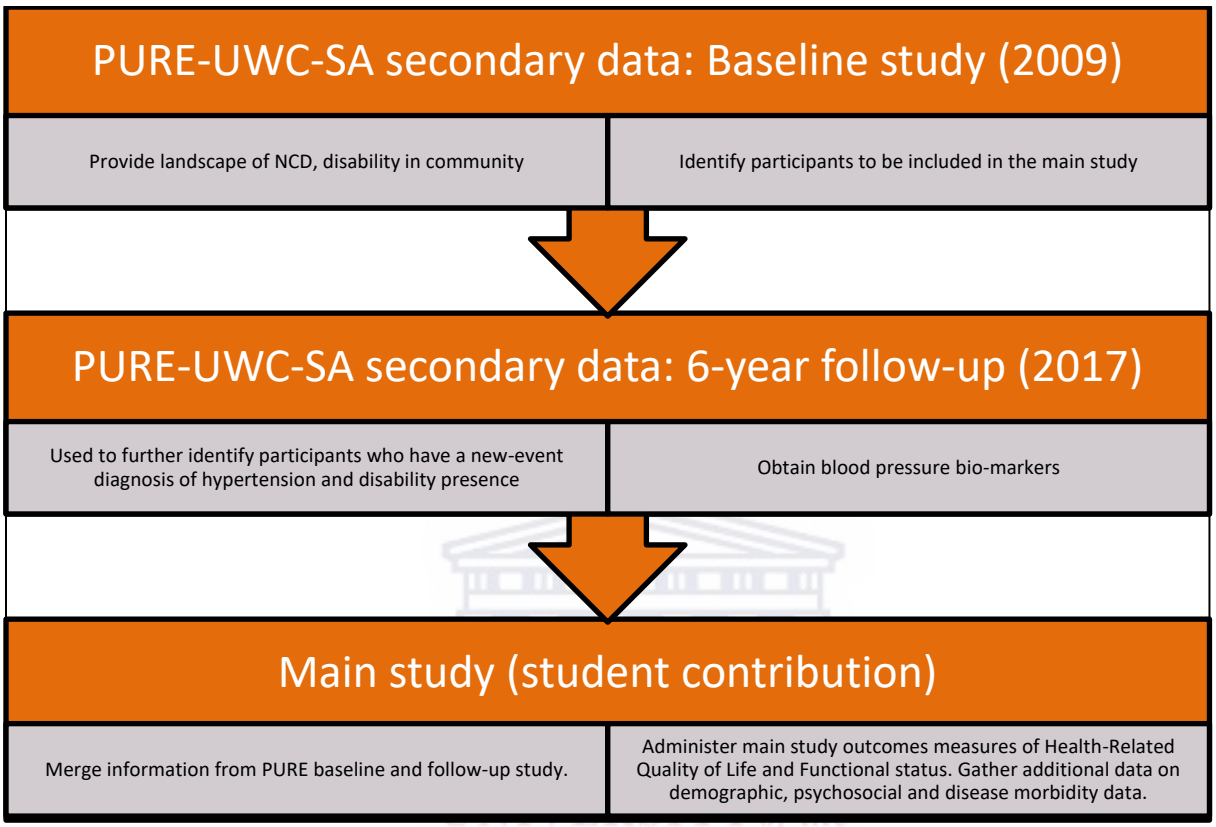

Figure 3.5 Graphical representation of all data sources used to compile data for the current study

3.4 Data collection instrument

All data were collected using questionnaires (Appendix F-G) outlined in Sections A to D. Individuals' questionnaires were combined to form a booklet. These minimised the risk of losing individuals' questionnaires after the interview process and also ensured that all questionnaires were captured under the same participant. Questionnaires were translated into isiXhosa by a professional translator and then translated back into English. These questionnaires were tested in a pilot study which will be discussed later in the chapter.

The collection instrument consisted of a booklet comprising demographic questions followed by three questionnaires measuring H-RQoL, functional status, and coping. Section A comprised the demographic questions along with measures of disability and psychosocial factors. Section B consisted of the Short Form 36 version 2 questionnaire, which measures functional status. Section C consisted of the Proactive Coping Inventory (PCI), and section D measured H-RQoL using the WHOQOL-BREF questionnaire. A brief outline of each section is provided.

3.4.1 Section A: Demographic questionnaire

In this section of the questionnaire, demographics, current disability, membership, recent traumatic events, work, home and financial stress, and depressive symptomology of the respondent were recorded. The demographic section consisted of eight questions on age, gender, marital status, educational level, employment, and whether they had stopped working because of illness.

Current disability was assessed using eight questions based on the International Classification of Functioning, with a yes or no response. The questions enquired whether the participant had difficulty grasping with their hands; required a walking stick/cane/walker to move about; problems bending down and picking up an object from the floor; any difficulty reading or seeing the individual grains of rice; difficulty seeing a person from across the room; trouble speaking and being understood, and trouble hearing what is being said in a normal conversation. Answering yes to any of the questions indicated the presence of a disability.

Psychosocial stress was assessed in demographic section of the questionnaire and consisted of several sets of questions, including *belonging to self-help and civic groups, stress at work and home, financial stress, the occurrence of major life events, and depression*. The same assessment was used in studies such as the INTERHART (Rosengrel *et al*., 2004; Yusuf *et al*., 2004), INTERSTROKE, (O'Donnell *et al*., 2010) and the PURE studies (Teo *et al*., 2013). Stress was separated into psychological and

financial stress. Psychological stress was calculated using two single-item questions related to stress at work and stress at home (Rosengren *et al*., 2015). As in the mentioned studies, stress was defined as feeling irritable, being filled with anxiety or as having sleep difficulties as a result of conditions at home or work (Rosengren *et al*., 2004). Respondents had to report on each question how often they had felt stressed using the following options, 1=never; 2=some periods; 3=several periods; and 4=permanent stress. The two questions were based on an adaptation of a single question used in multiple studies in Gothenburg, Sweden since 1970. For this present study, a similar global stress scale was adopted that combined work and or home stress using options used by Rosengren *et al*., (2004) and was graded as follow, 1=never experienced stress; 2=experienced some periods at home or at work; 3=experienced several periods at home or at work; and 4=experienced permanent stress at home or at work (Rosengren *et al*., 2004). For financial stress the level options were, 1=little/none; 2=moderate; and 3=high/severe.

Depression in the current study was assessed by asking whether a respondent had felt sad, 'blue' or depressed in the previous twelve months for two weeks in a row. If the respondent replied yes, an additional seven yes/no questions were enquired. These questions gauged whether they lose interest in things, feel tired or low on energy, whether they gained or lost weight, have trouble falling asleep, have trouble concentrating, have thoughts of death, and feel worthless. Having five or more positive answers to these questions were defined as positive. This set of questions was based on an adaptation of the short form Diagnostic and Statistical Manual Disorders-IV CIDI questionnaire for depression (Rosengren *et al*., 2015, Rosengren *et al*., 2004; Patten & Metz, 1997). The CIDI questions demonstrated excellent inter-rater reliability and showed good test-retest reliability and validity (Andrews & Peters, 1998).

Respondents were asked whether they had experienced any occurrence of major adverse life events. These were assessed by asking whether in the previous year they had experienced loss of job/retirement, marital separation/divorce, loss of crop or business failure, major intra-family conflict, violence, death of a spouse/close family member, new job, birth/separation of family, and major depression (Rosengren *et al.*, 2004).

3.4.2 Section B: The Short Form 36 version 2 questionnaire

This part of the questionnaire consisted of the Medical Outcomes Survey Short Form 36 version 2 (SF 36 V²) questionnaire and comprised 36 questions that measure functional health and well-being from the patient's point of view. The 36 items are scored in eight scales; i.e. physical functioning (10 items), role physical because of physical health problems (4 items), bodily pain (2 items), general mental health (psychological distress and psychological well-being, 5 items), role limitations because of emotional functioning (3 items), vitality (energy/fatigue, 4 items), and social functioning (2 items) scales (see figure 3.6). The scales assessed areas in the previous four weeks using the Likert method of summated ratings. The SF-36 v2 also includes a single-item measure of health transition of change and can be divided into two aggregate summary measures, which are the PCS and the MCS (Ware, 2000), to be used in the current study. Answers are scored and then summed to produce a raw scale score for each health concept which is then transformed to a 0-100 scale from which scoring algorithms can be applied to produce the PCS and MCS scores. Scores closer to 100 indicate advanced functioning on that particular PCS and MCS scale.

The SF-36 v2 reported good internal consistency and test-retest reliability. Good correlations with other measures and construct validity as well as adequate discriminatory power and criterion-related validity were also reported using the SF-36 v2. (Ware, 2000). The SF-36 v2 demonstrated excellent internal consistency which was calculated using Cronbach's Alpha scores to determine correlates

between items, ranging from the lowest alpha 0.80 (general health) to 0.92 (physical functioning) across all domains (Jenkinson, Stewart-Brown, Petersen & Paice, 1999).

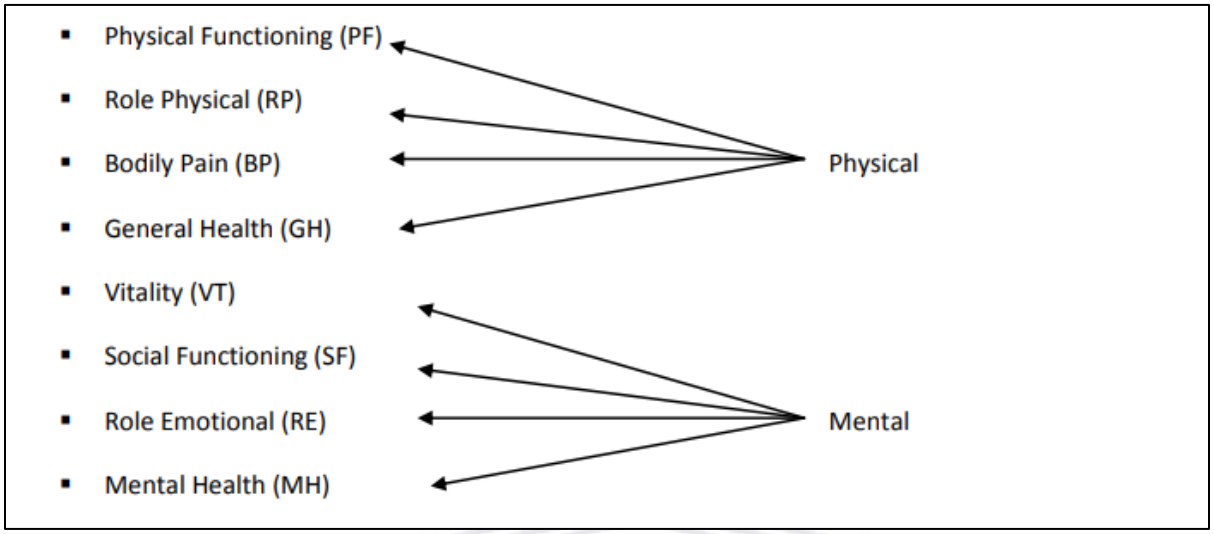

Figure 3.6 Model structure of the SF 36 v2

3.4.3 Section C: The Proactive Coping questionnaire

This section of the questionnaire comprised the PCI. The PCI consists of 55 items and seven subscales, i.e. the proactive coping subscale (14 items), the reflective coping subscale (11 items), the strategic planning subscale (4 items), the preventive coping subscale (10 items), the instrumental support seeking subscale (8 items), the emotional support seeking subscale (5 items), and the avoidance coping subscale (3 items). These implement on a behavioural and cognitive level a way of coping based on responsibility, resourcefulness, and vision (Greenglass, Schwartzer, Jakubiec, Fiksenbaum & Taubert, 1999). The 55 items were developed from the original 137 PCI items. The inventory is premised on the idea of coping as multidimensional as a process over time where coping activities are seen to occur simultaneously on cognitive and behavioural levels (Greenglass *et al*., 1999).

The scores of the subscales are assigned weights out of 100. Scores closer to 100 indicate higher coping in that particular subscale. The seven subscales of the PCI have yielded good construct validity, homogeneity, and acceptable reliabilities (Greenglass *et al*., 1999).

3.4.4 Section D: The WHOQOL-BREF questionnaire

The last section of the questionnaire consisted of the WHOQOL-BREF scale. This scale was developed by the WHOQOL group in an attempt to generate a QoL assessment that would be applicable cross-culturally. The WHOQOL-BREF scale is a 26-item version of the WHOQOL 100 scale and allows for a detailed assessment of each facet relating to QoL. The scale taps various domains such as physical health, psychological, environment, and social relationships, and is available in 19 different languages (see figure 3.7).

A specific computer syntax code is used to transform raw scores into computed scores out of 100. Scores closer to 100 indicated higher QoL in that particular subscale. The WHOQOL-BREF has been subjected to various psychometric testing, all yielding favourable results. In an analysis of internal consistency, discriminant validity and construct validity through confirmatory factor analysis the WHOQOL-BREF scale was found to have good to excellent psychometric properties of reliability and performed well in the preliminary test of validity (Skevington, Lofty & O'Connell, 2004). Cronbach's alpha test revealed acceptable scores for the physical health (0.82), psychological (0.81), environmental (0.80) domains and marginal for social relationships (0.68) (Skevington, Lofty & O'Connell, 2004).

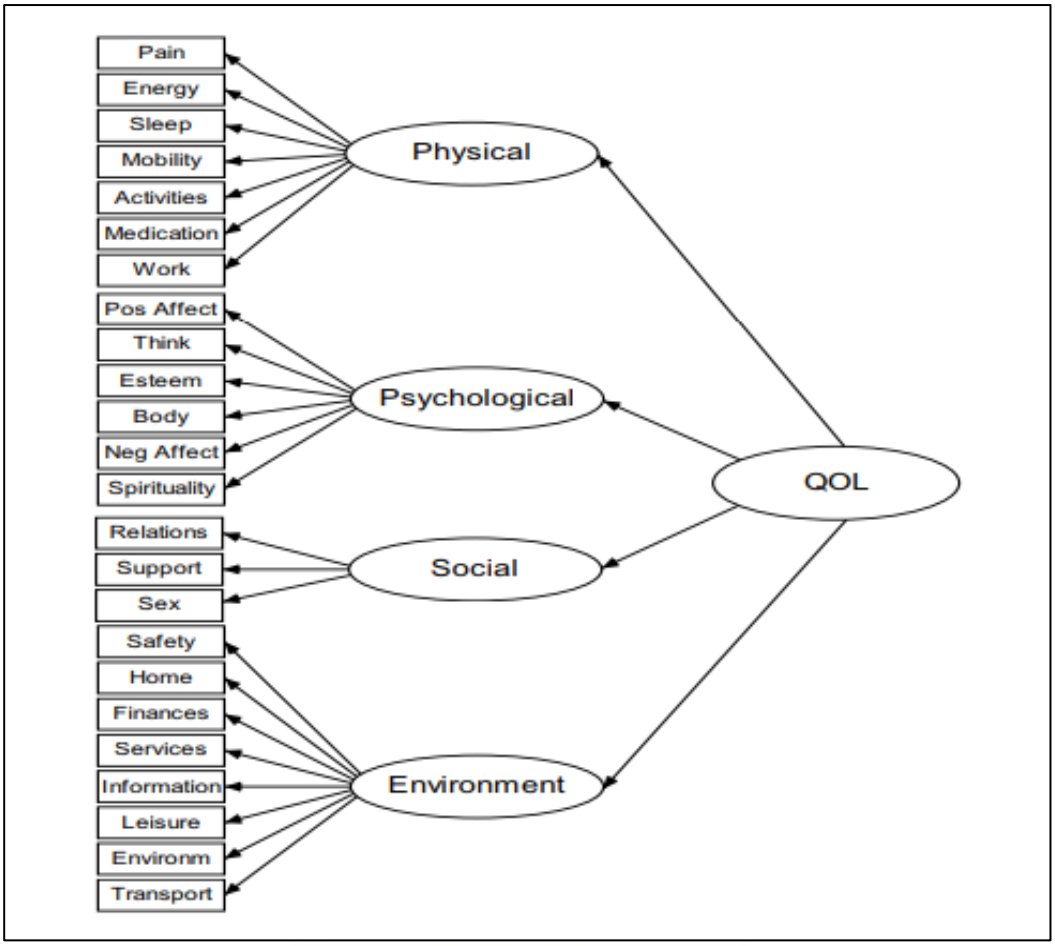

Figure 3.7 Model structure of the WHOQOL-BREF

3.4.5 Translation of collection instruments

The PURE study identified the main first languages in Langa as isiXhosa (97%) and English (3%). For this reason, the PCI and WHOQOL-BREF were translated into isiXhosa using forward-back translation and independently verified by another researcher fluent in isiXhosa, before being translated back into English. The SF 36 v2 produced by Optum Inc. 2017 is a licensed product available in 170 languages including isiXhosa and was not translated. To confirm reliability and validity of the instruments a pilot study was undertaken, which is described briefly (see 3.5).

3.5 Data collection procedures of the main study

Data were collected via structured face-to-face interviews between 14 October 2014 and 31 August 2015. The same fieldworkers who conducted the pilot study was involved in data collection for the main study. A brief retraining session was conducted after the pilot study to prepare the fieldworkers for data collection in the main study. The interview schedule consisted of direct questions with probing and further clarifications in case of unclear concepts or questions. Interviews were undertaken in participants' home. In cases where no one was home, three additional follow-up visits were made. Appointments were made with employed participants to be interviewed in the evening or on Saturday mornings. Interviews for the main study lasted approximately 15 – 20 minutes in duration, and the longest interview lasting 35 minutes. Respondents who agreed to participate in the study were required to sign a consent form which was stapled to the questionnaire booklet. All participating respondents received information pamphlets in English or isiXhosa (Appendices B and C) regarding the details of the study, with departmental contact information.

3.6 Data analysis procedures

Data analysis was computed using the IBM Statistical Package for the Social Sciences (SPSS) version 25 (2017) and STATA version 13 software. Various descriptive analyses were computed for all socio-demographic, psychosocial, and disease morbidity variables. Similar procedures were conducted on the outcome variables, H-RQoL and FS. These included basic exploratory analysis such as graphs and histogram relationships, frequency distributions, data dispersion analysis, and frequency and probability distribution analysis.

Data were further screened to identify outliers, which can especially have a negative impact on statistical models and can cause assumptions to be violated. Similarly, missing values in the dependent

outcome variables were investigated to determine whether they were attributable to capturing errors or omissions, and were excluded if needed.

Relationships between the socio-demographic, psychosocial and disease morbidity independent variables, and H-RQoL and FS dependent variables were examined using Pearson chi-square or One-Way ANOVA tests.

The predictive models were created using Multivariate Multiple Regression analysis. Multiple regression is an extension of simple regression in which an outcome is predicted in a linear combination of two or more predictor's variables (Field, 2014). This method is used to predict the probabilities of the different possible outcomes for FS and H-RQoL, given the set of socio-demographic, psychosocial factors, and disease morbidity variables. Logistic regression was used to test for NCDs for a mediator, and multinomial regression was used to test disability. The significance value for the interpretation of correlations was set at the 95% confidence interval level ($p < .05$) to counter the probability of Type 1 error. All models were subjected to assumptions testing, which is briefly outlined below (section 3.7.1).

3.7.1 Assumptions of multiple regression

Multiple regression is a statistical test and, therefore, a set of assumptions have to be met. Violating any of the assumptions could result in a biased interpretation of the test results. The test investigated the assumptions of linearity, normality, independence of errors, and multicollinearity.

3.7.2 Linearity

As with ordinary linear regression, it is assumed the outcome has a linear relationship with the predictors. The assumption of linearity in multiple regression assumes that there is a linear relationship

between any continuous predictor and the outcome variable (Field, 2014). A lack of linearity indicates a model is invalid, and variables may have to be transformed to avoid bias in the model.

3.7.3 Independence of errors

Violation of this assumption would result in dispersion, which is when the observed variance is greater than expected from the logistic regression model. Over-dispersion tends to limit standard errors, which can create two problems in the given statistical output (Field, 2014). First, the test statistic of regression parameters is computed by dividing the standard error. If the standard error is too small, then the test statistic will be too big and falsely found significant. Second, the confidence intervals will be computed from the standard errors. If the standard error is too small, then the confidence interval will be too narrow, which will inflate the confidence about the likely relationship between the predictors and the outcome variable. Independence of errors was tested using the Durbin-Watson equation statistic, which tests for serial correlations between errors, and whether adjacent residuals are correlated (Field, 2014).

3.7.4 Testing for multicollinearity

Multicollinearity can affect the parameters of a regression model. When one independent variable is perfectly correlated with another variable multicollinearity occurs, and clearly indicates dependency between the variables. Therefore, the model needs to be tested for collinearity (Steyerberg, 2009). If collinearity is found present, the results in the model are biased. Multicollinearity was tested using the variance inflation factor (VIF) and tolerance statistics.

3.7.5 Homoscedasticity

The assumption of homoscedasticity requires that the variance around the regression line is the same (stable) for all the predictor variable values (Field, 2014). Heteroscedasticity is present when the size

of the error term differs across values of an independent variable. This assumption was tested by examining the scatterplots produced by the models. The assumption was further subjected to the Breusch-Pagan significance testing for heteroscedasticity.

3.7.6 Normality

The assumption of normality assumes that independent and dependent variables are equally distributed, referred to as a normal distribution (Field, 2014). Normality was determined using kernel density estimates and P-P plots. Kernel density is a non-parametric way to estimate the probability distribution of a variable.

3.8 Ethical clearance procedure

The proposal for this research project was completed on 19 July 2014 and submitted to the Faculty Higher Degrees Committee on 24 July 2014. The proposal was referred to the University of the Western Cape Senate Committee, whose functions among other things are the superintendence and regulation of instruction and research. Permission to proceed with fieldwork for the study was approved by the Senate Committee through formal communication on 10 September 2014, registration number 14/7/9 (see Appendix A).

In research, which involves collecting information from subjects based on trust, the rights, interests and sensitivity of those being studied must be protected (Mouton, 2001). Durrheim and Wassenaar (1999) related this to three ethical principles. The first principle, ‘autonomy’ requires the researcher to respect the autonomy of the participants, and to allow them the freedom to withdraw at any time. The second principle, ‘nonmaleficence’, means the researcher must not harm the participants. Harm may include research that subjects the participants to anxiety, harassment, discomfort, invasion of privacy and demeaning or dehumanising procedures (Bailey, 1976). The third principle is beneficence,

which relates to doing research that will be of benefit to the participant, and if not directly to the participants then more broadly to other researchers and society at large (Durheim & Wassenaar, 1999).

3.8.1 Informed consent

According to Bailey (1978: p384), seeking consent "is probably the most common method in medical and social science research." The consent form typically offers broad general statements about the nature and purpose of the study. All participants in the pilot and main study were asked to assent to the study in writing by signing a consent form. By giving consent, the participant implies adequate awareness of the type of information the researcher needs. The consent form (Annexture D) was available in English and isiXhosa, in a language that was reasonably understandable to the participants. In the consent form, participants were explained that they were free to withdraw at any time without giving a reason, could decline to participate, and informed them of any foreseeable risk factors to participate in the study. Participants received a three-page summary information leaflet detailing the objectives of the study. Additionally, contact details of the researcher and the head of the School of Public Health were supplied in the information brochure should any concerns regarding the study or fieldworkers arise.

3.8.2 Privacy, confidentiality and anonymity

Sharing information about a respondent with other parties other than those involved in the research is unethical (Kumar, 1999). Respondents have the right to remain anonymous, and this right should be respected where it has been promised and where no clear understanding to the contrary has been reached (Mouton, 2001). In most research studies, confidentiality refers to the personal identity of the respondent being concealed, and only summarised or aggregated group information or anonymous quotations are published (Durrheim & Wassenaar, 1999). Fieldworkers safeguarded all completed questionnaires. The researcher attached each consent form to a completed questionnaire and collected

these at the end of each day. As a precaution, names were used to correctly identify the participants in conjunction with their unique PURE study identity number.

3.8.3 Protection from harm

According to Mouton (2001), the process of conducting research must not expose the subjects to personal harm. These can include physiological or psychological experiments, procedures that are interventional or 'invasive/intrusive', involve taking blood or tissue samples, performing invasive physiological or psychological measurements, exposing the subject to chemicals, stressful stimulus or activity, and the recording of personal, physiological or psychological data together with the subjects identity (Mouton, 2001: p245). The current study, which is questionnaire-based, is considered 'low risk'. According to Jackson (1999), minimal risk is classified under no more physical or emotional risk than would be encountered in daily life or routine physical and psychological examinations. Respondents were advised they could withdraw from the study at any time and without supplying a reason to ensure 'a no or low risk' in the current study.

3.9 Summary of the Chapter

Data from the PURE-UWC-SA study sight, located in Langa, Cape Town used in this study, particularly the data collection methods employed, are briefly described in this chapter. How the PURE-UWC-SA hypertensive study population and the anthropometric respondent follow-up data were used to supplement the current study, were also highlighted in this chapter. The data collection strategy and procedures of the current study were then outlined. The chapter is concluded by discussing which data analysis methods, and which predictive model-building techniques and ethical considerations were employed in the study. In the following chapter, the results of the study will be presented.

Chapter Four

Results

4.1 Introduction

The results of the **pilot** and **main study** will be presented in this chapter. The chapter will first present the descriptive data for the pilot study based on the socio-demographic factors, psychosocial factors and disease morbidity variables. This section will be followed by the results of the reliability testing of the H-RQoL and FS outcome measures in the pilot study.

The remainder of the chapter will present the results of the main study. The main results are presented according to the primary aims of the study. Aim 1 was to determine the relationships between the demographic, psychosocial and disease morbidity variables with H-RQoL and FS. The results for aim 1 will be presented in the form of the research hypothesis as outlined in chapter 1 (page10). For aim 2 statistical models were developed using selected demographic, psychosocial and disease morbidity variables to predict H-RQoL and FS in hypertensive individuals. This chapter will therefore conclude by presenting the predictive models and model summaries.

4.2 Results of the pilot study

A total of 40 participants were approached to participate in the pilot study. All participants who were approached to participate consented with no refusals; hence, a 100% response rate was achieved. The participants were chosen at random using purposive sampling. An integral part of the pilot was convincing respondents to participate in the study, therefore they were not supposed to know the fieldworker. The age of the participants ranged from 42–69 years, with a mean age of 57.9 years. There were more females (82.5%) than males (17.5%). All the participants were black Africans (100%), with isiXhosa being their first language. Most of them were unemployed (77.5%), with 80.0% having

secondary education, 6.0% with primary schooling, followed by 5.0% with tertiary education. None of the respondents had any difficulty or felt uneasy about answering a question. The demographic characteristics of the 40 participants in the pilot study are summarised in Table 4.1.

Table 4.1 Demographic characteristics of participants

	N	%
Gender		
Male	7	17.5
Female	33	82.5
Language		
isiXhosa	100	100.0
Marital Status		
Currently married	16	40.0
Divorced	1	2.5
Never married	18	45.0
Separated	1	2.5
Widowed	4	10.0
Education		
College/University	2	5.0
Primary	6	15.0
Secondary	32	80.0
Employment status		
Unemployed	31	77.5
Employed	8	20.0

On average, respondents took about 15–20 minutes to be interviewed. Fieldworkers were to note which questions respondents needed clarified, or refused to answer.

During the debriefing, fieldworkers suggested more spacing between the questions, purely to reduce skipping items in the questionnaire. This task was accomplished before the main study. All fieldworkers were content with the final questionnaire.

4.2.1 Results of reliability analysis

Results of the reliability analysis will briefly be outlined in this section. Reliability analysis was computed using the IBM Statistical Package for the Social Sciences (SPSS) version 25. Reliability analysis was conducted on the SF 36 v2, the PCI, and the WHOQOL-BREF. All items from subscales were considered weak if the inter-item correlation was found to be below .3, and if the Cronbach's Alpha increased significantly when the item was removed.

Reliability analysis is used to determine the consistency of a measure (Field, 2014). The Cronbach's (α) indicates the overall reliability of a questionnaire, where scores of around .80 are considered a good indicator of reliability. The SF 36 v2, the WHOQOL-BREF, and the PCI are all established measures. The purpose of the reliability analysis in the pilot study was not to improve the reliability of the instrument as this would influence the psychometric properties making it less comparable to other studies. Instead, the reliability analysis was done to identify possible weak items so that these may be interpreted with caution in the main study.

4.2.2 Reliability of the Short Form 36 version 2

All the subscales for the SF 36 v2, except for two subscales (general health, vitality) indicated excellent internal consistency and reliability (see Table 4.2). The subscales, physical functioning (.91), role physical (.98), role emotion (.89), social functioning (.96), bodily pain (.89), and mental health (.89) all had excellent reliability scores. These results were consistent with other studies that reported similar high scores (Zhou *et al*. 2014; Zhou *et al*., 2013; Wu *et al*., 2013; Laquardia *et al*., 2011). All inter-

item correlations for the above scales had scores above .3, which indicate that all the items positively contribute to the overall reliability (Field, 2014). According to Field (2014), when individual items have scored less than .3, it means a particular item does not correlate well with the overall score from the scale. Additionally, all items were investigated to determine whether deleting a particular one would increase the overall reliability of the subscale. The mental health subscale was found to have such an item. Though all the correlations were above .3, indicating a good correlation between the items and the overall scale. If item 2, 'felt down in the dumps that nothing could cheer you up' was deleted, the overall reliability of the subscale would increase from .89 to .95. This item will be interpreted with caution in the main study. The internal consistency of the general health scale was .51, indicating poor reliability. Other studies that were done by Zhou *et al*., 2013 and Laquardia *et al*. (2011), yielded much higher reliability scores. The inter-item total statistics revealed all were above .3, indicating the correlation between the different items and the scale. However, if item 1, 'is your health: excellent, very good, good, fair, poor' was deleted, the overall reliability of the scale would increase marginally from .51 to .55. This item should be interpreted with caution in the main study.

Table 4.2 Cronbach's alpha of the SF 36 v2

SF 36 v2 subscales	*A*	Items of the Subscale (*n*)
Physical functioning	.91	10
Role Physical	.98	4
Role Emotion	.89	3
Social Functioning	.96	2
Bodily Pain	.89	2
Mental Health	.89	5
General Health	.51	5
Vitality	.69	4

4.2.3 Reliability of the Proactive Coping questionnaire

In Table 4.3, reliability analysis reveals excellent Cronbach's alpha scores for the proactive (.86), reflective (.91), strategic (.84), preventive (.86), instrumental (.93), and emotional (.89) coping subscales, indicating very good internal consistency and reliability. These results were confirmed in other studies which found similar excellent Cronbach's scores (Elmassy, Pek, Papp, Greenglass, 2014; Renard & Snelgar, 2013).

The Cronbach's alpha coefficient for the avoidance coping subscale was .60 (see Table 4.3), indicating relatively low reliability. This subscale consisted of three items only, which could explain the low reliability. Renard and Snelgar (2013) and Almassy, Pek and Greenglasser (2014) reported findings with a higher score of .78. The Cronbach's alpha showed it would increase the overall reliability of the subscale from .60 to .90 if the item is deleted. This item could potentially be problematic to the scale and should be interpreted with caution in the main study.

Table 4.3 The Proactive Coping Inventory (PCI)

PCI subscales	*A*	Items of the subscales (*n*)
Proactive Coping	.86	14
Reflective Coping	.91	11
Strategic Coping	.84	4
Instrumental Coping	.93	8
Avoidance Coping	.60	3
Emotional Coping	.89	5
Preventive Coping	.86	10

4.2.4 Reliability of the WHOQOL-BREF

Item analysis was conducted for the WHOQOL-BREF. This QoL scale consists of four domains or subscales. Some questions had to be reverse scored. Coding for this was provided by the WHOQOL group in the form of syntax for SPSS. The physical and psychological domain subscales scored high internal consistencies of .98 and .84, respectively (see Table 4.4). The social functioning subscale achieved a lower reliability score of .69 and the environmental subscale the lowest score of .56. Although these two subscales received lower scores, none of the individual items scored below .3. The reliability scores for these two scales did not increase, should any of the items have been deleted. However, the social functioning scale should be interpreted with caution, as it only consists of three items, assessing personal relationships, social support, and sexual activity, instead of the recommended four items minimum (WHO, 1998).

Table 4.4 Reliability of the WHOQOL-BREF

WHOQOL-BREF	*A*	Items of the subscales (*n*)
Psychological	.84	6
Social relations	.69	3
Environmental	.56	8
Physical	.98	7

The reliability analysis for the physical (.98) psychological (.84) subscales, displayed in Table 4.4, show very well to excellent internal consistency. Overall, the corrected item-total correlations were all above .3, indicating all the items contribute positively to the reliability of the subscales. Similar scores were reported in other studies (Serinolli & Novaretti, 2017; Amir, Marcelo, Herrman, Lomachenkov, Lucas, Patrick & LIDO Group. 2000).

Lower reliability scores were reported for the social relations and environment subscales. The social functioning subscale achieved a lower reliability score of .69 and the environmental subscale the lowest score of .56. Amir *et al*. (2000) found a similar lower reliability score for the social functioning subscale. The reliability of the overall score of the social functioning subscale did not increase should any of the items have been deleted. The social functioning scale should, however, be interpreted with caution, as it only consists of 3 items assessing personal relationships, social support, and sexual activity, rather than the recommended minimum of 4 items (WHO, 1998).

The Cronbach's alpha coefficient for the environment subscale was .56, indicating relatively low reliability. Serinolli and Novaretti (2017) found a much more acceptable reliability score of 0.74. Two items were found to increase the overall reliability of the scale if these were deleted. Although these two subscales received lower scores, none of the individual items scored below .3. The results show that the overall reliability of the scale would increase from .56 to .60 and .65 if the two items were deleted. These items are, 'How available to you is the information that you need in your day-to-day life', and 'How satisfied are you with transportation'. In the main study, these items should be interpreted with caution.

4.2.5 Outcome of the Pilot study

The results of the pilot study showed that the data collection strategy was successful. All respondents agreed to particippate in the pilot with no refusals. The interview process was concluded in a reasonable time, and no item questions were identified as being overtly difficult or requiring additional explanation by the interviewer. Overall the reliability analysis of the SF 36 v2, the PCI, and the WHOQOL-BREF showed good to excellent reliability for most of the subscales. Several items were identified in the lower performing reliability subscales, which should be interpreted with caution in the main study. As mentioned earlier, the purpose of the reliability analysis was not to improve the

instrument, as this would influence the psychometric properties of the scales affecting the comparability of the scales with other studies. Instead, the reliability analysis was done to identify possible weak items, so that these may be interpreted with caution in the main study. The purpose of the pilot was to test the data collection procedure in terms of time taken to complete the interview, and identifying sections respondents had difficulty understanding.

Based on the results of the pilot study, the data collection instrument was slightly modified by spacing the questions to ensure none would be accidentally skipped.

The following section reports the results of the main study.

The **first aim** of the current study was to examine the relationships between the independent and dependent variables, using bivariate Pearson and Spearman correlations, and Analysis of Variance (ANOVA) statistical tests.

The **second aim** of the study was to construct models that examined socio-demographic factors, psychosocial factors, disability and disease morbidity as predictors of H-RQOL and functional status. Multiple regression analysis was used to test the second aim. For this aim, further assessments included whether disability and co-morbidity were mediators between the demographic and psychosocial variables.

This section of the results section therefore presents the relationships between the demographic, psychosocial and disase morbidity variables with H-RQoL and FS. This section of the results further presents the outputs of the predictive models.

4.3 Demographic characteristics of the sample

The study sample comprised more females (84.4%) than males (15.6%) (Table 4.5). Participants ages ranged between 41 and 70 years, with a mean age of 60.9 years and a standard deviation (SD) of 6.7. Most of the sample (59.0%) was between ages 60 and 70 years, followed by 32.4% between 50 and 59 years, and 8.7% between 40 and 49 years old.

Almost half of the sample (46.2%) were never legally married, while 36.4% were currently married, and 13.9% widowed. Most participants had secondary education (85.5%), followed by a smaller proportion who only had primary schooling (12.1%). Only 2.3% of the total sample had progressed to higher education levels. Most of the sample was unemployed (83.2%), while only 16.8% were employed. Of those who were unemployed, 18.3% had stopped working because of old age and 3.4% had stopped working because of illness.

Table 4.5 Summary of socio-demographic characteristics of the sample (N=173)

Socio-demographic variables	Categories	Frequency (n)	Percentage (%)
Sex	1 – Male	146	84.4
	2 – Female	27	15.6
	Total	173	100.0
Age	40–49	15	8.7
	50–59	56	32.4
	60–70	102	59.0
	Total	173	100.0
Socio-demographic variables	**Categories**	**Frequency (n)**	**Percentage (%)**
Marital Status	Currently married	63	36.4
	Never married	80	46.3
	Divorced/Separated/Widowed	30	17.3
	Total	173	100.0

Table 4.5 Summary of socio-demographic characteristics of the sample (Cont'd)

Education	Primary schooling	21	12.1
	Secondary schooling	148	85.5
	College/university	4	2.3
	Total	173	100.0
Employment	Yes	29	16.8
	No	117	67.6
	Not working because of old age	27	15.6
	Total	173	100.0
Stopped working because of old age	Yes	30	17.3
	No	143	82.7
	Total	173	100.0
Stopped working because of illness	Yes	5	2.9
	No	168	97.1
	Total	173	100.0
Disability variables	**Categories**	**Frequency (n)**	**Percentage (%)**
Assistive technology: Glasses	Yes	52	30.1
	No	121	69.9
	Total	173	100.0
Assistive technology: Hearing Aid	Yes	4	2.3
	No	169	97.7
	Total	173	100.0
Psychosocial variables	**Categories**	**Frequency (n)**	**Percentage (%)**
Self-help group, Social/Sports club	Yes	8	4.6
	No	165	95.4
	Total	173	100.0
Religious group	Yes	139	80.3
	No	34	19.7

Table 4.5 Summary of socio-demographic characteristics of the sample (Cont'd)

	Total	173	100.0
Stress at home	Never experienced stress	51	29.5
	Experienced some periods at home	114	65.9
	Experienced several periods at home	8	4.6
	Total	173	100.0
Financial stress	Little or none	67	38.7
	Moderate	99	57.2
	High or severe	7	4.0
Stress at work	Never experienced stress	82	47.4
	Experienced some periods at home	89	51.4
	Experienced several periods at home	2	1.2
	Total	173	100.0
Involvement in social, church group	None	150	86.7
	Little	16	9.2
	Moderate/average	6	3.5
	A great deal	1	0.6
	Total	173	100.0
Psychosocial variables	**Categories**	**Frequency (n)**	**Percentage (%)**
Recent traumatic experiences	None	137	79.2
	1 Experience	27	15.6
	2 Experiences	7	4.0
	Several experiences	2	1.2
	Total	173	100.0
Depression	Yes	26	15.0
	No	147	85.0

Table 4.5 Summary of socio-demographic characteristics of the sample (Cont'd)

	Total	173	100.0
Morbidity variables	**Categories**	**Frequency (n)**	**Percentage (%)**
Co-morbidity (NCDs)	Yes	73	42.2
	No	100	57.8
	Total	173	100.0
Type of NCD	Diabetes	45	26.0
	Stroke	7	4.0
	Heart failure	4	30
	Angina	7	4.0
	Other heart disease	5	2.9
	Hepatitis/jaundice	4	2.3
	Cancer	4	2.3
	Chronic obstructive pulmonary disease	7	4.0
	Asthma	15	8.7
Disability	No disability	61	35.3
	Have 1 disability	48	27.7
	Have 2 disabilities	38	22.0
	Have several disabilities	26	15.1
	Total	173	100.0
Co-morbidity with hypertension		73	42.4

A total of 197 hypertensive participants took part in the study. Of these 24 cases were omitted from the final sample because of missing data in the H-RQoL, FS and Coping scales. Based on missing data, four cases were rejected from the H-RQoL scale, three from the FS scale, and 17 cases from the Coping scales. The response rate was 87% (Table 4.6).

Table 4.6 Questionnaires discarded based on missing data

Measure	Exclusion criteria	Total
H-RQoL	Missing >20% cases	4
Functional status	Missing >15%	3
Coping scales	Missing >2 cases per subscale	17
Total questionnaires discarded = 24		

4.4 Independent variables in the study

4.4.1 Psychosocial variables

A large proportion of respondents belonged to a religious group or church (80.3%), while a smaller proportion belonged to self-help groups or social and sports clubs (4.6%). Respondents reported 'little' (9.2%) to 'moderate' reliance on these two groups. A small proportion of respondents had experienced at least one traumatic event in the last 12 months (15.6%), while only 5.2% reported two or more experiences. Most of the respondents (79.2%) had not experienced any recent traumatic events, whereas 15% were classified as being depressed.

4.4.2 Co-morbidity variables

In Table 4.5, it is shown that 42.2% of the sample had a co-morbid condition in addition to being hypertensive. Thirteen per cent (13%) had multi-morbidity, defined in this current study as having two or more co-occurring diseases or conditions. Most respondents who had a co-morbid disease were living with diabetes (26.0%). Disability was defined as having one or more limitations such as having difficulty walking, seeing, hearing, understanding, concentrating and remembering. Most respondents had no limitations (35.3%), while 27.7% had one limitation, and 22% had two limitations. The remainder of the sample had three of more limitations (15.1%). Based on this definition, 64.7% of

respondents had a disability. Furthermore, 30.1% of the sample made use of assistive technology such as glasses, and 2.3% made use of hearing aids, as indicated in Table 4.5.

4.5 Profile of the Quality of Life subscales

An of outline the descriptive information of the QoL and functional status measures, including the mean and standard deviation will follow in this Section. The gender differences between the QoL and functional status will further be outlined.

Table 4.7 Descriptive of the quality of life scale (WHOQOL-BREF)

	N	Mean	Std. Deviation
Psychological	173	71.52	6.073
Social relationships	173	69.84	9.797
Physical	173	69.15	10.487
Environmental	173	57.81	7.773

The total mean for the WHOQOL-BREF was 67.08 and SD=8.53. The Psychological subscale (71.52, SD=6.03) showed the highest mean score followd by Social Relationships (69.84 and SD=9.79), Physical (69.16, SD=10.48), and 57.81 Environmental (57.81, SD=7.77) QoL (see Table 4.7). The scale scores are calculated out of 100, with higher scores indicating higher levels of quality of life.

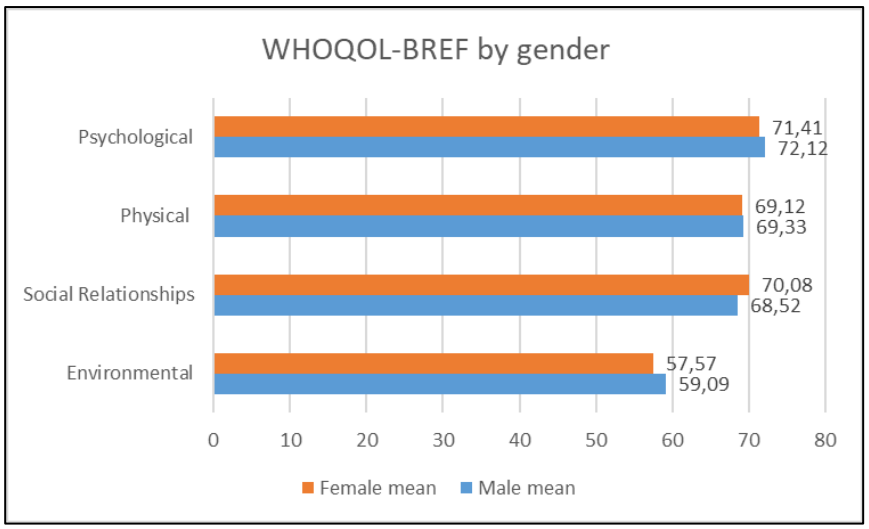

Figure 4.1 Quality of Life by gender (N=173)

The QoL levels by gender are indicated in Figure 4.1. Overall, the mean of the QoL subscales appear to be similar in males and females. Females reported a higher QoL in social relationships (70.08) subscales, whereas males reported higher levels in the environment (59.09) and psychological (72.12) subscales. There were no statistically significant differences in any of the scores between males and females (p=0.236).

4.6 Profile of Functional Status

Table 4. 8 Descriptive statistics of Functional Status

	N	Mean	Std. Deviation
Physical Functioning (PF)	173	79.45	24.042
Role Physical (RP)	173	73.45	25.290
Role Emotion (RE)	173	72.93	23.897
General Health (GH)	173	64.02	15.880
Social Functioning (SF)	173	62.73	19.456
Bodily Pain (BP)	173	56.95	22.450
Mental Health (MH)	173	58.55	7.460
Vitality (VT)	173	55.71	9.184
Physical Component Summary (PCS)	**173**	**50.03**	**6.328**
Mental Component Summary (MCS)	**173**	**42.58**	**5.027**

In Table 4.8, the mean and standard deviation for each of the functional status subscales as well as the PCS and MCS scores are indicated. The physical functioning, role physical, bodily pain and general health subscales were combined to form a PCS. The role emotion, vitality, mental health and social functioning subscales were combined to produce an MCS score. Scores are calculated out of 100, with higher scores indicating higher levels of functioning in the particular subscale.

The highest mean scores were reported in the physical functioning subscale (mean=79.45, SD=24.042), the role physical (mean=73.45, SD=25.290), and the role emotion subscales (mean=72.93, SD=23.89). Lower mean scores were reported in the vitality (mean=55.71, SD=9.184) and bodily pain (mean=56.95, SD=22.450) subscales.

Overall, the mean scores for the PCS (mean=50.03, SD=6.328) and MCS (mean=42.58, SD=5.027) subscales were somewhat lower than the individual subscale scores. Respondents reported a lower MCS score (mean=42.58, SD=5.027) than the PCS score (mean=50.03, SD=6.328).

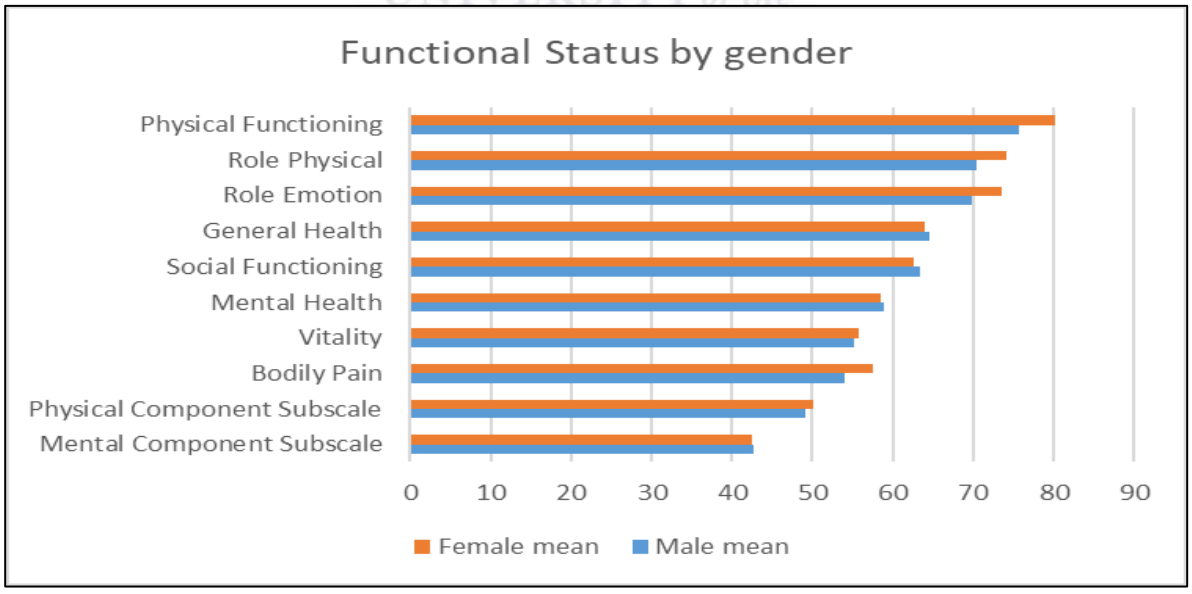

Figure 4.2 Functional Status mean scores by gender

The mean of the functional status subscales by gender is displayed in Figure 4.2. Females reported a marginally, higher mean in the bodily pain, role emotion, role physical, physical functioning subscales, and overall PCI subscale, while males reported higher mean scores in the mental health, social functioning and general health subscales. Overall, the MCS subscale was the same for males and females. There were no statistically significant differences in any of the scores between males and females (p=0.470).

4.7 Testing hypothesis 1: The relationship between demographic variables and Health-Related Quality of Life

1) **H 0** There is no significant relationship between demographic variables (*AGE, GENDER, EMPLOYMENT, MARITAL STATUS, EDUCATION*) and **Health-Related Quality of Life in people with hypertension**.

   H 1 There is a significant relationship between demographic variables (*AGE, GENDER, EMPLOYMENT, MARITAL STATUS,*) and **Health-Related Quality of Life in people with hypertension**.

Table 4.9 Relationships between demographic variables and quality of life (N=173)

	Physical	Psychological	Social Relationships	Environmental
1: Age	F(2,170)=2.03	F(2,170)=1.55	F(2,170)=0.51	F(2,170)=0.71
2: Gender	F(1,171)=0.01	F(1,171)=0.31	F(1,171)=0.58	F(1,171)=0.86
3: Marital Status	F(2, 170)=0.031	F(2,170)=7.08**	F(2,170)=3.90*	F(2,170)=1.66
4: Education	F(2, 170)=1.18	F(2,170)=0.02	F(2,170)=1.69	F(2,170)=1.16
5: Employment	F(2, 170)=1.25	F(2,170)=0.49	F(2,170)=0.98	F(2,170)=0.76

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

As shown in Table 4.9, psychological (F (2, 170) = 7.08, *p* >.*05*) and social relationships (F (2, 170) = 3.90, *p* >.*05*) QoL significantly differ across marital status. Respondents who were currently married reported higher psychological QoL, whereas those who were never legally married reported higher social relationships QoL. The independent variables age, gender, education and employment were not statistically related to any of the H-RQoL outcome variables.

The null hypothesis for physical and environmental QoL is accepted. There are no significant associations between these subscales and any of the demographic variables. The alternative hypothesis for social relationships and psychological QoL is partially rejected. The results show some supportive evidence for the research hypothesis 1 in terms of marital status.

4.8 Testing hypothesis 2: The relationship between psychosocial variables and Health-Related Quality of Life

1) **H 0** There are no significant relationships between psychosocial variables (*WORK/HOME/FINANCIAL STRESS, RECENT TRAUMATIC EVENTS, DEPRESSION, SOCIAL AND RELIGIOUS GROUPS BELONGINGNESS, and COPING)* and **Health-Related Quality of Life in people with hypertension**.

   H 1 There is a significant relationship between psychosocial variables (*WORK/HOME/FINANCIAL STRESS, RECENT TRAUMATIC EVENTS, DEPRESSION, SOCIAL AND RELIGIOUS GROUPS BELONGINGNESS, and COPING)* and **Health-Related Quality of Life in people with hypertension**.

Table 4.10 [2]Relationships between psychosocial factors and Quality of Life (N=173)

Self-help and religious group participation, recent traumatic events, stress at home, work and financial stress?, and depression are represented by F-values from ANOVA

	Physical	Psychological	Social Relationships	Environmental
Proactive Coping	.065	-.040	.027	.033
Reflective Coping	.087	.244**	-.248**	-.294**
Strategic Coping	-.023	.222**	-.260**	-.198**
Preventive Coping	.063	.256**	-.245**	-.290**
Instrumental Coping	-.092	.332**	-.244**	-.324**
Emotional Support Seeking	-.124	.326**	-.157*	-.321**
Avoidance Coping	.036	.225**	-0.131	-.220**
Self-help group belongingness	F(1,171)=6.045*	F(1,171)=0.000	F(1,171)=2.344	F(1,171)=0.009
Religious group belongingness	F(1,171)=0.731	F(1,171)=3.950*	F(1,171)=23.574**	F(1,171)=4.170*
Recent traumatic events	F(2, 170)=0.057	F(2, 170)=2.392	F(2, 170)=1.345	F(2, 170)=1.656
Stress at work	F(2, 170)=17.803**	F(2, 170)=0.001	F(2, 170)=8.358*	F(2, 170)=0.420
Stress at home	F(2, 170)=5.339**	F(2, 170)=1.623	F(2, 170)=0.599	F(2, 170)=3.969*
Financial stress	F(2, 170)=3.913*	F(2, 170)=1.874	F(2, 170)=10.317**	F(2, 170)=1.797
Depression	F(1,171)=0.015	F(1,171)=0.025	F(1,171)=23.223**	F(1,171)=3.22

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

- Belonging to a self-help group (F=7.08, *p >.01*) and having financial stress were (F=3.913, *p >.01*) significantly associated with poorer physical QoL. Stress at work (F=17.833) and stress

[2] Self-help and religious group participation, recent traumatic events, stress at home, work and financial stress?, and depression are represented by F-values from ANOVA's

at home (F=5.399) differed significantly across physical QoL. Experiencing no stress at home or having no financial stress associated positively with physical QoL.

- There were significant positive relationships found between psychological QoL and strategic coping (r = .43; medium effect; p <.05), preventive coping (r = .47; medium effect; p <.05), instrumental coping (r = .53; large effect; p <.05), and emotional coping. The more respondents engaged in these coping mechanisms, the higher their psychological QoL.
- Financial stress (F (2, 170) = 10.317, p >.*01*), stress at home (F (2, 170) = 8.35, p >.*01*) and depression (F (2, 170) = 23.22, p >.*01*) were significantly associated with social relationship QoL. Experiencing moderate financial stress and some stress at home decreased social functioning, whereas respondents who were not depressed experienced better social functioning. Reflective coping (r = -.24; small effect, p <.05), strategic (r = -.26; small effect, p <.05), instrumental (r = -.24; small effect, p <.05) and preventive (r = -.24; small effect, p <.05) coping had a negative significant effect. Engaging in these coping mechanisms decreased QoL in terms of social relationships.
- Similar associations' were found for the environmental QoL scale and coping. Negative associations were found between the strategic (r = -19; small effect, p <.05), reflective (r = -.29; small effect, p <.05), preventive (r = -.29; small effect, p <.05), instrumental (r = -.39; medium effect, p <.05) and avoidance (r = -.32; p <.05) QoL scale. Higher engagement in these coping mechanisms had a negative effect and decreased environmental QoL. Environmental QoL was also significantly associated with stress at home. Experiencing some or several periods of stress at home, significantly reduced environmental QoL.

The alternative hypothesis is accepted for social relationships, psychological and environmental QoL. There are significant associations between most of the psychological variables and these QoL subscales. The alternative hypothesis for physical QoL is partially accepted. There are only some

significant associations between physical QoL and the psychosocial variables self-help group belongingness, home, work and financial stress. There are no associations between any of the coping styles and physical QoL.

4.9 Testing hypothesis 3: The relationship between disease co-morbidity, disability and Health-Related Quality of Life

1) **H 0** There is no significant relationship between ***disease morbidity*** *(CO-MORBID/MULTI-COMORBID COMMUNICABLE/NON-COMMUNICABLE DISEASE),* disability **a**nd **Health-Related Quality of Life in people with hypertension**.

   H 1 There is a significant relationship between ***disease morbidity*** *(CO-MORBID/MULTI-COMORBID COMMUNICABLE/NON-COMMUNICABLE DISEASE)* disability **a**nd **Health-Related Quality of Life in people with hypertension**.

Table [3]4.11 Relationships between disability, disease morbidity and Quality of Life (N = 173)

	Physical	Psychological	Social Relationships	Environmental
Disability	F(2, 170)=4.930*	F(2, 170)=3.027*	F(2, 170)=1.293	F(2, 170)=4.628*
Co-morbidity	F(1,171)=0.515	F(1,171)=0.896	F(1,171)=03.308	F(1,171)=1.230

* Correlation is significant at the 0.01 level (2-tailed)

In Table 4.11, the predictor variable, disability, showed significant associations with the physical (F (2, 170) = 4.93, *p >.05*), psychological (F (2, 170) = 3.02, *p >.05*) and environmental (F (2, 170) = 4.62, *p >.05*) subscales of QoL. Having one or more limitations had a significant association with these QoL subscales. The most substantial difference in the mean was found between having 'none'

[3] Disease morbidity variables are depression are represented by F-values from ANOVA's

and having ‘several’ limitations. Respondents who had several limitations had performed significantly less in these QoL subscales. Co-morbidity did not effect the QoL.

The null hypothesis for social relationships is accepted. There are no significant associations between social relationships, disability and disease co-morbidity. The alternative hypothesis for physical, psychological and environmental QoL is partially accepted. Evidence shows disability negatively affected H-RQoL.

4.10 Testing hypothesis 4: The relationship between demographic variables and Functional Status

The second part of the first aim is to test the associations between demographic variables and physical and mental functional status. The hypotheses state:

1) **H 0** There is no significant relationship between demographic variables (*AGE, GENDER, EMPLOYMENT, EDUCATION*) and **Functional Status in people with hypertension**.

   H 1 There is a significant relationship between demographic variables (*AGE, GENDER, EMPLOYMENT, MARITAL STATUS, EDUCATION*) and **Functional Status in people with hypertension**.

Table [4]4.12 Relationships between demographics and Functional Status

	Physical Component	Mental Component
Age	F(2,170)=4.49*	F(2,170)=1.26
Gender	F(1,171)=0.52	F(1,171)=0.52
Marital Status	F(2, 170)=13.96**	F(2, 170)=0.00*
Education	F(2, 170)=8.55**	F(2, 170)=11.58
Employment	F(2, 170)=3.96*	F(2, 170)=4.61

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

The associations between the independent demographic variables and functional status are displayed in Table 4.12.

- Significant associations were found between the PCS and age (F (2, 170) = 4.49, *p >.05*), marital status (F (2, 170) = 13.96, *p >.01*), education (F (2, 170) = 8.55, *p >.01*), employment (F (2, 170) = 3.96, *p >.05*), and having stopped working because of old age (F (2, 170) = 7.84, *p >.05*). Respondents in the 60–70-age group had 2.8 times lower physical functional status. Higher functioning was also found in respondents who were never married than those who were divorced or separated. Having secondary schooling education also increased physical functional status.
- Only marital status was significantly associated with the MCS (F (2, 170) = 11.58, *p >.05*). Respondents who were never married had three times higher mental functional status than those who were married or separated.

The hypothesis for the MCS is partially accepted, as only marital status was significantly associated with MCS, while for the PCS subscale it was rejected. Age, marital status, employment and education were significantly associated with the PCS.

[4] Age, gender, employment, education and marital status are represented by F-values from ANOVA's

4.11 Testing hypothesis 5: The relationship between psychosocial variables and Functional Status

1) **H 0** There is no significant relationship between psychosocial variables (*WORK/HOME/FINANCIAL STRESS, RECENT TRAUMATIC EVENTS, DEPRESSION, SOCIAL AND RELIGIOUS GROUPS BELONGINGNESS, and COPING)* and **Functional Status in people with hypertension**.

H 1 There is a significant relationship between psychosocial variables (*WORK/HOME/FINANCIAL STRESS, RECENT TRAUMATIC EVENTS, DEPRESSION, SOCIAL AND RELIGIOUS GROUPS BELONGINGNESS, and COPING)* and **Functional Status in people with hypertension**.

Table [5]4.13 Relationships between psychosocial factors and Functional Status

	Physical Component	Mental Component
Proactive Coping	0.148	-.061
Reflective Coping	-0.034	-.144
Strategic Coping	-.186*	-.021
Preventive Coping	-.146	-.054
Instrumental Coping	-.124	-.126
Emotional Coping	-.233**	-.159*
Avoidance Coping	-.206**	-.095
Self-help group	F(1,171)=2.44	F(1,171)=0.94
Religious group	F(1,171)=0.00	F(1,171)=5.08*
Recent traumatic events	F(2, 170)=1.93	F(2, 170)=0.70
Stress at work	F(2, 170)=0.01	F(2, 170)=8.30*
Stress at home	F(2, 170)=0.46	F(2, 170)=14.33**
Financial stress	F(1,171)=0.46	F(1,171)=22.86*
Depression	F(1,171)=1.23	F(1,171)=5.01*

[5] Self-help and religious group participation, recent traumatic events, stress at home, work and financial stress?, and depression are represented by F-values from ANOVA's

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

Variables associated with functional status are shown in Table 4.13.

- Strategic (r = -.18; small effect; p <.05), emotional (r = -.23; small effect; p <.05) and avoidance coping (r = -.20; small effect; p <.05) were significantly associated with a negative PCS. Engaging in these coping styles had a negative effect on physical functioning.
- The MCS status had more significant associations with psychosocial variables. Depression (F (2, 170) = 5.01, p >.*05*), financial stress (F (2, 170) = 22.86, p >.*05*), stress at home (F (2, 170) = , p >.*05*), and religious group involvement (F (2, 170) = 5.08, p >.*05*) were significantly associated with mental functional status. Having no depression or having religious involvement was associated with improved mental functional status. Experiencing moderate to higher financial stress and stress at home resulted in four times lower mental functional status than those who reported no stress. Furthermore emotional coping (r = .16; small effect; p <.05), was negatively associated with mental functional status.

The alternative hypothesis for the PCS and MCS is partially accepted. There is some evidence of statistically significant correlations between the psychosocial variables and MCS and PCS. The MCS was significantly related to depression, financial stress, stress at home and religious group involvement. The PCS was significantly related to strategic, emotional and avoidance coping.

4.12 Testing hypothesis 6: The relationship between disease morbidity and Functional Status

1) **H 0** There is no significant relationship between ***disease morbidity*** *(CO-MORBID/MULTI-COMORBID COMMUNICABLE/NON-COMMUNICABLE DISEASE, DISABILITY),* and **Functional Status in people with hypertension.**

H 1 There is significant relationship between ***disease morbidity*** *(CO-MORBID/MULTI-COMORBID COMMUNICABLE/NON-COMMUNICABLE DISEASE, DISABILITY)* and **Functional Status in people with hypertension.**

Table [6]4.14 Relationship between disability, disease morbidity and functional status

	Mental Component	Physical Component
Disability	F(1,171)=1.33	F(1,171)=12.52**
Co-morbidity	F(2, 170)=0.62	F(2, 170)=0.22

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

In Table 4.14, the disease morbidity independent variables disability (limitations), and co-morbidity are displayed. Significant associations were found in only four functional status subscales.

- Disability was significantly associated with the physical component functional status (F (2, 170) = 12.52, *p >.05*). Having several disabilities lowered the physical functioning status by six times compared to those without any.

The null hypothesis for mental functional status was accepted. No associations were found between mental functional status and disease morbidity variables.

The alternative hypothesis for physical functional status is partially accepted. A statistically significant association was found between disability and PCS.

The second aim of the study was to construct models that examine socio-demographic factors, psychosocial variables, disease morbidity and disability as predictors of health-related quality of life.

[6] Disability and comorbidity are represented by F-values from ANOVA's

The second aim was tested using multiple regression analysis techniques to investigate the predictors of H-RQoL. All independent variables were computed individually using univariate analysis, and significant variables noted. Univariate analysis is a form of analysing data by summarising and finding patterns in data (Field, 2014). All significant variables were entered into a model with H-RQoL and FS as outcome dependent variables. All models were then subjected to model diagnostics by testing the assumptions of linearity, normality, homoscedasticity, and multicollinearity.

The following section will address the models produced for H-RQoL using the WHOQOL-BREF scale. The WHOQOL-BREF scale consists of four subscales, i.e. physical, environmental, psychological and social relationships, each having a score out of 100. Scores closer to 100 indicate a better QoL in that particular subscale.

The model diagnostics will be presented, followed by the final models of QoL.

4.13 Testing the assumptions of multiple regression for Health-Related Quality of Life

Several key assumptions are required to perform multiple regression. These include the presence of normality between the residuals; there must be no multicollinearity (the independent variables must not be highly correlated with each other), independence of errors, homoscedasticity, and the presence of a linear relationship between the outcome variable and the independent variable. These assumptions will be addressed below in sections 4.13.1 – 4.13.5.

Table 4.15 Summary of the multiple regression assumptions

	Description	Analysis results	Corrected action
1. Linearity	Physical	The assumption has been met	
	Psychological	The assumption has been met	
	Social Relations	The assumption has been met	
	Environmental	The assumption has been met	
2. Homoscedasticity	Physical	The assumption has been met	
	Psychological	The assumption has been met	
	Social Relations	The assumption has been met	
	Environmental	The assumption has been met	
3. Independence of errors	Physical	The assumption has been met	
	Psychological	The assumption has been met	
	Social Relations	The assumption has been met	
	Environmental	The assumption has been met	
4. Normality	Physical	The assumption has been met	
	Psychological	The assumption has been met	
	Social Relations	The assumption has not been met	Log transformation of Dependent variable subscale
	Environmental	The assumption has been met	
5. No perfect multicollinearity	Physical	The assumption has been met.	
	Psychological	The assumption has been met.	
	Social Relations	The assumption has been met.	
	Environmental	The assumption has been met.	

4.13.1 Linearity

A requirement for multiple regressions is linearity. This assumption defines the outcome dependent variable as a linear function of the independent predictor variable. To test for linearity scatterplots were produced for each QoL subscale. Figures 4.4–4.7 (Appendix H) depict scatterplots for the subscales between the regressions, standardised predicted value, and regressions standardised residuals. After a model is fitted with predictors, the remaining residuals can reveal unexplained

patterns in the data by the fitted model (Smith, 2002). A residual is a difference between the observed value and the predicted value in regression analysis. Residuals are positive if they are above the regression line and negative when below. The social relationships, psychological, environment and physical subscales all show negative relationships exist, depicting a regression line decreasing from left to right. These results indicate there is linearity among the dependent and independent variables for each subscale. The linearity assumption is, therefore, met for multiple regressions.

4.13.2 Homoscedasticity

The assumption of homoscedasticity requires that the variance around the regression line is the same (stable) for all the predictor variable values (Field, 2014). This assumption requires the variance of the residual terms and each level of the predictor variable to be constant (Keith, 2014). When this assumption is violated, it results in heteroscedasticity. Heteroscedasticity is present when the size of the error term differs across values of an independent variable, which can lead to bias in test statistics based on inaccurate confidence intervals (Field, 2014). The scatterplots depicted in figures 4.4–4.7 (Appendix H) were analysed to test for homoscedasticity and show the predicted values on the X-axis and the residual values on the Y-axis. Scatterplots for each subscale show the scores scattered across the regression line, which become concentrated in the middle and scatter outwards. The assumption of homoscedasticity is further tested using the Breusch-Pagan test for heteroscedasticity (Breusch & Pagan, 1979). The Breusch-Pagan tests the null hypothesis that the error variances are all equal (homoscedasticity). The alternative hypothesis is that the error variance is a multiplicative function of one or more variables (heteroscedasticity).

The results of the Breusch-Pagan test for heteroscedasticity are displayed in Table 4.16 and show the value of the chi-square at the level of significance p = .05. The results for the Physical (0.2369), Psychological (0.5361), Social Relations (0.1318) and Environmental (0.5491) subscales are all

insignificant, p >0.05. The null hypothesis of constant variance is, therefore, accepted at the 5% level of significance, meaning no presence of heteroscedasticity, which indicates the assumption of homoscedasticity, has been met.

Table 4.16 Breusch-Pagan test for heteroscedasticity

	Breusch-Pagan statistic	
	Chi 2 (1)	**Prob > 0.05**
Physical	1.40	0.2369
Psychological	0.38	0.5361
Social Relations	2.27	0.1318
Environmental	0.36	0.5491

4.13.3 Normality

The assumption of normality assumes that variables are equally distributed, which are referred to as a normal distribution (Field, 214). The kernel density estimates and P-P plots were analysed for each functional status subscale to determine the assumption of normality (Field, 2014). Kernel density is a non-parametric way to estimate the probability distribution of a variable. Figures 4.8–4.15 (Appendix I) display the kernel density estimates and P–P Plots of the residuals for the H-RQoL subscale scales. The kernel density estimation and P-P plots for the Physical, Environmental and Psychological subscales all appear normal. However, the Social relationship kernel density and P-P plot show a distinct deviation from the theoretical normal distribution.

4.13.4 Independence of error

The assumption for the independence of error assumes the error terms are independent and are not correlated. If this assumption is violated, the confidence intervals and significance tests will be invalid (Field, 2014). This assumption is tested using the Durbin-Watson statistic, indicated in Table 4.17.

Table 4.17 Multiple regression model summaries representing the Durbin Watson statistic

	Change statistics
	Durbin Watson
Environmental	1.914
Physical	1.878
Social Relations	1.806
Psychological	1.697

The Durbin-Watson equation tests for serial correlations between errors and whether adjacent residuals correlate (Field, 2014). The test can produce a statistic varying between zero and four, with a value of two or more indicating a negative correlation between adjacent residuals. Typically, values less than one and higher than two are cause for concern. In Table 4.17, the Durbin-Watson scores ranging from 1.697 (psychological) to 1.914 (environmental) are displayed. These scores for all QoL subscales fall within the normal range indicating the assumption for independence for errors for all subscales has been met.

4.13.5 No perfect multicollinearity

Multicollinearity exists when there is a strong correlation between two or more predictors (Field, 2014). This assumption depends on no relationship between the predictors (Keith, 2014). When a predictor is the perfect linear combination of the other, there is perfect collinearity. When perfect collinearity exists between predictors, it becomes impossible to obtain, unique estimates of the regression coefficients because there is an infinite number of combinations that would work equally well (Field, 2014). Multicollinearity for each QoL subscale was tested by analysing the VIF and tolerance statistics. In Table 4.18, the results of the lowest, highest and mean VIF statistics are displayed.

Table 4.18 Collinearity statistics of the variable inflation factors

Collinearity statistics					
	Tolerance		VIF		Mean VIF
Subscale	Lowest	Highest	Lowest	Highest	
Physical	0.252071	0.933117	1.18	3.97	1.82
Psychological	0.261385	0.944843	1.06	3.83	1.88
Social Relations	0.250554	0.861816	1.16	3.99	1.84
Environmental	0.253522	0.941818	1.06	3.94	1.77

The tolerance levels and variance inflation factors for each QoL subscale are displayed in Table 4.18. The VIF indicates whether a predictor has a strong relationship with other predictors. Variance inflation factors greater than ten are considered problematic (Bowerman & O'Connell, 1990), whereas tolerance below 0.2 indicates a potential problem (Menard, 2002). As indicated in Table 4.18, the VIF values for all the QoL subscales are below ten and tolerance well above 0.2. Thus, indicating that the assumption of no multicollinearity has been met.

4.14 Presenting the models for Health-Related Quality of Life

The regression model summaries for the psychological, social relationships, physical, and environmental subscales are displayed in Table 4.19.

Table 4.19 Model specifics of multiple regression for Quality of Life subscales

Subscale	R Square	Adjusted R Square	F	Prob. F
Psychological	.387	.282	3.71	0.000
Social Relations	.357	.267	3.92	0.000
Physical	.328	.229	3.33	0.000
Environmental	.272	.187	3.20	0.000

4.14.1 Model 1: The Psychological Quality of Life model

The model for the Psychological subscale was significant (F (21, 151) = 2.13 p <.05) and explained 28% of the variance in the model, which is presented in Table 4.20. Having a secondary education and experiencing some levels of stress at home was significantly associated with Psychological QoL, b = 7.50 (173) = 3.23, p <.05 and b = 1.37 (173) = 3.26, p <.05, respectively.

Table 4.20 The Psychological Quality of Life Model

	QoL Psychological	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Age group	40-49	ref					
	50-59	-1.55	6.38	-0.24	0.808	-14.17	11.06
	60-70	-6.80	6.42	-1.06	0.291	-19.49	5.88
Sex	Female	ref					
	Male	-1.03	4.68	-0.22	0.825	-10.29	8.21
Marital Status	Never married	ref					
	Currently married	-1.00	3.89	-0.26	0.798	-8.70	6.70
	Divorced/Separated	-5.44	4.95	-1.10	0.273	-15.22	4.34
Education	Primary	ref					
	Secondary	7.50	5.42	3.23	**0.002**	6.79	28.22
	College/University	9.57	11.55	0.83	0.409	-13.25	32.40
Employment	Employed	ref					
	Unemployed	1.44	5.14	2.22	0.728	1.26	21.61
	Unemployed due to old age/sickness	7.62	6.73	1.13	0.259	-5.67	20.92
Disabilities	None	ref					
	1	4.96	4.19	1.18	0.239	-3.32	13.24
	2	-3.96	4.62	-0.86	0.393	-13.11	5.18
	Several	-5.45	5.47	-1.00	0.321	-16.27	5.36
Religious groups	Yes	ref					
	No	2.82	4.83	0.58	0.560	-6.73	12.38
Stress at home	None	ref					
	Experience some	1.37	5.11	3.26	**0.001**	1.27	21.72

Table 4.20 The Psychological Quality of Life Model (Cont')

	Experience permanently	0.07	6.46	1.56	0.121	-2.70	22.84
Financial stress	Little or none	ref					
	Moderate	3.60	4.67	0.77	0.443	-5.64	12.84
	Severe	-6.69	5.51	-1.22	0.226	-17.58	4.19
Depression	Yes	ref					
	No	4.43	5.55	0.80	0.426	-6.54	15.41
Co-morbidity	No	ref					
	Yes	-2.26	3.26	-0.69	0.489	-8.71	4.18
Reflective coping		-0.05	0.49	-0.10	0.917	-1.03	0.92
Strategic coping		-1.16	1.10	-1.06	0.291	-3.34	1.00
Emotional		-1.02	1.11	-0.92	0.362	-3.22	1.18
Avoidance		-0.31	1.01	-0.30	0.761	-2.32	1.70
Constant		86.35	24.83	3.48	0.001	37.27	135.43

4.14.2: Model 2: The Social Relationships Quality of Life Model

In Table 4.21, the final model is indicated to be significant (F (21, 151) = 3.98 p <.05. The predictors in the model explain 27% of the variance, leaving 63% of the variance unaccounted for. Not belonging to a religious group was significantly associated with higher QoL in social relationships, b = 4.62 (173) = 2.37, p <.05. Moderate financial stress was negatively associated with social relationships QoL, b = -3.74 (179) = -2.22, p <.05.

Table 4. 21 The Social Relationship Quality of Life Model

	QoL Social Relations	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Age group	40-49	ref					
	50-59	1.63	2.57	0.64	0.526	-3.4	6.72
	60-70	-0.51	2.59	-0.20	0.843	-5.64	4.61
Sex	Female	ref					
	Male	-0.90	1.89	-0.48	0.633	-4.64	2.83
Marital Status	Never married	ref					
	Currently married	-1.59	1.59	-1.00	0.319	-4.75	1.55
	Divorced/Separated	0.48	2.02	0.24	0.810	-3.50	4.47
Education	Primary	ref					
	Secondary	0.29	2.18	0.13	0.893	-4.01	4.60
	College/University	4.01	4.58	0.88	0.383	-5.04	13.07
Employment	Employed	ref					
	Unemployed	2.17	2.09	1.04	0.302	-1.97	6.31
	Unemployed due to old age/sickness	2.32	2.76	0.84	0.401	-3.12	7.77
Disabilities	None	ref					
	1	-2.23	1.71	-1.31	0.193	-5.61	1.14
	2	-0.77	1.91	-0.41	0.685	-4.53	2.98
	Several	-1.30	2.22	-0.59	0.559	-5.69	3.08
Religious groups	Yes	ref					
	No	4.62	1.95	2.37	0.078	0.76	8.47
Financial stress	Little or none	ref					
	Moderate	-3.74	1.69	-2.22	**0.028**	-7.06	-0.40
	Severe	-1.20	2.19	-0.55	0.585	-5.55	3.14
Co-morbidity	No	ref					
	Yes	-2.06	1.33	-1.55	0.123	-4.69	0.56
Reflective coping		0.42	0.19	2.24	**0.027**	0.04	0.80
Strategic coping		-0.21	0.42	-0.51	0.613	-1.05	0.62
Emotional		0.42	0.39	1.06	0.290	-0.36	1.20
Constant		58.37	8.00	7.29	0.000	42.56	74.18

4.14.3: Model 3: The Physical Quality of Life Model

The final model for the physical subscale was found to be significant (F (21, 151) = 3.98 p <.05, with an adjusted R^2 of .229 (Table 4.22). The predictor variables in the model accounted for 23% of the variation. Having a college or university education had a significant positive association with physical QoL, b = 10.16 (173) = 2.08, p <.05. Respondents who had several limitations had eight times lower physical QoL than those who had none, which was found to be significant, b = -8.55 (173) = -3.50, p <.05. Reflective and strategic coping was also significantly associated with physical QoL, b = .56 (173) = 2.79, p <.05, and b = -1.08 (173) = -2.43, p <05, respectively (see Table 4.22).

Table 4.22 The Physical Quality of Life Model

	QoL Physical	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Age group	40-49	ref					
	50-59	2.02	2.83	0.71	0.476	-3.57	7.63
	60-70	2.01	2.83	0.71	0.478	-3.58	7.61
Sex	Female	ref					
	Male	0.76	2.09	0.36	0.716	-3.38	4.91
Marital Status	Never married	ref					
	Currently married	-0.77	1.73	-0.44	0.658	-4.20	2.65
	Divorced/Separated	-3.63	2.22	-1.64	0.104	-8.02	0.75
Education	Primary	ref					
	Secondary	1.31	2.35	0.56	0.577	-3.34	5.97
	College/University	10.16	4.89	2.08	0.039	0.49	19.82
Employment	Employed	ref					
	Unemployed	2.37	2.33	1.02	0.310	-2.23	6.99
	Unemployed due to old age/sickness	2.07	2.97	0.70	0.487	-3.81	7.96
Disabilities	None	ref					
	1	-3.10	1.87	-1.66	0.099	-6.80	0.5
	2	-2.79	2.09	-1.34	0.183	-6.92	1.33

Table 4.22 The Physical Quality of Life Model (Cont')

	Several	-8.55	2.44	-3.50	**0.001**	-13.38	-3.72
Self-help groups	Yes	ref					
	No	5.30	3.63	1.46	0.147	-1.88	12.49
Stress at home	None	ref					
	Some	-1.18	2.23	-0.53	0.597	-5.60	3.23
	Always	-4.13	2.82	-1.46	0.146	-9.72	1.45
Financial stress	Little or none	ref					
	Moderate	-2.67	2.11	-1.26	0.209	-6.86	1.51
	Severe	0.78	2.46	0.32	0.750	-4.07	5.65
Co-morbidity	No	ref					
	Yes	-0.20	1.46	-0.14	0.892	-3.09	2.69
Reflective coping		0.56	0.20	2.79	**0.006**	.164	0.96
Strategic coping		-1.08	0.44	-2.43	**0.016**	-1.97	-0.20
Instrumental		-0.51	0.38	-1.32	0.188	-1.27	0.25
Constant		73.78	10.18	7.24	0.000	53.65	93.90

4.14.4: Model 4: The Environmental Quality of Life model

The environmental QoL model explained the least variance of all the H-RQoL subscales. In the model, the predictor variables explained 19% of the variance (Table 4.22). The remaining 81% of the variation in the environment scale cannot be explained by the predictor variables. The overall model for the QoL environmental subscale was a good fit of the data, with F (18, 154) = 3.20, p <.05.

In Table 4.23, the coefficients of the individual predictor variables that significantly contributed to the model are displayed. Respondents, who had a college or university level education, had ten times higher environmental QoL than those who had primary schooling only and were found to be significant, b = 10.35 (173) = 2.65 p <.05. Being unemployed because of old age or illness and not belonging to a religious group was positively associated with environmental QoL, b = 4.96 (173) = 2.65, p <.05, and b = 4.68 (173) = 2.93, p <.05, respectively.

Table 4.23 The Environmental Quality of Life Model

	QoL Environmental						
		Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Age group	40–49	ref					
	50–59	-0.94	2.14	-0.44	0.660	-5.18	3.29
	60–70	-0.09	2.15	-0.05	0.964	-4.34	4.15
Sex	Female						
	Male	0.94	1.57	0.61	0.545	-2.15	4.06
Marital status	Never married	ref					
	Currently married	0.47	1.31	0.36	0.718	-2.11	3.05
	Divorced/Separated	-0.73	1.69	-0.44	0.664	-4.06	2.59
Education	Primary	ref					
	Secondary	0.80	1.79	0.45	0.654	-2.74	4.36
	College/University	10.35	3.91	2.65	**0.009**	2.63	18.07
Employment	Employed	ref					
	Unemployed	2.43	1.75	1.39	0.168	-1.04	5.91
	Unemployed because of old age/sickness	4.96	2.24	2.21	**0.029**	0.52	9.40
Disabilities	None	ref					
	1	-0.87	1.41	-0.62	0.538	-3.66	1.92
	2	-1.67	1.58	-1.06	0.289	-4.79	1.43
	Several	-5.92	1.85	-3.21	**0.002**	-9.57	-2.28
Religious groups	Yes	ref					
	No	4.68	1.59	2.93	**0.004**	1.53	7.84
Co-morbidity	No	ref					
	Yes	-0.16	1.11	-0.14	0.888	-2.35	2.03
Avoidance		0.86	0.31	2.75	**0.007**	0.24	1.47
Constant		55.97	4.83	11.57	0.000	46.41	65.52

The second aim of the current study was to to develop multivariate predictive models using socio-demographic, psychosocial and disease morbidity independent variables and Functional status (physical and mental) outcomes.

As with the analysis for H-RQoL, all independent variables were computed individually using univariate analysis and significant variables noted. All significant variables were entered into a model with MCS and PCS as outcome dependent variables. All models were then subjected to model diagnostics by testing the assumptions of linearity, normality, homoscedasticity, and multicollinearity. The model diagnostics will be presented first, followed by the final models.

4.15 Testing the assumptions of Multiple Regression for Functional Status

Table 4.24 Summary of assumptions tested for the SF 36 v2

	Description	**Analysis results**	**Corrected action**
1. Linearity	Physical Component Summary	The assumption has been met	None
	Mental Component Summary	The assumption has been met	None
2. Homoscedasticity	Physical Component Summary	The assumption has NOT been met	**Robust regression techniques**
	Mental Component Summary	The assumption has been met	None
3. Independence of errors	Physical Component Summary	The assumption has been met	None
	Mental Component Summary	The assumption has been met	None
4. Normality	Physical Component Summary	The assumption has NOT been met.	**Log transform variable to normal distribution**
	Mental Component Summary	The assumption has been met	None
5. No perfect multicollinearity	Physical Component Summary	The assumption has been met	None
	Mental Component Summary	The assumption has been met	None

4.15.1 Linearity

Linearity defines the outcome dependent variable as a linear function of the independent predictor variable. Scatterplots were produced for each functional status subscale to test for linearity. Figures 4.16–4.24 (Appendix J) depicts scatterplots for the subscales between the regressions standardised predicted value and regressions standardised residuals. The social functioning, role emotion, role physical, vitality, general and mental health, social functioning and bodily pain subscales all show negative relationships exist, depicting a regression line decreasing from left to right. These results indicate there is linearity among the dependent and independent variables for the subscales. Therefore, the linearity assumption is met for multiple regressions. Only the physical functioning subscale showed a more scattered pattern, indicating a possible violation of linearity.

4.15.2 Homoscedasticity

The assumption of homoscedasticity requires that the variance around the regression line is the same (stable) for all the predictor variable values (Field, 2014). When this assumption is violated, it results in heteroscedasticity. As mentioned earlier, heteroscedasticity is present when the size of the error term differs across values of an independent variable, which can lead to bias in test statistics based on inaccurate confidence intervals (Field, 2014).

Scatterplots were investigated and plots between the residuals and the fitted values in the mental and physical functional status models. A residual is a vertical distance between the data point in the model and the regression line (Field, 2014). Residuals are an effective indicator of how good or bad a model represents the data. After a model is fitted with predictors, the remaining residuals can reveal unexplained patterns in the data by the fitted model (Smith, 2002).

A requirement when computing regression analysis is that the variance of the error terms must be constant and must have a mean of zero. The error term refers to the margin of error within a statistical model. The error term consists of the sum of deviations within a regression line and can explain the difference between the actual observed results and the results of the model (Bockstael & Strand, 1987).

The scatterplot for the mental functional status regression analysis (Appendix J) shows the errors have constant variance, with the residuals scattered randomly around zero. Furthermore, the vertical width of the scatter graph does not appear to increase or decrease across the fitted values. Therefore, we can conclude that the variance in the error terms is constant.

An additional way of verifying the constant variance assumption is to plot the square unstandardised residuals against the fitted values. Most of the prediction is concentrated close to zero indicating accurate prediction.

The scatterplot for the mental functioning component (Appendix J) shows the residuals are randomly scattered around the mean of zero. There is no evident pattern displayed in the residuals, and the vertical width of the scatter graph does not appear to increase or decrease across the fitted values. Therefore, we can assume the variance in the error terms are constant. However, there appears to be a concentration of the squared residuals around zero. The assumption will be subjected to further investigation using significance testing for this subscale.

The assumption of homoscedasticity is further tested using the Breusch-Pagan test for heteroscedasticity (Breusch & Pagan, 1979). The Breusch-Pagan is a significance test, which assesses the null hypothesis that the error variances are all equal (homoscedasticity). The alternative hypothesis is that the error variance is a multiplicative function of one or more variables (heteroscedasticity).

The results of the Breusch-Pagan test for heteroscedasticity are displayed in Table 4.25, showing the value of the chi-square at the level of significance p = .05. The results for the PCS is significant at p > 0.05. The null hypothesis of constant variance is, therefore, rejected at the 5% level of significance, meaning there is the presence of heteroscedasticity in the model. Thus, indicating the assumption of homoscedasticity has not been met.

Table 4.25 Breusch-Pagan test for heteroscedasticity

	Breusch-Pagan statistic	
	Chi 2 (1)	Prob > 0.05
Physical Component summary	11.91	**0.000**
Mental Component summary	0.88	0.348

4.15.3 Independence of errors

The assumption of the independence of errors assumes the error terms are independent and are not correlated. If this assumption is violated, the confidence intervals and significance tests will be invalid (Field, 2014). This assumption is tested using the Durbin-Watson statistic, indicated in Table 4.26. The test can produce a statistic varying between 0 and 4, with a value of 2 or more indicating a negative correlation between adjacent residuals. Typically, values less than one and two are cause for concern. In Table 4.26, the Durbin-Watson scores of the PCS score (1.813) and the MCS score (1.964) are displayed. These summary scores fall within the normal range indicating the assumption of independence of errors for physical and mental functional status has been met.

Table 4.26 Multiple regression model summaries representing the Durbin Watson statistic

Change Statistics	
Durbin Watson	
Physical Component Summary	1.813
Mental Component Summary	1.964

4.15.4 Normality

The assumption of normality assumes that variables are equally distributed, and is referred to as a normal distribution (Field, 2014). The kernel density estimates and P-P plots were analysed for each functional status subscale to determine the assumption of normality (Field, 2014). In Figures 4.21–4.24 (Appendix K), the kernel density estimates and P–P plots of the residuals for the functional status subscales are displayed. Kernel density estimates the limits governing a probability function such as the mean and variance of a normal distribution using real data. Kernel density plots are similar to histograms but have the added advantage of better determining the distribution shape because they are not affected by the number of bins used in histograms (Sheather & Jones, 1991). The kernel density and P-P plot distributions for mental and physical functional status appear normal. The Shapiro-Wilks test was computed to further statistically test for normality. Significant results (p = <.05) in the Shapiro-Wilks test will indicate non-normally distributed data. The PCS score, indicated in Table 4.27, were found to violate normality. The PCS variable will be log transformed and the model re-run.

Table 4. 27 Shapiro Wilks statistical test of normality

	Shapiro-Wilks		
	Statistic	df	Sig.
Mental Component Summary	.977	173	.006
Physical Component Summary	.988	173	.166

p = <.05

4.15.5 No perfect multicollinearity

Multicollinearity exists when there is a strong correlation between two or more predictors (Field, 2014). Multicollinearity for mental and physical functional status was tested by analysing the VIF and tolerance statistics. The results of the lowest, highest and mean VIF statistics are displayed in Table 4.28. The VIF indicates whether a predictor has a strong relationship with other predictors. Variance

inflation factors greater than ten are considered problematic (Bowerman & O'Connell, 1990), whereas tolerance below 0.2 indicates a potential problem (Menard, 2002). In Table 4.28, the VIF values for all the Functional subscales are below ten and tolerance well above 0.2 are indicated, which indicate the assumption of no multicollinearity has been met. The full VIF and tolerance results are displayed in the Appendix.

Table 4.28 Collinearity statistics of the Variable Inflation Factors

	Collinearity Statistics				
	Tolerance		VIF		Mean VIF
	Lowest	Highest	Lowest	Highest	
Physical Functioning	0.240292	0.830382	1.08	4.16	2.00
Bodily Pain	0.238657	0.919710	1.09	4.19	1.99
Vitality	0.234345	0.853686	1.17	4.27	1.93
Social Functioning	0.237359	0.834690	1.20	4.21	2.00
Role Emotion	0.241331	0.831490	1.20	4.14	1.95
Mental Health	0.237359	0.834690	1.20	4.21	2.00
Role Physical	0.248375	0.929326	1.08	4.03	1.90
Physical Component Summary	**0.400320**	**0.829115**	**1.21**	**3.01**	**2.00**
Mental Component Summary	**0.239143**	**0.857901**	**1.17**	**3.69**	**1.92**

4.16 Presenting the models for the MCS and PCS models

The following section will present the final models for the MCS and PCS models. Univariate analysis was computed to determine which variables were entered into the models.

Table 4.29 Model summaries of Physical and Mental Component Summaries

Subscale	R Square	Adjusted R Square	F	Prob. F
Physical Component Summary*	.403		6.78	0.000
Mental Component Summary	.454	.357	4.67	0.000

* Robust regression

4.16.1: The Physical Component Summary model

The model for PCS violated the constant variance and independence errors assumption for multiple regression. Heteroscedasticity is when the variability of a variable is unequal across the range of values of a second variable that predicts it, which was found in the data after doing statistical significance tests. A robust regression model technique was used to compute the model to rectify this. Robust regression is used when data are contaminated with outliers and works by down-weighting the influence of outliers (Bockstael & Strand, 1987).

The predictors in the overall model for the PCS model explained 40% (R^2) of the variance, R = .40, F (24, 148) = 6.78 p <.05. Results in Table 4.30 reveal seven significant predictors of the PCS score. Respondents who reported having several limitations had five times lower physical functional status than those who reported having no limitations, b = -5.64, t = -4.11 p <.05. Being currently married or being separated or divorced was significantly predicted negative physical functional status (b = -2.93, t = -3.51 p <.05, b = -3.63, t = -2.94 p <.05, respectively). Similarly, having a secondary education (b = -2.93, t = -3.05 p <.05) and college or university education (b = 3.63, t = 2.94 p <.05) were significantly associated with physical functional status. Engaging in reflecting coping was positively associated with physical functional status, whereas avoidance coping was negatively associated (b = .25, t = 2.05 p <.05, b = -.49, t = -2.04 p <.05, respectively).

Table 4.30 The Physical Component Summary (PCS) Model

	PCS model	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Age group	40-49	ref					
	50-59	-0.61	1.57	-0.39	0.698	-3.72	2.50
	60-70	-1.28	1.57	-0.82	0.415	-4.39	1.82
Sex	Female	ref					
	Male	-0.43	1.15	-0.37	0.709	-2.70	1.84
Marital status	Never married	ref					
	Currently married	-2.93	0.83	-3.51	**0.001**	-4.58	-1.27
	Divorced/Separated	-3.63	1.45	-2.51	**0.013**	-6.50	-0.77
Education	Primary	ref					
	Secondary	-2.93	0.96	-3.05	**0.003**	4.83	-1.03
	College/University	-3.63	1.23	-2.94	**0.004**	-6.08	-1.19
Employment	Employed	ref					
	Unemployed	1.88	1.26	1.49	0.139	-.615	4.37
	Unemployed because of old age/sickness	-0.64	1.65	-0.39	0.697	-3.92	2.62
Disabilities	None	ref					
	1	0.77	1.03	0.75	0.456	-1.27	2.81
	2	-0.32	1.15	-0.28	0.782	-2.60	1.96
	Several	-5.64	1.37	-4.11	**0.000**	-8.36	-2.93
HPT only		ref					
HPT with Co-morbidity		-0.45	0.82	-0.55	0.582	-2.09	1.18
Reflective coping		0.25	0.12	2.05	**0.042**	0.00	0.49
Emotional		-0.43	0.24	-1.81	0.072	-0.91	0.04
Avoidance		-0.49	0.24	-2.04	**0.043**	-0.98	-0.01
Constant		50.96	4.03	12.64	0.000	43.00	58.92

4.16.2: The Mental Component Summary model

The predictors in the overall model in Table 4.31 for the MCS accounted for 36% (R^2) of the variance explained in the model and was significant at (F (24, 148) = 4.67 p <. 05).

Seven predictors were significantly associated with mental functional status. Having stopped working because of illness decreased mental functional status by fives times, b = -5.73, t = -2.69, p <. 05. Being currently married and being divorced or separated was negatively associated with mental functional status, b = -2.00, t = -2.58, p <. 05, b = -2.78, t = -2.78, p <.05 respectively. Experiencing moderate stress at home (b = -2.10, t = -2.06, p <. 05) and moderate financial stress (b = -2.31, t = -2.47, p <. 05) was also negatively associated with mental functional status, whereas emotional coping was positively associated, b = .43, t = 1.95, p <.05). Respondents who were only hypertensive had higher mental functional status than those who had a co-morbidity in addition to hypertension. However, this was however not significant.

Table 4. 31 The Mental Component Summary (MCS) Model

	MCS model	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf. Interval]	
Age group	40-49	ref					
	50-59	0.08	1.25	0.07	0.945	-2.40	2.57
	60-70	-1.32	1.26	-1.05	0.295	-3.82	1.16
Sex	Female						
	Male	0.79	0.92	0.86	0.390	-1.03	2.63
Marital status	Never married	ref					
	Currently married	-2.00	0.77	-2.58	**0.011**	-3.54	-0.46
	Divorced/Separated	-2.78	1.00	-2.78	**0.006**	-4.76	-0.80
Education	Primary	ref					
	Secondary	1.16	1.05	1.10	0.273	-0.92	3.26
	College/University	2.55	2.21	1.16	0.249	-1.81	6.92
Employment	Employed	ref					
	Unemployed	1.66	1.02	1.62	0.106	-0.36	3.69
	Unemployed because of old age/sickness	1.25	1.32	0.95	0.344	-1.36	3.88
Disabilities	None	ref					
	1	-1.48	0.83	-1.77	0.079	-3.13	0.17
	2	-1.21	0.91	-1.33	0.186	-3.02	0.59
	Several	-1.22	1.13	-1.08	0.284	-3.46	1.02
Stress at work		Ref					
		0.25	0.76	0.34	0.737	-1.24	1.76
Stress at home	None	ref					
	Some stress	-2.10	1.01	-2.06	**0.041**	-4.11	-0.08
	Permanent stress	0.52	1.29	0.40	0.687	-2.04	3.08
Financial stress	Little or none	ref					
	Moderate	-2.31	0.93	-2.47	**0.015**	-4.17	-0.46
	Severe	0.97	1.09	0.89	0.372	-1.18	3.13
Depression	Yes	Ref					

Table 4.37 The Mental Component Summary (MCS) model (Cont')

No	-0.13	1.13	-0.12	0.905	-2.37	2.10
HPT only						
HPT with Cormorbidity	-0.15	0.65	-0.24	0.812	-1.45	1.14
Reflective coping	0.06	0.10	0.62	0.536	-0.13	0.26
Strategic	0.11	0.21	0.55	0.583	-0.30	0.54
Preventive	0.12	0.08	1.48	0.140	-0.04	0.28
Instrumental	-0.28	0.20	-1.44	0.152	-0.68	0.10
Emotional	0.43	0.22	1.95	**0.053**	-0.00	0.88
Avoidance	-0.13	0.20	-0.66	0.508	-0.52	0.26
Constant	45.31	5.10	8.87	0.000	35.22	55.41

4.17 Conclusions

Presented under this Section is a summary of all the significant results.

Data were collected from 173 hypertensive participants regarding their H-RQoL and FS outcomes, as described in Chapter 3.

The mean age was 60.9 years, with an SD of 6.7 years. Most of the sample (59.0%) was between ages 60 and 70 years, followed by 32.4% between 50 and 59 years, and 8.7% between ages 40 and 49 years. The mean total for the WHOQOL-BREF was 69.15 and SD = 10.48 (Physical), 71.52, SD = 6.03 (Psychological), 69.84 and SD = 9.79 (Social Relationships) and 57.81 and SD = 7.77 (Environmental) for the various subscales. The scale scores are calculated out of 100, with higher scores indicating higher levels of QoL. Quality of life was highest in the psychological subscale and lowest in the environment subscale.

Regarding the first aim: *relationships between* ***demographics, psychosocial, and disease morbidity*** *variables and* ***quality of life***, the following are highlighted.

The relationship between demographics and QoL revealed **marital status** to have a significant association. Never having been legally married resulted in higher social relationship QoL, whereas being currently married increased psychological QoL. Regarding the psychosocial variables, having little to no **stress at home, work,** or **financial stress** was significantly associated with improved physical, social relationships and environmental QoL. Engaging in reflective, strategic, preventive, instrumental, emotional and avoidance coping had a significant positive effect on the physical QoL, but had a significant negative effect on social relationships and environmental QoL. **Disability** or having several limitations had significant negative associations across the QoL subscales.

The current study found significant associations between the PCS score and **age, marital status, employment**. Higher functioning was also found in respondents who were never married than those who were divorced or separated. Respondents in the 60–70-age group had 2.8 times lower physical functional status. Having secondary schooling education also increased physical functional status. Only **marital status** was significantly associated with the mental component functional status. Respondents who were never married had three times higher mental functional status than those who were married or separated.

Strategic, emotional support seeking and **avoidance coping** was significantly associated with negative **physical component functional status**. Engaging in these coping styles had a negative effect on physical functioning. **Depression, financial stress, stress at home, and religious group involvement** was significantly associated with **mental functional status**. Having no depression or having religious involvement was associated with improved mental functional status. Experiencing moderate to higher financial stress and stress at home resulted in four times lower mental functional

status than those who reported no stress. Furthermore, emotional support seeking was negatively associated with mental functional status.

Disability was significantly associated with the physical component functional status. The presence of several disabilities lowered physical functioning status by six times when compared to respondents who did not have a disability.

*Summary with regard to the second aim (1): to construct models that **examined socio-demographic** factors, **psychosocial** factors, disability and **disease morbidity** as predictors of **health-related quality of life**.*

In Table 4.32, the model summaries of all the significant predictors for QoL, their direction and strength as well as their associated confidence level and P-value are demonstrated.

Table 4.32 Model summaries of significant predictors for Quality of Life

Dependent variable	Explanatory variables significant in the model and direction of effect	Regression coefficient (with 95% confidence intervals)	P <.05
QoL Environmental	**Higher if:**		
	Have college/university education	10.35 (2.63 to 18.07)	0.009
	Lower if:		
	Have several limitations	-5.92 (-9.57 to -2.28)	0.002
QoL Physical	**Higher if:**		
	Have college/university education	10.16 (0.49 to 19.82)	0.039
	Reflective coping	0.56 (0.16 to 0.96)	0.006
	Lower if:		
	Strategic coping	-1.08 (-1.97 to -0.20)	0.016
QoL Social Relationships	**Lower if:**		
	Moderate financial stress	-3.74 (-7.06 to -0.40)	0.028
QoL Psychological	**Higher if:**		
	Secondary education	7.50 (6.79 to 28.22)	0.002
	Some stress at home	1.37 (1.27 to 21.72)	0.001

The psychological subscale satisfied all the assumptions required for multiple regressions. The final model had an adjusted R^2 of .282 and the predictors in the model accounted for 28% of the variance.

Having secondary schooling (p=0.002) and some stress at home (p=0.001) significantly predicted psychological QoL. These predictors had a positive association with physical QoL.

All tested assumptions for the multiple regression testing were met for the social relationships subscale. The model had 27% explanatory power based on the predictors in the model. Only two predictors had a significant association with social relationships. Not belonging to a religious group (p=0.019) had a positive influence on social relationships, whereas having moderate financial stress (p=0.028) had a negative impact.

The model physical QoL was significant, and the predictors in the model accounted for 23% of the variance. Having a college or university education (p=0.039) and utilising reflective coping (p=0.006) increased physical QoL. Strategic coping had a negative association and decreased physical QoL.

The assumptions of linearity, normality, independence of errors, and no perfect multicollinearity were all met for the environmental subscale. This model accounted for 19% of the variance. Having a college or university education (p=0.009) and being unemployed because of illness or old age (p=0.029) had a positive effect on environmental QoL. Having several limitations (p=0.002) resulted in five times lower environmental QoL.

Summary with regard to the second aim (2): to construct models that examined ***socio-demographic factors, psychosocial factors, disability*** *and* ***disease morbidity*** *as predictors of* ***functional status***.

The model summaries of all the significant predictors for QoL, their directional and strength, and well as their associated confidence level and P-value are demonstrated in table 4.33.

Table 4.33 Model summaries of significant predictors of Functional Status

Dependent variable	Explanatory variables significant in the model and direction of effect	Regression coefficient (with 95% confidence intervals)	P <.05
Physical Component summary	**Higher if:**		
	Reflective coping	0.25 (0.00 to 0.49)	0.042
	Lower if:		
	Currently married	-2.93 (4.58 to 1.27)	0.001
	Divorced or separated	-3.63 (-6.50 to 0.77)	0.013
	Secondary schooling	-2.93 (4.83 to -1.03)	0.003
	College or university	-3.63 (-6.08 to -1.19)	0.004
	Avoidance coping	-0.49 (-0.98 to -0.01)	0.043
	Several disabilities	-5.64 (-8.36 to -2.93)	0.000
Mental Component summary	**Higher if:**		
	Emotional coping	0.43 (-0.00 to 0.88)	0.053
	Lower if:		
	Currently married	-2.00 (-3.54 to -0.46)	0.011
	Divorced or separated	-2.78 (-4.76 to -0.80)	0.006
	Have moderate home stress	-2.10 (-4.11 to -0.08)	0.041
	Have moderate financial stress	-2.31 (4.17 to -0.46)	0.015

Model diagnostics for the PCS model revealed a violation of homoscedasticity, which meant the variance around the regression line in the model was the same for all the values of the predictor variable, physical functional status. Violation robust regression techniques were used to re-run the model to set this right. When data is contaminated with outliers, robust regression is used, which works by down-weighting the influence of outliers (Bockstael & Strand, 1987).

The model revealed reflective coping (p=0.042) was the only predictor that increased physical functional status. Being currently married (p=0.001), divorced or separated (p=0.013), having secondary schooling (p=0.003) or college or university education (p=0.004), engaging in avoidance coping (p=0.043) and having several disabilities (p=0.000) significantly decreased physical functional status.

Model diagnostics for the MCS model showed a deviation of normality based on the Shapiro significance test. Log transformations were computed to rectify the skewed data. Log transformation transforms skewed data to approximately conform to normality (Changyong, Hongyue, Naiji, Tian, Hua & Ying, 2014).

The MCS model revealed emotional coping (p=0.053) was shown to increase mental functional status. Being currently married (p=0.011), divorced or separated (p=0.006), having stopped working because of illness (p=0.008), having moderate stress at home (p=0.041) and moderate financial stress (p=0.015) decreased mental functional status.

In chapter five, the findings of this study on investigating the predictors of H-RQoL and FS in people with hypertension will be considered in detail. Furthermore, the results will be compared with other studies in this area of investigation, and the practical implications of the study presented. Chapter five will be concluded by outlining the limitations of the current study and providing recommendations for future research.

Chapter Five

Discussion and Conclusion

5.1 Introduction

In Chapter five, a discussion of the study results, which examined the predictors of the H-RQoL and FS in people with hypertension is provided. The chapter is outlined according to the two aims of the study. In this chapter, the study's strengths and limitations will be highlighted, and importantly, recommendations for the management of hypertension and disability will be presented.

5.2 The relationships between age, gender, marital status, employment and Health-Related Quality of Life

The results of the current study showed evidence that the null hypothesis for the physical and environmental quality of life is accepted. There were no significant associations between these subscales and any of the demographic variables. The alternative hypothesis for social relationships and psychological QoL is partially rejected. The results show some supportive evidence for the research hypothesis 1 regarding marital status. In the following Section, these relationships will be briefly discussed.

Age and Health-Related Quality of Life

The current study showed no correlation between age and H-RQoL. Similar results were reported by Westlake *et al*. (2002) and Rosen, Contrada, Gorkin, and Kostis (1997), who found no direct association between age and H-RQoL. There is evidence showing that an increase in age is highly associated with deterioration of health status and disease onset. For instance, in the South African study, SAGE, in adults over 50 years old, older adults were more likely found to report weaker health status and QoL than younger adults (Phaswana-Mafuya *et al*., 2013). Similar results were reported in

studies investigating health status and QoL among the elderly (Mwanyangala, Mayombana, Urassa, Charles, Mahutanga, Abdullah & Nathan, 2010; Debpuur, Welaga, Wak & Hodgson, 2010).

Results from previous studies investigating the relationship between age and H-RQoL have been inconsistent, as not all older patients experience poorer H-RQoL (Hou, Chui, Eckert, Oldridge, Murray & Bennett, 2004). For instance, studies focusing on QoL in older adults have found a strong independent association with H-RQoL and self-rated health (Oliveira *et al*., 2013; Trentini *et al*., 2011; Burström, Johannesson & Diderichsen, 2001). Quality of life was higher in older individuals who evaluated themselves as having good health (Oliveira *et al*., 2013). These results are supported by those of Campos and colleagues (2014), who examined the associations among QoL, gender, and physical and psychosocial health in older Brazilian community-dwelling adults. The results by Campos *et al*. (2014) is supported by the results of the current study, which found psychological, social relationships and environmental QoL were higher for individuals who had stopped working because of old age, compared to those who were employed or unemployed.

Hou *et al*. (2004) provided a possible explanation for the inconsistency in results between age and H-RQoL. The author's purported age may have been treated as a continuous variable in some studies and as categorical variables in other studies. They further suggested the relationship of a person's age and sex to H-RQoL may be through the association with other variables such as social support and depression. Different studies on H-RQoL use a combination of instruments to measure their independent and outcome variables. Furthermore, different definitions may affect the results and manner in which research is undertaken, which may explain why there are so many inconsistent findings among studies.

Gender and Health-Related Quality of Life

Most participants (84.4%) in the current study were females. The mean of the QoL subscales appears similar in males and females. Females reported a higher QoL in social relationships (70.08) subscales, whereas males reported higher levels in the environment subscale (59.09) and psychological (72.12) subscales. However, these differences were too minimal to detect significant differences. The was no significant correlation found between gender and H-RQoL in the current study.

Marital status and Health-Related Quality of Life

Most the sample was never legally married (46.2%), while 36.4% were currently married and 17.3% were divorced, separated or widowed.

In the current study, marital status was significantly correlated with social relationships and psychological QoL. These results are similar to other studies investigating the influence of marital status on QoL. For instance, Fonseca, Pal and Martin (2008) investigated life satisfaction and QoL among elderly Portuguese. They found respondents who were currently married reported higher psychological QoL. Gutiérrez-Vega and colleagues (2018) investigated the protective effect of marital status in QoL among Mexican older people. They found in the psychological health component of QoL, single and married older adults had the highest scores compared to widowed and divorced. Similarly, married older adults had the highest QoL in social relationships. Several studies have shown that married individuals are more likely to report more happiness than people who never married, divorced or are separated (Gove *et al*., 1983; Peters & Liefbroer, 1997). Additionally, married people are more likely to enjoy a supportive and intimate relationship, thus are less likely to suffer loneliness (Kahneman, 1999).

The finding of this research further showed that participants who were never legally married reported higher social relationships QoL. Participants who have never been legally married are probably more involved in social relationships, which has been linked to improved mental and physical health (Umberson & Karas Montez, 2010).

Cross-tabulation revealed 90% of respondents in the current study who are divorced, separated or widowed were in 60–70-year age group. The lowest QoL was reported for this age group across all the QoL domains. A practical implication for individuals in this age group is loneliness. Loneliness is frequent among the elderly and is associated with impaired QoL as well as adverse health consequences, from a mental and physical health viewpoint (Routasalo & Pitkala, 2003; Luanaigh & Lawlor, 2008). Therefore, close monitoring of this age group is suggested since loneliness among the elderly is strongly associated with depression (Luanaigh & Lawlor 2008).

Education and Health-Related Quality of Life

No significant correlation between education levels and H-RQoL was found in this study. In several studies, education has consistently been identified as a determinant of QoL, where people with higher levels of education report better QoL (Molzahn, Kalfoss, Schick Makaroff & Skevington, 2010; Mwanyangala *et al*. 2010; Trentini *et al*., 2011; Ha, Duy, Le, Khanal, & Moorin, 2014; Gholami, Jarhomi, Zarei & Dehghan, 2013; Ng *et al*., 2010; Ghimire, Pradhananga, Baral & Shrestha, 2017; Zhang *et al*., 2017; Uchmanowicz, Chudiak, & Mazur, 2018). This finding suggests education provides a sense of safety and security in hypertensive individuals.

Ross and Wu (1995) found well-educated people indicate higher levels of self-reported health and physical functioning, and lower levels of mortality, morbidity and disability than those with less education. A possible explanation for this association is health literacy. People with higher educational

levels tend to have higher levels of health literacy, which is linked to better health which is considered helpful for improving H-RQoL (Zhang *et al*., 2017; van der Heide, Rademakers, Schipper, Droomers, Sørensen & Uiters, 2013). Naimi Naderiravesh, Bayat, Shakeri and Matbouei (2017) conducted a study to determine the correlation between health literacy and H-RQoL in patients with hypertension. They found a significant and positive correlation between health literacy and H-RQoL. Similarly, Van de Heide *et al*. (2013) investigated whether health literacy could be a pathway by which education levels affects health status in a sample of 5 136 adults. They found health literacy was a partial mediator and underlying mechanism driving the relationship and association between low education and low self-reported health status. Participants who are better educated are more likely to have accurate health beliefs and knowledge resulting in better lifestyle choices and may also have higher occupational prospects and higher income, which can have a positive effect on their QoL.

Employment and Health-Related Quality of Life

In the current study, no significant correlation was found between education and any of the QoL domains. Studies have shown that employment is highly correlated with H-RQoL (Carlier, Schuring, Lötters, Bakker, Borgers & Burdorf, 2013).

Employment not only increases QoL but also improves self-rated health, according to Carlier *et al*. (2013). Min and Cho (2018) investigated the impact of job retention on QoL in a study conducted on Patterns in QoL according to employment among Korean older adults. They found QoL was significantly higher in the group who had job retention than those who experienced job loss.

In the current study, we found 16% of the sample had ceased working because of old age. In another study on global ageing in adults over 50 years, more than half of the men and women had difficulty with work or household activities (Phaswana-Mafuya *et al*., 2013). This finding could suggest the

early onset of disability, preventing or hindering employment, and also suggest further research in this area to determine how this South African households are affected.

5.3 The relationship between stress, coping, depression and Health-Related Quality of Life

The results of the current study provided evidence that the alternative hypothesis for social relationships, psychological and environmental QoL should be partially accepted. Significant associations were found between most of the psychological variables and these QoL subscales. The hypothesis for physical QoL is partially accepted. There are only some significant associations between physical QoL and the psychosocial variables, self-help group belongingness, home, work and financial stress. There were no associations between any of the coping styles and physical QoL.

Stress and Health-Related Quality of Life

Stress correlates highly with hypertension, although the mechanism for this is not well understood. Hu *et al*. (2015) investigated the association between stress and hypertension and found stress at work and home was significantly related to hypertension and increased risk in females. Similar findings were reported by Liu, Li, Li and Khan (2017), who found psychosocial stress was associated with an increased risk of hypertension, and also that hypertensive patients had a higher incidence of psychosocial stress compared to normotensive patients.

In the current study, having financial stress was significantly associated with social relationships and physical QoL. Experiencing no stress at home or having no financial stress was positively associated with social relationships and physical QoL. Financial concerns or hardship can represent potent stressors, which have shown to negatively affect psychological well-being (Bergeman & Wallace, 1999). Ahmad, Maon and Aziz (2018) investigated the relationship between job stress and QoL among working adults. Their findings revealed a significant relationship between job stress and the QoL

among workers. They further revealed that the most influential factor on QoL was job-related stress, followed by organisational, interpersonal, perceived stress and work environment-related stress.

Further evidence on this link was reported by Lu, Qiao, Liang, Yao, Yan, Wang, & Pei *et al*. (2019), who investigated the reciprocal relationship between psychosocial work stress and QoL between 1 109 workers with high job control, and 1 072 with high job reward over two years. They found a reciprocal relationship between psychological work stress and poor QoL and showed psychological work stress had a negative impact on QoL.

Coping and Health-Related Quality of Life

Interestingly, in the current study, physical QoL did not correlate with any of the coping styles. Psychological QoL was positively correlated with all the coping styles. The social relationships and environmental QoL domains negatively correlated with all the coping styles, except proactive coping. Coping strategies are behavioural and cognitive modalities employed to manage the negative impact of stressful situations (Lazarus & Folkman, 1984). However, not all coping is beneficial. Depending on the success and failure of this process, coping can be functional (adaptation) or dysfunctional (increase stress). A possible explanation is presented by Aldao and Nolen-Hoeksema (2012), who referred to this as "no equivalence of particular coping strategies''. According to the authors, instead of using a specific coping strategy, the overall effect of coping depends on the use of adaptive and maladaptive coping strategies. The maladaptive coping strategies (emotional, avoidance, instrumental) would , therefore, have to be compensated by adaptive strategies (strategic, preventive). Kroemeke and Gruszczynska (2016) provides a possible reason for this, in that permanently high coping effects involve psychological costs (Kroemeke & Gruszczynska, 2016). Coping is treated as a management process (Hobfall, 2002), whereby coping costs concern resource depletion or loss after investing; more

probable is that the resources expended in the coping process exceed its outcomes (Kroemeke & Gruszczynska, 2016).

Depression and Health-Related Quality of Life

Only 15% of the study participants met the criteria for depression based on the short form Diagnostic and Statistical Manual Disorders-IV CIDI questionnaire for depression (Rosengren *et el*, 2015, Rosengren *et al*, 2004; Patten & Metz, 1997) criteria, as outlined in Chapter 3. In the current study, depression was negatively correlated with social relationship QoL. Individuals who experienced no depression had better QoL in this domain. The mean for physical, environmental and psychological QoL was similar in depressed and non-depressed individuals.

There is strong evidence supporting the association between QoL and depression (Bardage & Isacson, 2001; Burström *et al*., 2001; Barger & Muldoon, 2006; Trentini *et al*., 2011; Phaswana-Mafuya *et al*., 2013; Renaud & Bédard, 2013; Campbell *et al*., 2013). Hypertensive patients with depression reported a more functional disability, lower H-RQoL, impaired cognitive functions, reduced well-being and reduced life satisfaction (Scuteri *et al*., 2011). These results have been replicated in studies with other chronic diseases as well. For instance, depression has shown to play an important role in the prediction of QoL in patients with CVD (Malik *et al*, 2005; Rumsfield & Ho, 2005). Similarly, Ruo, Rumsfeld, Hlatky, Liu, Browner & Whooley (2003) examined the contribution of depressive symptoms and measures of cardiac function to the health status among 1 024 patients with coronary artery disease. Their study revealed depressive symptoms were strongly associated with more physical limitations, worse health status and lower QoL levels.

5.4 The relationship between disability, co-morbidity and Health-Related Quality of Life

The null hypothesis for social relationships is accepted. There were no significant associations found between social relationships QoL, disability and disease co-morbidity. The alternative hypothesis for the physical, psychological and environmental QoL is partially accepted. The evidence shows disability negatively affected these H-RQoL domains.

Disability and Health-Related Quality of Life

Just over a third (35.3%) of the sample had no disability as defined by the Washington Group on disability questions. Twenty-seven per cent had one disability followed by 37.1% who had two or more (several) disabilities (section 5.4).

Several studies have shown lower QoL among hypertensive patients (Mena-Martin *et al*., 2003; Alonso *et al*., 2004; Gonçalves, Moreira, Gus & Fuchs, 2007; Korhonen *et al*., 2011). However, although hypertension is often asymptomatic, it is a major risk factor for CVD, including stroke, heart failure, atrial fibrillation, coronary artery and peripheral vascular disease. These diseases put individuals at extreme risk of disability. Cardiovascular disease is the leading cause of NCD-related deaths and lost productive years and disability-adjusted life years Poluzzi *et al*., 2007; WHO, 2011). Disability is further negatively correlated with chronic disease (Boeckxstaens, Vaes, Legrand, Dalleur, de Sutter & Degryse, 2015), and multi-morbidity on disability is progressively greater, with increases in the number of chronic conditions (Loza, Jover, Rodriguez, Carmona & EPISER Study Group, 2009; Garin *et al*., 2014).

The study by Phaswana-Mafuya *et al*. (2013), examining self-rated health and associated factors among South Africans over 50 years, showed 30.9% of women and 22.3% of men had some difficulty in functioning. These are similar to South African population estimates, where disability is more

prevalent among females (8.3%) compared to males (6.5%) (WHO, 2011). Females, in the current study, proportionally had twice as many disabilities than males did, and is even more prevalent between ages 60–70 years. Not only does this have practical implications for females in the South African context but also abroad. Disability and living conditions in older age are policy concerns throughout the world (Phaswana-Mafuya *et al*., 2013). Policy implementation, as noted in the National Development Plan – Vision 2030 should, be executed effectively to minimize this concern.

Co-morbidity and Health-Related Quality of Life

The current study found no correlation between co-morbidity and H-RQoL, while other studies have. For instance, Pengpid and Peltzer (2018) examined the impact of chronic disease on the QoL in 4 803 adult chronic primary care patients in Cambodia, Myanmar and Vietnam. Their examination found people with major chronic conditions had worse QoL. Poorer QoL was found in people who had cancer, followed by Parkinson's disease, mental disorder, epilepsy, asthma, kidney disease, obstructive pulmonary disease and cardiovascular diseases. Similar findings were reported by Sibone *et al*. (2013), who found lower H-RQoL scores of chronic pulmonary diseases, including asthma and chronic obstructive pulmonary disease, and higher scores in those with diabetes.

5.5. The relationships between age, gender, marital status, employment and Functional Status (MCS, PCS)

The hypothesis for the MCS is partially accepted as only marital status was significantly associated with MCS, while that for the PCS subscale was rejected. Age, marital status, employment and education were significantly associated with the PCS.

Age and Functional Status

Age was significantly correlated with physical functional status in the current study. Respondents in the 60–70-age group had 2.8 times lower PCS score than the 50–59-age group. In a study by Phaswana-Mafuya *et al*. (2013), they showed that as age increases in the South African population it results in depreciation in health and daily functioning, particularly for individuals over 50 years. Poorer FS was associated with age and co-morbidity and increased as age increased (McHorney, Ware & Raczek, 1993; Wensing, Vingerhoets & Grol, 2001). Similarly, many studies have shown that in the longer term (ten years or longer), FS tends to decline (Kahng, Dunkle & Jackson, 2004; Liang *et al*, 2008).

Employment and Functional Status

In the current study, employment was significantly correlated with physical FS. The results revealed individuals who had stopped working because of old age, had higher physical functional status than those who were employed and unemployed. Most (67.6%) of the sample was unemployed. Sixteen per cent of the sample was not working because of old age, which could explain why physical functional status was higher in this group.

Respondents who had discontinued working because of old age had lower physical functional status than employed and unemployed respondents did. Possibly this may be because of disabilities, which were very high in the current sample, particularly among the 60–70-year-old and female group.

Research, for example, has shown that higher mental and physical functioning was observed with higher job status (Hemingway, Nicholson, Stafford, Roberts & Marmot, 1997). In the current sample, only 2.3% of respondents had a college or university education. The government needs to upskill

poorly educated citizens as another way of decreasing unemployment. However, disability and early-age disability will continue to be problematic in the current context requiring urgent intervention.

Several studies have examined whether physical functioning declines after retirement (2017; Mein *et al*., 2003; Stenholm *et al*., 2014; Szabo, Allen, Stephens & Alpass, 2017). Szabo *et al*. (2017) examined ten-year longitudinal data from the New Zealand Health, Work, & Retirement Study , which revealed three distinct profile trajectories. At baseline, participants in profile 1, displayed good physical functioning, which sharply declined until retirement and slowed down post-retirement. The group in profile 2, experienced poor and declining physical pre-retirement and greater reported improvements in physical functioning post-retirement, whereas in profile 3, good and stable physical functioning pre-retirement and a slow decline post-retirement were recorded (Szabo *et al*., 2017).

Results between various studies are inconsistent and warrant further investigation as the 60–70-year age group is considered a vulnerable group. Participants in this age group are likely to have multi-morbidity, are at risk of functional incapacity, and might have further socio-economic, psychological problems putting them at an increased risk of hospital and institutional admission.

Gender and Functional Status

No significant correlation was found between gender and FS in the current study, while current findings regarding gender differences in changes in FS are mixed (Liang *et al*., 2008). Evidence exists in some studies that men and women experience similar incidence in disability and functional decline (Kahng *et al*., 2004; Liang *et al*., 2008). Conversely, in other studies, women have shown to experience greater odds of functional impairment (Anderson, James, Miller, Worley& Longino, 1998; Leveille, Penninx, Melzer, Izmirlian & Guralnik, 2000), while in others, men experience greater decline than women do (Mendes de Leon, Guralnik & Bandeen-Roche, 2002).

A possible reason for the non-significant result between gender and FS is the gender ratios in the current sample. This issue will be highlighted further in the limitations section.

Marital status and Functional Status

Marital status was significantly correlated with physical and mental FS. Respondents who were never married had significantly better physical and mental functional status. Respondents who were divorced or separated had lower physical and mental functional status. These results are similar to those found by Mor *et al*. (1989), who found that the absence of a spouse was a risk for functional decline in a study of 852 healthy elders.

Results that are consistent with the current study's findings have not been found in other studies, for example, a national cross-sectional study was conducted on health behaviours, social networks and healthy ageing, with 56 436 women (Michael, Colditz, Coakley & Kawachi, 1999). Strong predictors of higher functioning were found among women who had partners or close relatives, with a significant negative reduction in physical functioning in women who did not have a partner or spouse (Michael, *et al*, 1999). A fact in many of these studies' inconsistent results, could be the sample size. Generally, studies that have larger samples are able to detect significance in greater detail than studies with smaller sample sizes.

Education and Functional Status

The results show a significant correlation between education and physical functional status. Respondents who have secondary schooling and college or university education had better physical functioning. These results are confirmed by other studies, which successfully established a link between education and functional status (Woolf, Rothemich, Johnson & Marsland, 1998).

Higher education levels have been linked to higher health literacy, which is related to better health and subsequently improved physical functional status (Zhang *et al*., 2017). In some studies, education has been suggested as having a protective effect on functional health status. Older people with higher education levels were shown to have a lower probability of early mortality and a higher probability of recovery from functional disability (Freedman, Martin, Schoeni & Cornman, 2008; Martin, Schoeni, Andreski & Jagger, 2012).

5.6 The relationship between stress, coping, depression and Functional Status (MCS, PCS)

The alternative hypothesis for the PCS and MCS is partially accepted, and there is some evidence of statistically significant correlations between the psychosocial variables and MCS and PCS. The MCS was significantly correlated to depression, financial stress, stress at home and religious group involvement. The PCS was significantly related to strategic, emotional and avoidance coping.

Stress and Functional Status

Financial stress and stress at home and work were shown to correlate significantly with mental functional status in the current study. Stress was not correlated with physical functional status.

The effect of stress on FS has been disease-specific as investigated by studies (Ref). For instance, Endrighi, Dimond, Waters, Dimond, Harris, Gottlieb and Krantz (2019) investigated perceived stress and anger associations in respondents with heart failure, FS and symptoms. They found perceived stress and anger were associated with poorer functional and health status, but perceived stress was a stronger predictor. Furthermore, they found negative effects of anger on heart failure, FS and health status may partly operate through psychological stress.

In another study, Radanov, Schwarz, Frost, and Augustiny (1997) assessed the relationship between psychosocial factors and self-rated functional status in 66 patients. Their study found psychosocial stress did not significantly contribute to how rheumatoid arthritis patients perceive their functional ability. The study did find that a proportion of rheumatoid arthritis patient's self-rated functional status may depend on the patient's disposition probably promoting impaired illness behaviour.

Mental functional status comprises mental health, role emotion and vitality. This could explain the relationship between mental functional status. Hypertension is mostly asymptomatic and this could explain the non-significant relationship with physical functional status.

Coping and Functional Status

Coping involves efforts to control harmful, threatening, or challenging conditions that occur when a routine or habitual response is not readily available. Ineffective coping can increase stress on an individual and subsequently decrease functional status. In the current study, emotional support seeking and avoidance coping was significantly correlated with physical functioning, whereas only emotional support seeking was correlated with mental functional status. Engaging in these coping styles had a negative impact on physical and mental functional status.

Emotional support seeking concerns the regulation of temporary emotional distress through the disclosure of one's feelings to others (Renard & Snelgar, 2013). Avoidance coping is an escape of emotion or cognitive events (e.g., When I have a problem I like to sleep on it; if I find a problem too difficult sometimes I put it aside until I'm ready to deal with it; and, When I have a problem I usually let it simmer on the back burner for a while). These examples are opposite to active coping strategies, whether behavioural or cognitive, which are good strategies to deal with stressful events. Avoidance-oriented coping involves trying to avoid a stressful situation by seeking out social support or engaging

in different leisure activities, which is likely to increase stress, thus negatively impacting the respondent.

5.7 The relationship between disability, co-morbidity and Functional Status (MCS, PCS)

The null hypothesis for mental functional status was accepted and there were no significant associations found between the MCS and disease morbidity variables. The alternative hypothesis for the PCS is partially accepted. A statistically significant association was found between disability PCS.

Disability and Functional Status

In the current study, disability was significantly correlated with physical functional status. Sixty-four per cent of the current sample had a disability of which 37.1% had two or more disabilities.

Physical functional status consists of role physical, bodily pain, physical functioning and general health, which implies disability has a more physical effect on the respondent than a psychological effect. A few studies have shown that many older individuals consider the capacity to carry out activities of daily living (i.e., functional independence) to be of greater concern than prevention of disease (Warburton, Gledhill & Quinney, 2001; Paterson, Govindasamy, Vidmar, Cunningham & Koval, 2004).

As a result of disabling conditions, it is useful to discern instrumental disabilities and disabilities incurred. For instance, respondents who suffer from a stroke or myocardial infarction episode suffers severe decreases in functional status compared to the diagnosis of an NCD (Segal & Schall, 1994). Older people have a higher risk of disability, which is compounded by a global increase in chronic health conditions associated with other disabilities such as diabetes, CVD, and mental illness (WHO, 2011. Furthermore, as age increases so does the rate of disability onset. Research has shown that people who age positively have greater satisfaction with life and make fewer demands on the

healthcare system, whereas older individuals with fewer resources are at risk for developing a disability (Kempton *et al*, 1999), thereby decreasing functional status.

Co-morbidity and Functional Status

Chronic diseases can have the potential to worsen the overall health of patients by limiting their FS, their capacity to live well, disrupting an individual's life in terms of its impact on well-being (Megari, 2013).

There was no significant correlation between chronic disease co-morbidity and mental and physical functional status. Although respondents, who had an additional chronic disease, reported slightly lower FS, the difference was minimal.

As shown in studies, poorer FS is strongly associated with age and co-morbidity, and as age increased FS declined (Wensing, Vingerhoets & Grol, 2001). Further studies found having two or more chronic conditions had a much higher negative impact on FS than having one chronic condition (VanderZee, Sanderman & Heyink, 1996; Mozes, Maor, & Shmueli, 1999; Wensing, Vingerhoets & Grol, 2001). Likewise, research conducted by Stewart *et al*., 1989 evaluated the functioning and well-being of 9 385 adults in the 2-year longitudinal cross-sectional Medical Outcomes Survey. Their study indicated that patients with multiple conditions showed greater decrements in functioning and well-being than those with only one condition. They concluded that the impact of chronic conditions on health is substantial, and for most chronic conditions, involves all aspects of functioning and well-being. Therefore, co-morbidity exacerbates the impact of chronic diseases and those diagnosed with a chronic condition should be appropriately educated to prevent the onset of an additional NCD.

5.8 Predictors of Health-Related Quality of Life

The second aim of the current study was to to develop multivariate predictive models using socio-demographic, psychosocial and disease morbidity independent variables and Health-Related Quality of Life outcomes. The second aim was tested utilizing a multiple regression analysis.

5.8.1. Model 1 representing predictors of Quality of Life: Psychological domain

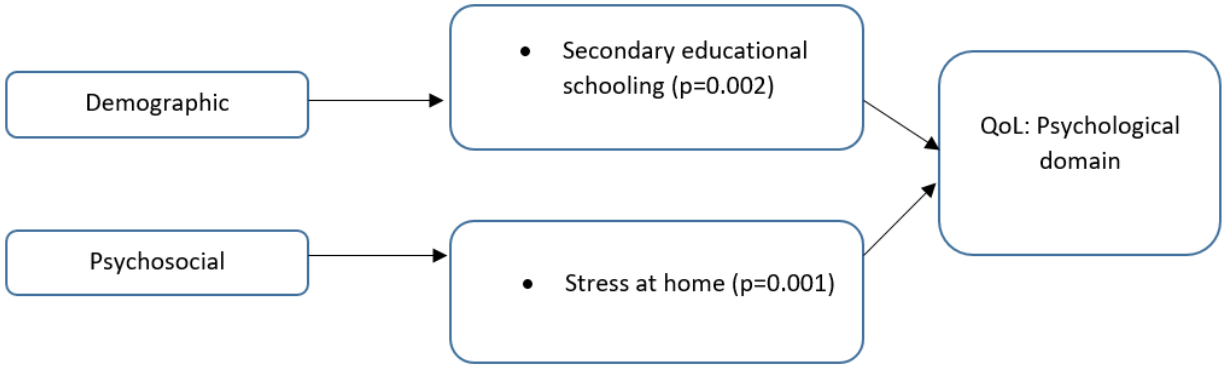

Figure 5.1 Graphical representation of the Psychological model

The variance explained for the psychological model accounted for 39% of the explanatory power of the model. Only two predictors significantly predicted H-RQoL, i.e. having secondary education and moderate levels of stress in the home environment. The findings of this research showed having a secondary education was significantly associated with increased psychological QoL. Similar results were found by other studies (Van Minh, Ng, Byass & Wall, 2012; Gomez-Olive *et al.*, 2010; Ng, Hakimi, Byass, Wilopo & Wall, 2010).

The presence of stress is a significant predictor of psychological QoL. In a study by Rosengren *et al.* (2004), who investigated the associated factors with acute myocardial infarction, found respondents experienced a higher prevalence of work, financial stress and stress at home than in the control group.

Research has also shown that psychological stress is more apparent in the presence of multiple diseases (Leveille, Penninx, Melzer, Izmirlian & Guralnik, 2000). Older persons are more likely to have multiple co-morbid diseases.

Although age was not a significant predictor, those in the 60–70-year age group had six times lower psychological QoL, which confirms the findings of Ojike *et al*. (2016) who investigated the association between psychological distress and hypertension. They found psychological distress was associated with higher odds of hypertension.

5.8.2. Model 2 representing predictors of Quality of Life: Social relationships domain

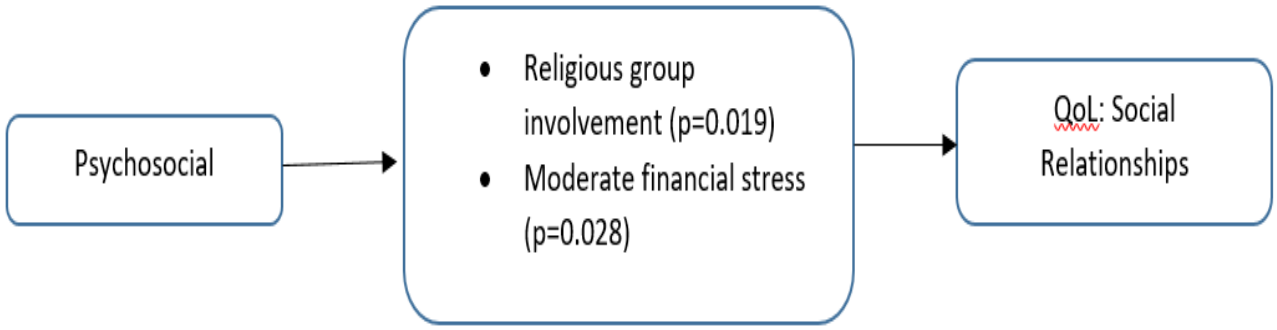

Figure 5. 2 Graphical representation of Social Relationship model

The predictors in the QoL social relationship's model explained 37% of the variance leaving 63% of the variance unaccounted. Only one psychosocial independent variable significantly predicted social relationships. Having moderate financial stress decreased social relationship QoL by three times. Similar findings by Ames *et al*. (2001), who investigated the impact of stress on QoL in 183 randomly recruited low-income individuals over two years. Individuals were chosen from two primary care medical clinics and had established hypertension. Their analysis revealed minor and major stresses were significant predictors across all domains of QoL. Their research proved stress has a significant and persistent impact on the QoL of low-income individuals with established hypertension.

As mentioned earlier, most (67.6%) participants were unemployed, and only 16.8% were employed. The high unemployment rate may due to the South African economic climate in which there is high unemployment. Currently, the rate of unemployment in South Africa is 27.1% (Stats SA, 2018). Financial stress can cause persistent negative thoughts, feelings of fear, worry or regret related to one's finances.

5.8.3. Model 3 representing predictors of Quality of Life: Physical domain

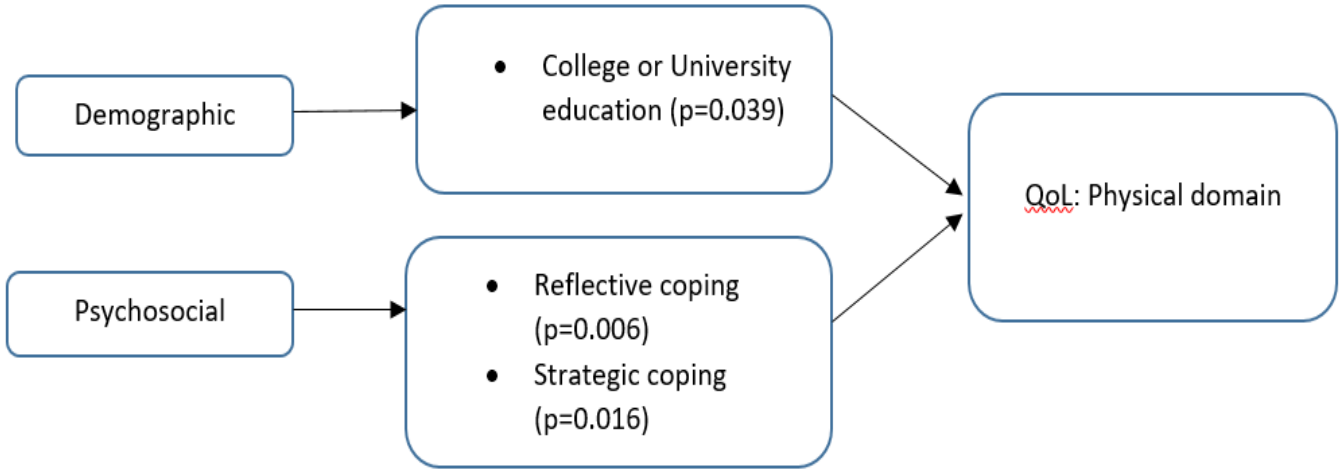

Figure 5. 3 Graphical representation of the Physical model

The physical QoL model identified three significant predictor variables. Having a college or university education and engaging in reflective and strategic coping were significant predictors.

Having a college or university education increased physical QoL by as much as ten times. Education was an equally strong predictor in other studies. In a Vietnamese study among hypertensive patients over 50 years, it was found having grade 12 or higher, increased QoL by seven times. A possible reason for this is that higher education may be associated with better knowledge and access to health facilities and services, consequently leading to a better QoL and health (Van Minh *et al*., 2012).

Phaswana-Mafuya *et al*., (2013) conducted a national population-based cross-sectional study (SAGE) in 3 840 South Africans 50 years and older to describe self-reported ratings of overall health and functioning, and to identify factors associated with self-rated health.

Respondents with primary education or less were more likely found to report poorer health compared to those with secondary or higher education. Individuals with higher education have improved access to healthcare services and can make better-informed decisions, thereby increasing their QoL. In another study by Zhang *et al*. (2017), it was found that junior or primary education in people with hypertension was a significant risk factor for lower QoL.

Strategic coping involves the process of generating a goal-oriented schedule of activities in which extensive tasks are divided into manageable components (Greenglass *et al*., 1999), and encompasses a positive psychological coping profile (Roesch, Aldridge, Huff, Langner, Villodas & Bradshaw, 2009). Individuals who engage in this type of coping take difficult situations and split them into manageable components (e.g., I often find ways to break down difficult problems into manageable components; I break down a problem into smaller parts and do one part at a time; I make a list and try to focus on the most important things first).

Reflective coping describes replication and inspection regarding a variety of possible behavioural alternatives by comparing their imagined effectiveness and includes brainstorming, analysing problems and resources, and generating hypothetical plans of action (Greenglass *et al*., 1999).

Individuals who engage in reflective coping are likely to think about the short-term and long-term consequences of possible solutions (Wei, Ku, Russell, Mallinckrodt & Liao, 2008). Engaging in this type of proactive coping can help individuals curb stress and consequently improve their physical QoL.

5.8.4. Model 4 representing predictors of Quality of Life: Environmental domain

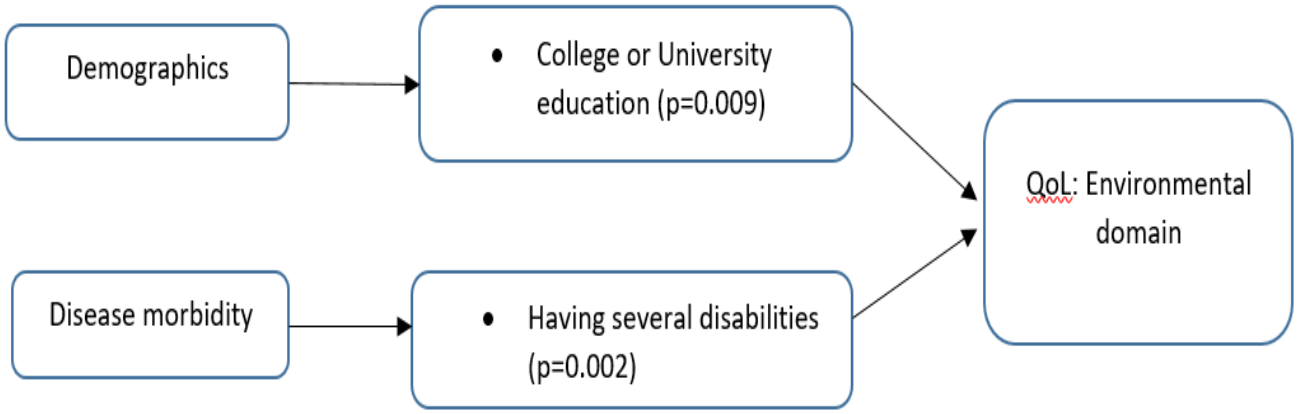

Figure 5. 4 Graphical representation of Environmental model

The environment QoL model explained the least variance (27%) of all the H-RQoL, leaving 73% of the total variation unaccounted.

The findings of this research show education, employment status, having several disabilities and engaging in avoidance coping were significant predictors of environmental QoL. Having a college or university education was a significant positive predictor of environmental QoL, which meant having a higher education was beneficial to the respondent's QoL. Participants who have higher education training are able to have better vocational prospects, implying increased income, which positively affects their QoL. These results have been replicated in several studies indicating a positive association with QoL (Stewart *et al*., 1989; Phaswana-Mafuya *et al*., 2013; Jufar *et al*., 2017; Jalali-Farahani, Amiri, Bakht, Shayeghian, Cheraghi & Azizi, 2017).

Respondents who had several disabilities had five times lower environmental QoL. Thirty-seven per cent of the current sample had several disabilities, mostly located in the 60–70-year-old group and among females. This finding is supported by several studies that shows disability increases with age (Van Minh *et al*., 2012; Razzaque *et al*., 2010; Phaswana-Mafuya *et al*., 2013). An epidemiological

study by Caskie, Sutton and Margrett (2010), observed the rate of increase in disability limitations in relation to hypertension over seven years among 3 046 older Mexican Americans. Their results indicated an increase in disability limitations over time, with greater disability in those with than without hypertension. The authors found these disabilities were significant predictors of environmental, physical and psychological H-RQoL.

5.8.5. Model 4 representing predictors of Physical Functional Status

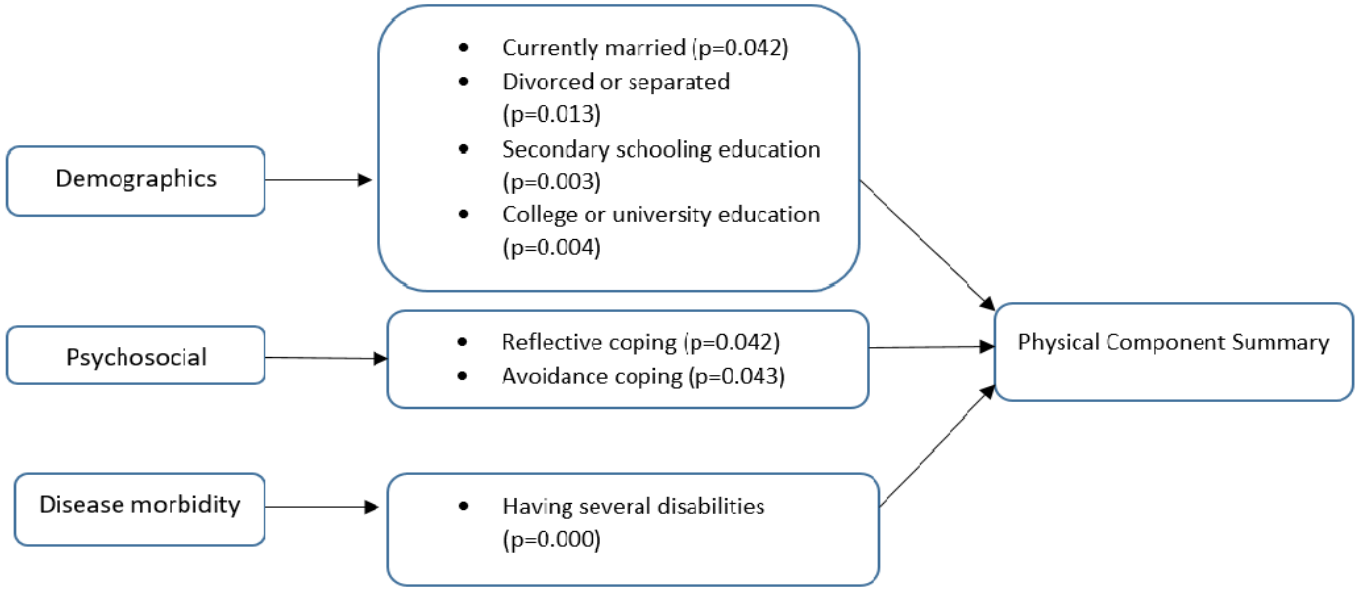

Figure 5. 5 Graphical representation of Physical Component Summary score model

The predictors in the overall model for PCS explained 40% of the variance. The PCS score assesses physical function, role limitations caused by physical problems, bodily pain, and general health. There were seven significant predictors in the final model. Reflective coping was the only predictor to increase physical functioning. Generally, this reflective style of coping draws on activities, such as planning and exploring causal relationships, and systematic steps in coping (e.g., I imagine myself solving difficult problems; I tackle a problem by thinking about the realistic alternative; I take action only after thinking carefully about a problem, etc.). It involves contemplation and simulation about a

variety of possible alternatives by comparing their imagined effectiveness which includes analysing problems and resources, brainstorming, and generating hypothetical plans of action (Greenglass *et al*., 1999). Respondents who utilise this type of coping can more effectively deal with stress and decision making.

Having secondary schooling a college or university education were significant negative predictors of PCS score. A study by Chen and Hu (2018) found that a higher education level acted as a buffer against decreased functional status. The study further found respondents with primary education or less were more likely to report poorer health compared to those with secondary education (Phaswana-Mafuya *et al*., 2013). The mechanism between education level and physical functional status requires further investigation.

Having several disabilities was a significant predictor of physical functional status and decreased physical functioning by five times. Impairments in specific physical and cognitive functions (i.e., walking, sight and concentration) constitute the basic physical capacities necessary to perform basic or routine daily tasks successfully and will result in decreased physical functioning (Mendes de Leon, Guralnik & Bandeen-Roche, 2002). This decrease has practical implications because at least 64% of the current sample had a disability of which 37.1% had two or more disabilities.

5.8.6 Model 6 representing predictors of Mental Functional Status

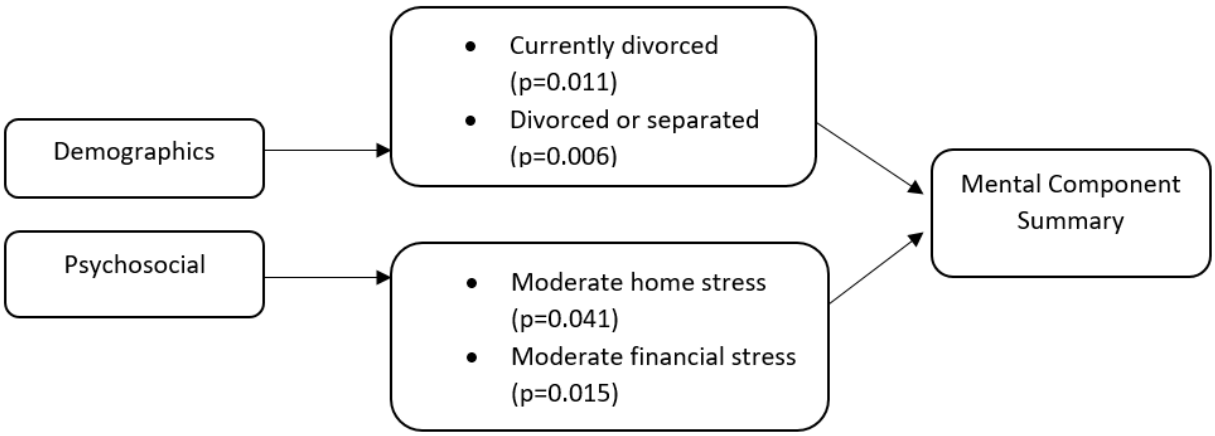

Figure 5. 6 Graphical representation of Mental Functioning model

The predictors in the overall model for mental functional status accounted for 45% (R^2) of the variance explained in the model. Mental functional status includes questions about an emotional role (e.g., reduced time working), vitality (e.g., full of pep or tired), mental health (e.g., nervous, happy, nothing can cheer you up), and social functioning (interference with social activities). There were five significant predictors of mental functional status. The final model revealed emotional support seeking (p=0.053) increased mental functional status.

Emotional support seeking concerns the regulation of temporary emotional distress through the disclosure of one's feelings to others (Renard & Snelgar, 2013). Emotional support seeking is an important factor in dealing with life difficulties. Individuals who engage in this type of coping often seek advice or coaching from close family and friends. This advice allows them to obtain multiple views regarding the current problem they are facing enabling them to make informed decisions on how to reduce the current stress.

Being currently married (p=0.011), divorced or separated (p=0.006), having moderate stress at home (p=0.041) and moderate financial stress (p=0.015) decreased mental functional status. It has often been reported that marriage can act as a stress buffer. Conversely, marital distress and dissolution have been linked to poor psychological and physical health (Kiecolt-Glaser & Newton, 2001). For instance, Holt-Lunstad, Birmingham and Jones (2008) examined ambulatory blood pressure among 204 married and 99 single males and females. They found marital status and marital quality were important factors in marriage. Married individuals had greater life satisfaction and blood pressure than single individuals. Although they found high marital quality was associated with lower blood pressure, less depression and lower stress, they also found single individuals had lower blood pressure, suggesting that single individuals fare better than their unhappily married counterparts. Most (90%) of the divorced or separated respondents were in the 60–70-year age group, which could indicate a lack of buffering or social support leading to a decrepit in their vitality, social functioning, mental health and role emotion.

According to findings in the current study, even moderate financial stress and stress at home can decrease mental functional status. Similar results were found by Bergeman and Wallace (1999) who linked financial concerns as potent stressors, which negatively affect psychological well-being. In Figure 5.7, the models of predictors for H-RQoL and FS are displayed.

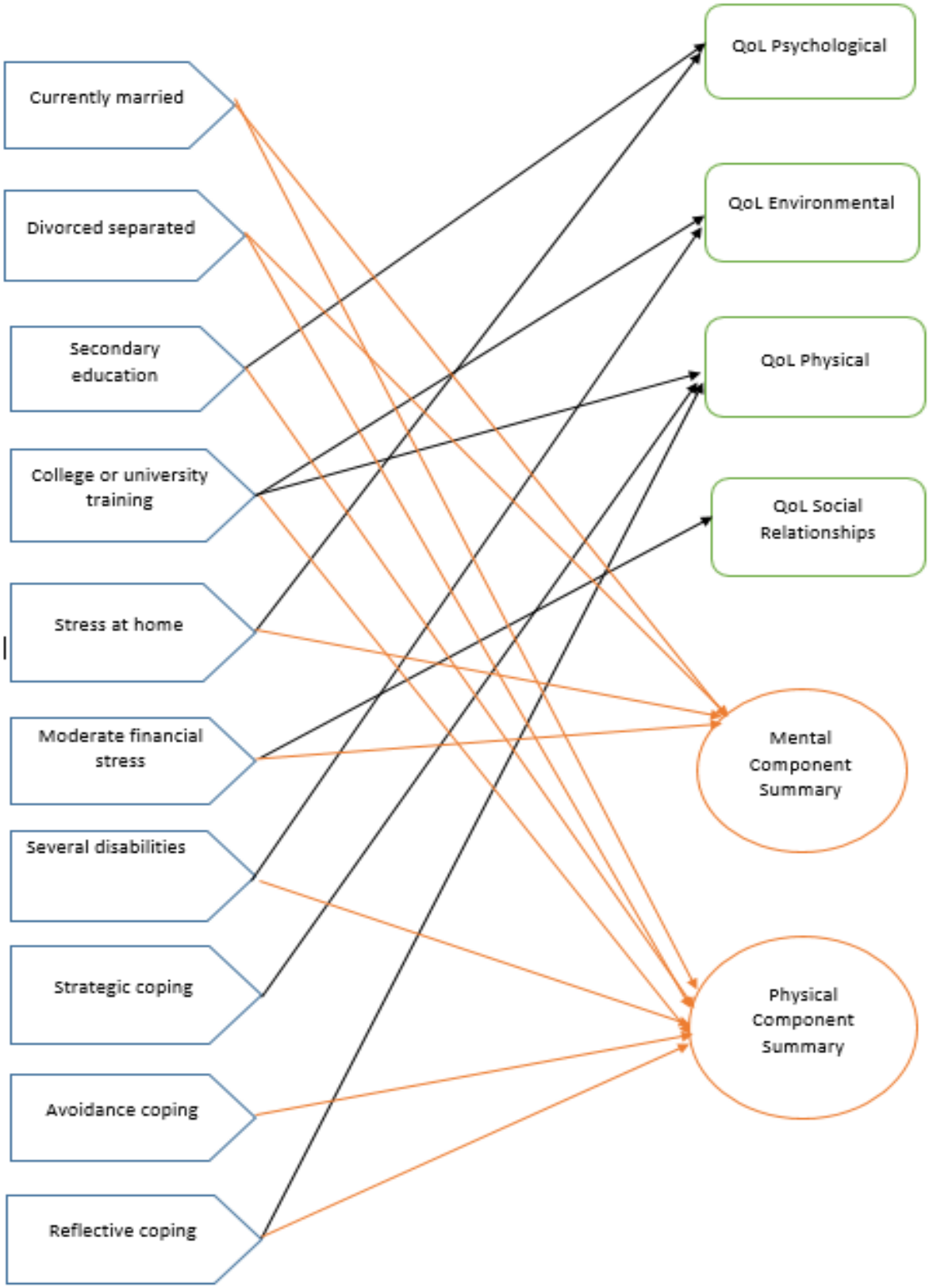

Figure 5. 7 Model representing predictors of Health-Related Quality of Life and FS

5.9 Conclusion

The main aims of this research were to 1) determine the relationships between socio-demographic, psychosocial and disease morbidity variables and outcomes H-RQoL (physical, environmental, psychological, social relationships) and FS, and 2) to develop predictive models for H-RQoL and FS outcome variables.

In this study, we found marital status, education, coping, stress and disability were significant predictors across both H-RQoL and FS measures. All these predictors are considered modifiable. Participants who had higher education levels were found to have significantly higher H-RQoL and FS. Having higher educational levels make it more likely that participants will have better access to financial resources, physical environments, and better accessibility to quality health and social care. Higher educational levels are linked to higher socio-economic status, which in turn result in better life satisfaction (Gaibie & Davids, 2011). Education has been considered the root cause of individual well-being. Education shapes people's opportunities for employment, the kind of work they do, their income level, and their social psychological resources (Ross & van Willigen, 1997).

Improving education outcomes in communities is vital, as this potentially allows people to make more informed decisions regarding their health and well-being, and can provide better access to resources which can improve their QoL. Therefore, the need for government to continuously enforce policy on education regarding strict enrolment and completion is highlighted.

Stress at home and moderate financial stress were also significant predictors of H-RQoL and FS. Participants who experienced moderate financial stress had three times lower social relationship QoL. Financial stress can be characterised by intrusive thoughts, disordered feelings and avoidant behaviours related to one's finances. Financial stressors can be potent, especially when the economy

experiences a downturn and can negatively affect psychological well-being (Bergeman & Wallace, 1999). Financial stress as a result of being unemployed or job loss can cause participants to experience feelings of loss of dignity and belonging as a human being (Hiswåls, Marttila, Mälstam & Macassa, 2017). Most (77.5%) of the sample in the current study was unemployed, which may cause feelings of worry, insecurity and stress and lead to isolation and loss of self-esteem (Hiswåls *et al*., 2017).

Disability in the current study was found to be a significant predictor of the physical aspects of H-RQoL and FS. Participants in this study who had several disabilities had up to eight times lower H-RQoL and five times lower FS. These results suggest that participants had problems with their mobility, sight, hearing or concentrating. Having a disability can result in transportation difficulties and decreased participation in leisure activities. Disabilities do not only affect the physical performance of activities of daily living but also the mental and social aspects of daily life. In the current study, disability especially affected environmental H-RQoL and physical functional status. Participants in the current study may have had disabilities preventing them from engaging in gainful employment or participating in leisure activities, thus negatively impacting their H-RQoL and FS. Only some disabilities highly impacted H-RQoL and FS in the current study, which may imply that the presence of one disability may not greatly affect their current H-RQoL and FS, and highlights the urgency of preventing additional disability onset.

Predictors of H-RQoL and FS are highlighted in this study, and the results confirmed that these were modifiable and non-modifiable. Disability, marital status, education, stress and coping were found to be more disabling factors to H-RQoL and FS than co-morbidity.

5.10 New contributions from this PhD research

The findings of this study contributes to the broader knowledge of factors and empirically tested associations that predict H-RQoL and FS in people with hypertension, and provides support for additional investigation of this condition outcome. This study had a particularly emphasis on investigating psychosocial, disability and co-morbidity variables, which has not been widely studied in South Africa, thus addressing a particular gap. The current research shows that through assessing how a person perceives his or her health is useful for determining appropriate treatment strategies thus providing more positive health and management outcomes. This highlights the importance of objective as well as subjective indicators and the why clinicians or physicians should include them in their routine treatment management. Stress, education, marital status, disability and coping goes beyond lifestyle changes to effectively manage hypertension and subsequently improve H-RQoL and FS.

The current study further details the significant impact of disability on H-RQoL and FS, and offers support that future studies into these constructs include disability to gain a more detailed picture of H-RQoL and FS in hypertensive people.

There is currently no gold standard when selecting H-RQoL measures, particularly in disease/condition specific studies such as hypertension and QoL. The results obtained from this study show the WHOQOL-BREF and SF 36v2 are adequate measures of H-RQoL and FS in people with hypertension in this particular South African context.

5.11 Limitations of this study

The current study is cross-sectional in nature and therefore causality cannot be implied. Cross-sectional studies do not allow observations to be analyzed over time, but rather collects data for a specific point in time. Therefore the study cannot determine cause and effect regarding predictors of

H-RQoL and functional status. Another limitation of cross-sectional studies is that the timing of the snapshot is not guaranteed to be representative. Collecting data at a point in time subjects the study to environmental, political and economic factors that cannot be controlled. For instance, if data is collected during a period where there is political and racial instability (xenophobia) or unrest, or during a period of economic crisis. These external factors can affect an individual's QoL.

This is a small scale study, which is a further limitation. The sample size is not sufficient to inform policy formation or program implementation. A further limitation of the sample size (N=173) is the reduction in statistical power. This is a possible explanation for many of the variables in the study not predicting H-RQoL and FS where other studies with bigger sample sizes have (Sibone *et al*, 2013; Ninh *et al*, 2014; Xie *et al*, 2014).

The study does not allow the determination of whether socio-demographic, psychosocial and co-morbidities are risk factors for the pathogenesis of hypertension. To determine this longitudinal studies will have to be conducted.

There are disparities in the size or ratios of gender attributable to sampling. This disparity prevented adequate gender analysis. Previous studies have found gender to be a significant predictor of H-RQoL and FS (Burström, Johannesson & Diderichsen, 2001; Hou *et al*, 2004; Trentini *et al*, 2011).

The predictors of H-RQoL and FS in the final models did not account for huge variances. This highlights a lack of explanatory power in the models. Therefore, more research is needed to verify some of the findings given this limitation. The current findings suggest a more comprehensive set of independent variables should be included in the models, which was limited because of sample size considerations. For instance, a researcher might consider including anthropometric measurements such as body mass index (BMI), waist circumference and weight and height measurements, as well as

data regarding physical exercise. Introducing these variables will boost the model's predictive and explanatory power as well as allowing for the control of mediator variables.

The last limitation is possible survey fatigue in the participants. Survey fatigue occurs when participants become tired of the survey and quality of responses decreases. The PURE study is a longitudinal study involving many follow-ups with participants, which included anthropometric measurements at each follow-up over the course of several years. This could potentially have resulted in respondents not giving enough thought to questions during the interview, which can result in the construct not being measured properly.

Despite the above limitations, it may be concluded that the study shows the potential for further investigation regarding the role of hypertension in relation to other chronic diseases and H-RQoL and FS. The current study has highlighted, as identified in other studies, vulnerable groups that require further investigation and which may hopefully stimulate future research involving the implementation and testing of interventions.

5.12 Recommendations

Based on the findings, conclusions and the limitations of this study, the following recommendations are suggested:

The South African healthcare system is burdened with an influx of citizens depending on its services. The pressure to deliver effective treatment and the required human resources to do so continues to be a challenge. This highlights the citizen's satisfaction with the services provided. According to Fan *et al*. (2005) patient education and ability to cope with chronic conditions are more strongly associated with satisfaction with their primary care provider than disease severity. Therefore, improvements in health service delivery are vital to ensure efficient management of NCDs and subsequent sequalae.

These can be achieved through more stringent budget and expenditure monitoring, and through building strategic partnerships between the public and private health sectors.

This study has shown stress to have a significant negative association with individuals in the current study. It is recommended future studies investigate the impact of stress management interventions on H-RQoL in hypertensive individuals, and investigate how other psychological variables may impact or moderate the association between H-RQoL and stress.

The government should ensure there is adequate access and resources devoted to improving education. Additionally, based on the results of the current study and literature from other studies, emphasis should be placed on plans to minimize secondary school drop-outs. This will likely improve self-reported health status among individuals leading to improved H-RQoL.

In the produced models most of the variance could not be explained by the independent variables. It is recommended that future studies include other possible explanatory variables such as NCD treatment and adherence, duration of the condition, built environment and chronic disease severity.

Lower H-RQoL has consistently been found in hypertensive individuals with co-morbidities. This highlights and supports the importance of early diagnosis and effective treatment of chronic conditions to improve and sustain H-RQoL.

Implement research studies that focus on life-course approaches to dealing with chronic disease because most NCDs are modifiable.

Longitudinal studies are needed to better understand how H-RQoL and FS change and impact over time after diagnoses.

Implement regular monitoring of the health status of older people. This will enable health institutions and agencies with needed information to protect, assess and promote the health and well-being of the older population.

Future studies should focus on investigating the impact of interventions for improving and preserving H-RQoL in hypertensive individuals, particularly those in vulnerable groups such as those identified in the current study; older age and lower education.

Regular screening for depressive symptoms in hypertensive patients to try to reduce the negative impact of H-RQoL. Possibly provide appropriate treatment once mild to moderate symptoms are identified.

Strengthen the improvement of school management through compulsory formal training of teachers to be promoted as principals or heads of department to re-enroll pupils who have dropped out of school.

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Appendices

Appendix A: Ethical Clearance

UNIVERSITY of the WESTERN CAPE

OFFICE OF THE DEAN
DEPARTMENT OF RESEARCH DEVELOPMENT

10 September 2014

To Whom It May Concern

I hereby certify that the Senate Research Committee of the University of the Western Cape approved the methodology and ethics of the following research project by:
Mr M Clayford (School of Public Health)

Research Project:	Predicting health related Quality of Life and functional status in middle –aged to older adults with hypertension and/or physical disabilities living in selected urban and rural communities in South Africa.
Registration no:	14/7/9

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

The Committee must be informed of any serious adverse event and/or termination of the study.

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

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Appendix B: Information letter English

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INFORMATION SHEET

Project Title: Predicting health related Quality of Life and Functional Status in middle-aged to older adults with hypertension and/or physical disabilities living in selected urban and rural communities in South Africa.

What is this study about?
This is a research project being conducted by Mario Clayford at the University of the Western Cape. We are inviting you to participate in this research project because you have participated in the PURE study since 2009 and you are over 60 years old. The purpose of this research project is to determine what social-demographic and psychosocial determinants can predict health related quality of life and functional status in older persons with physical disabilities and hypertension or high blood pressure?

What will I be asked to do if I agree to participate?
You will be asked to participate in an interview with the fieldworker. The fieldworker will ask you questions from 3 surveys. These questions will be about your quality of life, your current health, your environment and social relationships, how you cope with daily life activities and your mental health. The interview will last about 40 minutes.

Would my participation in this study be kept confidential?
We will do our best to keep your personal information confidential. To help protect your confidentiality your date of birth will be used instead of your name to link your survey to your identity. A code in the form of your date of birth will be placed on the surveys. Through the use of a database with your previous results, the researcher will be able to link your survey to your identity. Only the researcher will have access to this database. All the information you provide will captured on a password protected computer that only the researcher will have access to. If we write a report or article about this research project, your identity will be protected to the maximum extent possible.

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In accordance with legal requirements and/or professional standards, we will disclose to the appropriate individuals and/or authorities information that comes to our attention concerning child abuse or neglect or potential harm to you or others.

What are the risks of this research?
Some questions will be asked about your emotional or psychological state and may make you feel uncomfortable. Other than these there are no other known risks associated with you participating in this research project.

What are the benefits of this research?
This research is not designed to help you personally, but the results may help the investigator learn more about how different aspects of elderly people's lives can predict their quality of life and functional status if they have high blood pressure or physical disabilities. We hope that, in the future, other people might benefit from this study thereby preventing older people from getting sick.

Do I have to be in this research and may I stop participating at any time?
Your participation in this research is completely voluntary. You may choose nt to take part at all. If you decide to participate in this research, you may stop participating at any time without providing a reason for doing so. The fieldworker may also discontinue the interview should they observe you are not able to answer the questions at this point in time.

What if I have questions?
This research is being conducted by Mr Mario Clayford at the University of the Western Cape. If you have any questions about the research study itself, please contact Mario at 87 Plein street, Plein Park building, Cape Town, 8000. Tel 021 466 7829, or mclayford@gmail.com.

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

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Dean of the Faculty of Community and Health Sciences:
Prof Jose Frantz
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This research has been approved by the University of the Western Cape's Senate Research Committee and Ethics Committee.

A WHO Collaborating Centre for Research and Training in Human Resources for Health

UNIVERSITY of the WESTERN CAPE

A place of quality, a place to grow, from hope to action through knowledge

Appendix C: Information sheet isiXhosa

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INFORMATION SHEET
Uxwebhu lweenkcukacha

Isihloko: Uqikelelo lwempilo kubantu abadala abaphila nesifo sokunyuka kwegazi (High Blood Pressure) abahlala emaphandleni nasedolophini

Uphando lungantoni na?
Olu phando luqhutywa ngu Mario Clayford ophuma kwi Dyunivesithi Yasentshona Koloni. Siyakumema ukuba uthabathe inkxaxheba njengoko wawenze ngako kuphando okuthiwa yi Pure study olwaqala ngonyaka ka 2009. Injongo yolu phando kukuvavanya indlima edlalwa yindawo ohlala kuyo nezinto ezikungqongileyo kwimeko yempilo kubantu abadala abakhubazekileyo nabaphila nesifo segazi elinyukileyo (High Blood Pressure).

Yintoni endizakuyibuzwa malunga nolu phando?
Uyakucelwa uphendule imibuzo kumntu oqashiweyo kolu phando (fieldworker). Lo msebenzi uzokubuza imibuzo. Le mibuzo iqondene nezimvo zakho malunga nempilo yakho, indawo ohlala kuyo kwakunye nendlela oziva ngayo. Udliwano ndlebe luzothatha malunga ne 40 minutes.

Ingaba iimpendulo zam kolu phando zizogcinwa zingapapashwa kusini na?
Sizokwenza ngandlela zonke ukuba zingapapashwa izimvo zakho. Ukukhusela ukwaziwa kwakho; sosebenzisa imini yakho yokuzalwa kuphela ukwenzela ukuba igama lakho likhuseleke.

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Inumba (code) yakho izakusetyenziswa kulo lonke oluvavanyo. Zonke iimpendulo zakho zohlala ziselukhuselweni ngokusebenzisa icode ezifihlakeleyo kwenzelwa abantu bangakwazi uzifumana iimpendulo zakho kwi computer.

Ukhona umgcipheko wokuthabatha inxaxheba kolu phando?
Eminye imibuzo malunga nesimo sakho sempilo enokubuzwa inokuthi ikwenze ungakhuleleki kakuhle. Kodwa qiniseka ukuba akukho ngxaki onozifumana ukuyo ngokuthabatha inxaxheba koluphando.

Yintoni na inzuzo yam ngoluphando?
Ayikho sipho ozokuthi usifumane ngokuthatha inxaxheba kolu phandlo. Kodwa iziphumo zalo zingaluncedo ingakumbi kwabantu abadala abaphila nesigulo segali eliphezulu

Kunyanzelekile na ukuba ndithathe inxaxheba kolu phando, ndingakwazi na ukuphuma xa sele ndiqalile?
Ukunizinikela kwakho kolu phando akunyanzelekanga. Ungakhetha ukuphuma nanini na ufuna ngaphandle kokuniika izizathu ezithe zakwenza ukuba wenze njalo.

Ukuba ndinemibuzo mayela nolu phando, ndingenza njani?
Olu phando lwenziwa ngu Mario Clayfort ophuma kwi Dyuniversiti yeNtshona Koloni. Ukuba uthe wanezinto ongaziqondiyo, funa ulwazi kwezinkcukacha zilandelayo:
87 Plein street, Plein Park building, Cape Town, 8000. Tel 021 466 7829, okanye mclayford@gmail.com.

Usenokwazi ufumana ulwazi oluphangaleleyo kwezi nkcukacha zilandelayo:

Umphathi:
Prof Helene Schneider
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Olu phando lugunyazizwe lisebe ekuthiwa yi Senate Research Committee and Ethics Committee yase Dyunivesithi YeleNtshona Koloni

Appendix D: Consent form English

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CONSENT FORM

Title of Research Project: Investigating predictors of Health-Related Quality of Life and Functional Status in middle to older adults with hypertension in a selected urban community

The study has been described to me in language that I understand and I freely and voluntarily agree to participate.

My questions about the study have been answered. I understand that my identity will be kept confidential and will not be disclosed, and that I may withdraw from the study at any time without giving a reason and this will not negatively affect me in any way.

Participant's name……..

Participant's signature……..

Witness……

Date……

Appendix E: Consent form isiXhosa

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sivumelwano

Isihloko soluphando:

Uqikelelo lwempilo kubantu abadala abaphila nesifo sokunyuka kwegazi (High Blood Pressure) abahlala emaphandleni nasedolophini

Olu phando lucaciswe ngolwimi oluvakalayo kwaye ndiyavuma ukuthabatha inxaxheba ngokuvakalisa izimvo zam.

Imibuzo ebendinayo iphendulwe ngendlela ephandle necacileyo. Ndiyaqonda ukuba iinkcukacha zam aziyi kushicilelwa ngaphandle kwemvume yam kwaye ndiyaqonda ukuba ndingalumisa uphando nangaliphina ixesha ndifuna kwaye isigqibo sam asisayi kundifaka engxakini nangayiphina indlela

Igama lakho .....

Isignitsha yakho.....

Isignitsha yengqina lakho..... **Date**.....

Appendix F: English Questionnaire

1. Name: _____ Surname: _____ Date: _____

2. DOB:

Y	Y	Y	Y	M	M	D	D

3. Sex: Female ☐ Male ☐

4. Marital status

	Never married		Divorced		Widowed
	Currently married		Separated		Common law

5. What level of formal education have you completed?

	None		Secondary/high school		College/university
	Primary		Trade school		Unknown

6. Are you currently employed? Yes ☐ No ☐

7. Have you stopped working due to old age? Yes ☐ No ☐

8. Have you stopped working due to illness? Yes ☐ No ☐

9. Current disability:

Do you have any problems using your fingers to grasp or handle?	Yes	No
Do you have trouble bending down and picking up an object from the floor?	Yes	No
Do you require a walking stick/cane/walker to move about?	Yes	No
Do you have any trouble reading or seeing the individual grains of rice Corn on your plate? (with glasses worn)	Yes	No
Do you have trouble seeing a person from across the room? (12 feet/3.5 meters (with glasses worn)	Yes	No
Do you have trouble speaking and being understood?	Yes	No
Do you have trouble hearing what is being said in a normal conversation?	Yes	No

8. Are you a member of the following? No Yes

1. Self help group, Co-operative, social club, Sports club, ☐ ☐
2. Religious group(church etc) ☐ ☐
3. Other_____

9. **In a difficult situation, whose help can you count on from?**

(i) Civic organizations_____

☐ None ☐ little ☐ moderate/average ☐ a great deal

(ii) Religious organizations_____

☐ None ☐ little ☐ moderate/average ☐ a great deal

10 Have you experienced any of the following in the last 12 months?

		Yes	No	No response
1	Loss of a job			
2	Retirement			
3	Loss of crop/business failure			
4	Household break in			
5	Marital separation/divorce			
6	Other major intra-family conflict			
7	Major personal injury or illness			
8	Violence			
9	Armed conflict/war			
10	Death of a spouse			
11	Death/major illness of close family			
12	Other major stress			
13	Wedding of new family member			
14	New job			
15	Birth in the family			
16	Separation in the family			
17	Unavailability of food			

11 Stress is defined as feeling irritable or filled with anxiety, or as having sleeping difficulties as a result of conditions at work or at home.

		No response	Never	Some	Several periods	Permanent stress
I	How often have you felt stressed at work in the last 12 months?					
II	How often have you felt stress at home in the last 12 months?					

12. What level of financial stress have you felt in the last 12 months?

	No response		Little/none		Moderate		High/severe

13. During the past twelve months, was there ever a time when you felt sad, blue, or depressed for two weeks or more in a row?

No Yes → If yes, during those time, did you

		No response	Yes	No
1	Lose interest in most things like hobbies, work or activities that usually give you pleasure?			
2	Feel tired or low on energy?			
3	Gain or lose weight?			
4	Have trouble falling asleep?			
5	Have trouble concentrating?			
6	Think a lot about death? (either your own or someone else)			
7	Feel down on yourself, no good or worthless?			

The SF 36 V2

Your Health and Well-Being

This questionnaire asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. ***Thank you for completing this survey!***

For each of the following questions, please mark an ☒ in the one box that best describes your answer.

Read carefully: Ask if you should read in isiXhosa unclear

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

2. <u>Compared to one year ago</u>, how would you rate your health in general <u>now</u>?

Much better now than one year ago	Somewhat better now than one year ago	About the same as one year ago	Somewhat worse now than one year ago	Much worse now than one year ago
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

		Yes, limited a lot	Yes, limited a little	No, not limited at all
a	Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports	☐ 1	☐ 2	☐ 3
b	Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	☐ 1	☐ 2	☐ 3
c	Lifting or carrying groceries	☐ 1	☐ 2	☐ 3
d	Climbing several flights of stairs	☐ 1	☐ 2	☐ 3
e	Climbing one flight of stairs	☐ 1	☐ 2	☐ 3
f	Bending, kneeling, or stooping	☐ 1	☐ 2	☐ 3
g	Walking more than a kilometre	☐ 1	☐ 2	☐ 3
h	Walking several hundred metres	☐ 1	☐ 2	☐ 3
i	Walking one hundred metres	☐ 1	☐ 2	☐ 3
j	Bathing or dressing yourself	☐ 1	☐ 2	☐ 3

3 The following questions are about activities you might do during a typical day. Does <u>your health now limit you</u> in these activities? If so, how much?

Don't forget to ask How much?

4. During the <u>past 4 weeks</u>, how much of the time have you had any of the following problems with your work or other regular daily activities <u>as a result of your physical health</u>?

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a Cut down on the <u>amount of time</u> you spent on work or other activities	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b <u>Accomplished less</u> than you would like	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c Were limited in the <u>kind</u> of work or other activities	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d Had <u>difficulty</u> performing the work or other activities (for example, it took extra effort)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

5. During the <u>past 4 weeks</u>, how much of the time have you had any of the following problems with your work or other regular daily activities <u>as a result of any emotional problems</u> (such as feeling depressed or anxious)?

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a Cut down on the <u>amount of time</u> you spent on work or other activities	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b <u>Accomplished less</u> than you would like	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c Did work or other activities <u>less carefully than usual</u>	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

6. During the <u>past 4 weeks</u>, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

7. How much <u>bodily</u> pain have you had during the <u>past 4 weeks</u>?

None	Very mild	Mild	Moderate	Severe	Very severe
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

8. During the <u>past 4 weeks</u>, how much did <u>pain</u> interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

9. These questions are about how you feel and how things have been with you <u>during the past 4 weeks</u>. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the <u>past 4 weeks</u>…

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a Have you felt full of life?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b Have you been very nervous?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c Have you felt so down in the dumps that nothing could cheer you up?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

d Have you felt calm and peaceful? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

e Have you had a lot of energy? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

f Have you felt downhearted and depressed? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

g Have you felt worn out? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

h Have you been happy? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

i Have you felt tired? ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

10. During the <u>past 4 weeks</u>, how much of the time has your <u>physical health or emotional problems</u> interfered with your social activities (like visiting friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

11. How TRUE or FALSE is <u>each</u> of the following statements for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
a I seem to get sick a little easier than other people	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b I am as healthy as anybody I know	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c I expect my health to get worse	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d My health is excellent	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Instructions to Subjects

Read to the respondent

"The following statements deal with reactions you may have to various situations. Indicate how true each of these statements is depending on how you feel about the situation. Do this by checking the most appropriate box."

_____

Proactive Coping Inventory Items by Scale

1= Not at all true; 2 = Barely true; 3 = Somewhat true; 4 = Completely true

PROACTIVE COPING SCALE : **1= Not at all true; 2 = Barely true; 3 = Somewhat true; 4 = Completely true**					
1	I am a "take charge" person.	1	2	3	4
2	I try to let things work out on their own. (-)	1	2	3	4
3	After attaining a goal, I look for another, more challenging one.	1	2	3	4
4	I like challenges and beating the odds.	1	2	3	4
5	I visualise my dreams and try to achieve them.	1	2	3	4
6	Despite numerous setbacks, I usually succeed in getting what I want.	1	2	3	4
7	I try to pinpoint what I need to succeed.	1	2	3	4
8	I always try to find a way to work around obstacles; nothing really stops me.	1	2	3	4
9	I often see myself failing so I don't get my hopes up too high. (-)	1	2	3	4
10	When I apply for a position, I imagine myself filling it.	1	2	3	4
11	I turn obstacles into positive experiences.	1	2	3	4
12	If someone tells me I can't do something, you can be sure I will do it.	1	2	3	4
13	When I experience a problem, I take the initiative in resolving it.	1	2	3	4
14	When I have a problem, I usually see myself in a no-win situation. (-)	1	2	3	4

REFLECTIVE COPING SCALE: 1= Not at all true; 2 = Barely true; 3 = Somewhat true; 4 = Completely true					
1	I imagine myself solving difficult problems.	1	2	3	4
2	Rather than acting impulsively, I usually think of various ways to solve a problem.	1	2	3	4
3	In my mind I go through many different scenarios in order to prepare myself for different outcomes.	1	2	3	4
4	I tackle a problem by thinking about realistic alternatives.	1	2	3	4
5	When I have a problem with my co-workers, friends, or family, I imagine beforehand how I will deal with them successfully.	1	2	3	4
6	Before tackling a difficult task I imagine success scenarios.	1	2	3	4
7	I take action only after thinking carefully about a problem.	1	2	3	4
8	I imagine myself solving a difficult problem before I actually have to face it.	1	2	3	4
9	I address a problem from various angles until I find the appropriate action.	1	2	3	4
10	When there are serious misunderstandings with co-workers, family members or friends, I practice before how I will deal with them.	1	2	3	4
11	I think about every possible outcome to a problem before tackling it.	1	2	3	4

STRATEGIC PLANNING SCALE: 1= Not at all true; 2 = Barely true; 3 = Somewhat true; 4 = Completely true					
1	I often find ways to break down difficult problems into manageable components.	1	2	3	4
2	I make a plan and follow it.	1	2	3	4
3	I break down a problem into smaller parts and do one part at a time.	1	2	3	4
4	I make lists and try to focus on the most important things first.	1	2	3	4
PREVENTIVE COPING SCALE: 1= Not at all true; 2 = Barely true; 3 = Somewhat true; 4 = Completely true					
1	I plan for future eventualities.	1	2	3	4
2	Rather than spending every cent I make, I like to save for a rainy day.	1	2	3	4
3	I prepare for adverse events.	1	2	3	4
4	Before disaster strikes I am well-prepared for its consequences.	1	2	3	4

5	I plan my strategies to change a situation before I act.	1	2	3	4
6	I develop my job skills to protect myself against unemployment.	1	2	3	4
7	I make sure my family is well taken care of to protect them from adversity in the future.	1	2	3	4
8	I think ahead to avoid dangerous situations.	1	2	3	4
9	I plan strategies for what I hope will be the best possible outcome.	1	2	3	4
10	I try to manage my money well in order to avoid being destitute in old age.	1	2	3	4
INSTRUMENTAL SUPPORT SEEKING SCALE: 1= Not at all true; 2 = Barely true; 3 = Somewhat true; 4 = Completely true					
1	When solving my own problems other people's advice can be helpful.	1	2	3	4
2	I try to talk and explain my stress in order to get feedback from my friends.	1	2	3	4
3	Information I get from others has often helped me deal with my problems.	1	2	3	4
4	I can usually identify people who can help me develop my own solutions to problems.	1	2	3	4
5	I ask others what they would do in my situation.	1	2	3	4
6	Talking to others can be really useful because it provides another perspective on the problem.	1	2	3	4
7	Before getting messed up with a problem I'll call a friend to talk about it.	1	2	3	4
8	When I am in trouble I can usually work out something with the help of others.	1	2	3	4
EMOTIONAL SUPPORT SEEKING SCALE: 1= Not at all true; 2 = Barely true; 3 = Somewhat true; 4 = Completely true					
1	If I am depressed I know who I can call to help me feel better.	1	2	3	4
2	Others help me feel cared for.	1	2	3	4
3	I know who can be counted on when the chips are down.	1	2	3	4
4	When I'm depressed I get out and talk to others.	1	2	3	4
5	I confide my feelings in others to build up and maintain close relationships.	1	2	3	4
AVOIDANCE COPING SCALE: 1= Not at all true; 2 = Barely true; 3 = Somewhat true; 4 = Completely true					
1	When I have a problem I like to sleep on it.	1	2	3	4
2	f I find a problem too difficult sometimes I put it aside until I'm ready to deal with it.	1	2	3	4
3	When I have a problem I usually let it simmer on the back burner for a while.	1	2	3	4

WHOQOL-BREF SCALE: Quality of life scale

"This assessment asks how you feel about **your quality of life, health, or other areas of your life**. Please answer all the **questions. If you are unsure about which response to give to a question, please choose the one that appears most** appropriate. This can often be your first response."

Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life in the last **two weeks.**

Please read each question aloud, ask the respondents to assess their feelings, and circle the number on the scale for each question the respondent gives.

How would you rate your quality of life?	**Very poor**	**Poor**	**Neither poor nor good**	**Good**	**Very good**
	1	2	3	4	5

How satisfied are you with your health?	**Very dissatisfied**	**Dissatisfied**	**Neither satisfied nor dissatisfied**	**Satisfied**	**Very satisfied**
	1	2	3	4	5

The following questions ask about how much you have experienced certain things in the last two weeks.

To what extent do you feel that physical pain prevents you from doing what you need to do?	**Not at all**	**A little**	**A moderate amount**	**Very much**	**An extreme amount**
	1	2	3	4	5
How much do you need any medical treatment to function in your daily life?	1	2	3	4	5
How much do you enjoy life?	1	2	3	4	5
To what extent do you feel your life to be meaningful?	1	2	3	4	5

	Not at all	A little	A moderate amount	Very much	An extreme amount
How well are you able to concentrate?	1	2	3	4	5
How safe do you feel in your daily life?	1	2	3	4	5
How healthy is your physical environment?	1	2	3	4	5
Do you have enough energy for everyday life?	1	2	3	4	5
Are you able to accept your bodily appearance?	1	2	3	4	5
Have you enough money to meet your needs?	1	2	3	4	5
How available to you is the information that you need in your day-to-day life?	1	2	3	4	5
To what extent do you have the opportunity for leisure activities?	1	2	3	4	5

How well are you to get around?	Very poor	Poor	Neither poor nor good	Good	Very good
	1	2	3	4	5

	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
How satisfied are you with your sleep?	1	2	3	4	5

How satisfied are you with your ability to perform your daily living activities?	1	2	3	4	5
How satisfied are you with your capacity for work?	1	2	3	4	5
	Very dissatisfied	**Dissatisfied**	**Neither satisfied nor dissatisfied**	**Satisfied**	**Very satisfied**
How satisfied are you with yourself?	1	2	3	4	5
How satisfied are you with your personal relationships?	1	2	3	4	5
How satisfied are you with your sex life?	1	2	3	4	5
How satisfied are you with the support you get from your friends?	1	2	3	4	5
How satisfied are you with the conditions of your living place?	1	2	3	4	5
How satisfied are you with your access to health services?	1	2	3	4	5
How satisfied are you with your transport?	1	2	3	4	5

The following question refers to how often you have felt or experienced certain things in the last two weeks.

How often do you have negative feelings such as blue mood, despair, anxiety, depression?	**Never**	**Seldom**	**Quite often**	**Very often**	**Always**
	1	2	3	4	5

Appendix G: isiXhosa questionnaire

Questionnaire isiXhosa (demographic sention is English)

1. Name: _____ Surname: _____ Date: _____ Age: ___

2. Participant Date Of Birth:

Y	Y	Y	Y	M	M	D	D

PURE I.D (see spreadsheet)

3. Sex: Female ☐ Male ☐

4. Marital status

	Never married		Divorced		Widowed
	Currently married		Separated		Common law

5. What level of formal education have you completed?

	None		Secondary/high school		College/university
	Primary		Trade school		Unknown

6. Are you currently employed? Yes ☐ No ☐

7. Have you stopped working due to old age? Yes ☐ No ☐

8. Have you stopped working due to illness? Yes ☐ No ☐

9. Current disability:

Do you have any problems using your fingers to grasp or handle?	Yes	No
Do you have trouble bending down and picking up an object from the floor?	Yes	No
Do you require a walking stick/cane/walker to move about?	Yes	No
Do you have any trouble reading or seeing the individual grains of rice Corn on your plate? (with glasses worn)	Yes	No
Do you have trouble seeing a person from across the room? (12 feet/3.5 meters (with glasses worn)	Yes	No
Do you have trouble speaking and being understood?	Yes	No
Do you have trouble hearing what is being said in a normal conversation?	Yes	No

8. Are you a member of the following? No Yes

1. Self help group, Co-operative, social club, ☐ ☐

Sports club,

2. Religious group(church etc) ☐ ☐
3. Other_____

9. **In a difficult situation, whose help can you count on from?**

(i) Civic organizations_____

☐ None ☐ little ☐ moderate/average ☐ a great deal

(ii) Religious organizations_____

☐ None ☐ little ☐ moderate/average ☐ a great deal

10 Have you experienced any of the following in the last 12 months?

		Yes	No	No response
1	Loss of a job			
2	Retirement			
3	Loss of crop/business failure			
4	Household break in			
5	Marital separation/divorce			
6	Other major intra-family conflict			
7	Major personal injury or illness			
8	Violence			
9	Armed conflict/war			
10	Death of a spouse			
11	Death/major illness of close family			
12	Other major stress			
13	Wedding of new family member			
14	New job			
15	Birth in the family			
16	Separation in the family			
17	Unavailability of food			

11 Stress is defined as feeling irritable or filled with anxiety, or as having sleeping difficulties as a result of conditions at work or at home.

		No response	Never	Some	Several periods	Permanent stress
I	How often have you felt stressed at work in the last 12 months?					
II						

	How often have you felt stress at home in the last 12 months?					

12. What level of financial stress have you felt in the last 12 months?

	No response		Little/none		Moderate		High/severe

13. During the past twelve months, was there ever a time when you felt sad, blue, or depressed for two weeks or more in a row?

No Yes → If yes, during those time, did you

		No response	Yes	No
1	Lose interest in most things like hobbies, work or activities that usually give you pleasure?			
2	Feel tired or low on energy?			
3	Gain or lose weight?			
4	Have trouble falling asleep?			
5	Have trouble concentrating?			
6	Think a lot about death? (either your own or someone else)			
7	Feel down on yourself, no good or worthless?			

Impilo neNtlalo-ntle Yakho

Le mibuzo ikweli phepha ibuza izimvo zakho malunga nempilo yakho. Ezi nkcukacha ziza kunceda ekubeni kubekwe iliso kwindlela oziva ngayo nokuba ukwazi kakuhle kangakanani na ukwenza imisebenzi yakho yesiqhelo nezinye izinto oqhele ukuzenza. ***Enkosi ngokugcwalisa eli phepha lemibuzo!***

Kumbuzo ngamnye kule ilandelayo, nceda ufake olu phawu ☒ ebhokisini eyiyeyona iyichaza kakuhle impendulo yakho.

1. Ngokubanzi, ungathini xa uchaza impilo yakho? Ungathi:

Ungumqaba-qaba	Intle kakhulu	Intle	Ayintlanga kakhulu	Inkenenkene
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

2. <u>Xa kuthelekiswa nonyaka omnye ophelileyo</u>, ungathi injani ngokubanzi impilo yakho <u>ngoku</u>?

Ingcono kakhulu ngoku kunakunyaka omnye ophelileyo	Ingcono nokwana ngoku kunakunyaka omnye ophelileyo	Iphantse ibe bufana nakunyaka omnye ophelileyo	Imandundu noko ngoku kunakunyaka omnye ophelileyo	Imandundu kakhulu ngoku kunakunyaka omnye ophelileyo
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

	Ewe, iyala kakhulu	Ewe, iyala kancinci	Hayi, akukho ngxaki konke konke
a Izinto ozenzayo ezisebenzisa amandla, ezifana nokubaleka, ukuphakamisa izinto ezinzima, ukuthabatha inxaxheba kwimidlalo enzima	☐ 1	☐ 2	☐ 3
b Imisebenzi ephakathi ngobunzima efana nokutyhala itafile, ukutshayela nokusebenzisa umatshini wokucoca phantsi, ukwenza umsebenzi wasegadini okanye ukuhambahamba usolula imilenze	☐ 1	☐ 2	☐ 3
c Ukuphakamisa okanye ukuphatha igrosari	☐ 1	☐ 2	☐ 3
d Ukunyuka imigangatho emininzi yezistepsi	☐ 1	☐ 2	☐ 3
e Ukunyuka umgangatho omnye wezistepsi	☐ 1	☐ 2	☐ 3
f Ukugoba, ukuguqa okanye ukuthoba	☐ 1	☐ 2	☐ 3
g Ukuhamba ngaphezu kwekhilomitha enye	☐ 1	☐ 2	☐ 3
h Ukuhamba iimitha ezingamakhulu-khulu	☐ 1	☐ 2	☐ 3
i Ukuhamba iimitha ezilikhulu	☐ 1	☐ 2	☐ 3
j Ukuzihlamba okanye ukuzinxibisa	☐ 1	☐ 2	☐ 3

3. Le mibuzo ilandelayo ingezinto osenokuthi uzenze ngosuku oluqhelekileyo. <u>Ingaba impilo yakho iyala na ngoku</u> ukuba uzenze kakuhle ezi zinto? Ukuba ngaba kunjalo, ungathi yala kangakanani?

4. Kwezi <u>veki zine zidlulileyo</u>, lingakanani ixesha okhe wanayo neyiphi na kwezi ngxaki zilandelayo ngalo xa usenza umsebenzi wakho okanye eminye imisebenzi yemihla ngemihla oyenzayo rhoqo, <u>ngenxa yempilo yakho ngokwasemzimbeni</u>?

	Ngalo lonke ixesha	Ngamaxesha amaninzi	Ngamanye amaxesha	Ixesha elincinci	Khange ziyiphazamise nanini na ngelo xesha
	▼	▼	▼	▼	▼
a Uye wacutha <u>ubungakanani bexesha</u> olisebenzisileyo emsebenzini okanye kwezinye izinto ozenzileyo	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b <u>Uphumeze izinto</u> ezimbalwa kunezo ubunqwenela ukuziphumeza	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c Iye yakwalela impilo ekwenzeni umsebenzi <u>wohlobo oluthile</u> okanye ezinye izinto ozenzayo	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d Uye wafumanisa <u>ubunzima</u> xa usenza umsebenzi okanye ezinye izinto ozenzileyo (umzekelo, kuye kwafuneka usebenzise amandla kakhulu)	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

5. Kwezi <u>veki zine zidlulileyo</u>, lingakanani ixesha obe nayo nayiphi na kwezi ngxaki zilandelayo ngalo xa usenza umsebenzi wakho okanye ezinye izinto zemihla ngemihla ozenzayo rhoqo <u>ngenxa yeengxaki zomphefumlo</u> (ezifana nokudakumba okanye ukuxhalaba?

	Ngalo lonke ixesha	Ngamaxesha amaninzi	Ngamanye amaxesha	Ixesha elincinci	Khange ziyiphazamise nanini na ngelo xesha
a Uye wacutha <u>ubungakanani bexesha</u> olisebenzisileyo emsebenzini okanye kwezinye izinto ozenzileyo	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b <u>Uphumeze izinto</u> ezimbalwa kunezo ubunqwenela ukuziphumeza	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c Ndiwenzile umsebenzi okanye ezinye izinto <u>andacoselela kakuhle njengesiqhelo</u>	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

6. Kwezi <u>veki zine zidlulileyo</u>, ingaba iingxaki zempilo yakho ngokwasemzimbeni okanye ngokwasemphefumlweni zithe zaziphazamisa kangakanani na izinto zolonwabo oqhele ukuzenza kunye nosapho lwakho, abahlobo, abamelwane okanye amaqela?

Khange zindiphaza-mise konke konke	Zindiphaza-misile kancinci njee	Zindiphami-sile njee nokwana	Zindiphaza-misile kakhulu	Zindiphaza-misile gqitha
▼	▼	▼	▼	▼
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

7. Ingaba ububuhlungu kangakanani <u>umzimba</u> wakho kwezi <u>veki zine zidlulileyo</u>?

Ubungebuhlu-ngwanga	Ububuhlungu njee kancinci	Ububuhlungu njee	Ubuphakathi	Ububuhlungu kakhulu	Ububuhlungu gqitha
▼	▼	▼	▼	▼	▼
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

8. Kwezi <u>veki zine zidlulileyo</u>, zikuphazamise kangakanani iintlungu kumsebenzi wakho wesiqhelo (kubandakanywa umsebenzi waphandle ekhayeni nomsebenzi wendlu)?

Khange zindiphaza-mise konke konke	Zindiphaza-misile kancinci njee	Zindiphami-sile njee nokwana	Zindiphaza-mise kakhulu	Zindiphaza-misile gqitha
▼	▼	▼	▼	▼
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

9. Le mibuzo ingendlela oziva ngayo nendlela ebezingayo izinto ebomini bakho <u>kwezi veki zine zidlulileyo</u>. Ngombuzo ngamnye, nceda unike impendulo ibenye eyiyeyona isondeleyo kwindlela obuziva ngayo. Kwezi <u>veki zine zidlulileyo</u>, uye waziva ngolu hlobo ixesha elingakanani?

	Ngalo lonke ixesha	Ngamaxesha amaninzi	Ngamanye amaxesha	Ixesha elincinci	Khange ziyiphazamise nanini na ngelo xesha
a Uye waziva udlamkile na?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b Uye waziva uphakuphaku kakhulu?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c Uye waziva udakumbe kakhulu kangangokuba akukho nto ibinokukonwabisa?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d Ingaba uzive uzolile yaye unoxolo?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
e Ingaba ubunamandla kakhulu?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
f Uzive uthe khunubembe okanye udakumbile emphefumlweni?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
g Ingaba uzive uphelelwe ngamandla na?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
h Ube wonwabile na?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
i Ingaba uzive udiniwe na?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

10. Kwezi <u>veki zine zidlulileyo</u>, ingaba impilo yakho okanye <u>iingxaki zempilo yakho ngokwasemzimbeni okanye ngokwasemphefumlweni</u> zithe zaziphazamisa ixesha elingakanani na izinto ozenzayo ekuhlaleni (ezifana nokundwendwela abahlobo, izizalwane njl njl)?

Ngalo lonke ixesha	Ngamaxesha amaninzi	Ngamanye amaxesha	Ixesha elincinci	Khange ziziphazamise nanini na ngelo xesha
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

11. YINYANISO okanye ASIYONYANI kangakanani kuwe ingxelo <u>nganye</u> kwezi zilandelayo?

	Yinyaniso egqibeleleyo	Inyanisile ubukhulu becala	Andazi	Ayinyani-sanga ubukhulu becala	Asiyonyani tu
a	Ingathi mna ndigula lula kakhulu kunabanye abantu	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b	Ndisempilweni njengaye nawuphi na umntu endimaziyo.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c	Ndilindele ukuba iye isiba mbi nangaphezulu impilo yam.....	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d	Ndingumqabaqaba	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

PROACTIVE COPING SCALE (INDLELA YOKUMELANA NEZINTO NGENDLELA EDLAMKILEYO)

Imiyalelo kwimiba

Fundela lowo uzakuphendula

"Ezi ngxelo zilandelayo zimalunganendlela owenze ngayo kwiimeko ezithile othe wahlangana nazo. Bonisa ukuba zinyanise kangakanani ezi ngxelo zilandelayo oko kuxhomekeke ukuba uziva njani ngezi meko. Yenza oku ngokukhangela eyona bhokisi ifanelekileyo."

_____

Proactive Coping Inventory Items by Scale

1= Akuyonyani kwaphela; 2 = Akuyonyani nakancinci; 3 = Kuyinyani kancinci; 4 = Kuyinyani ngokupheleleyo

PROACTIVE COPING SCALE (INDLELA YOKUMELANA NEZINTO NGENDLELA EDLAMKILEYO)					
1	Ndingumntu "ozithathela kuye izinto".	1	2	3	4
2	Ndiyazama ukuba izinto ndiziyeke zizenzekele. (-)	1	2	3	4
3	Emva kokufumana oko ndizimisele ukukufumanal, ndijonga okunye okuzakundisebenzisa nangaphezulu.	1	2	3	4
4	Ndiyakuthanda ukucela umngeni nokwenza okusemandleni ukuze ndoyise	1	2	3	4
5	Ndiye ndibenemibono yamaphupha am ndize ndizame ukufikelela kuwo	1	2	3	4
6	Noba kukho amagingxi-gingxi , ndiye ndikufumane oko ndikufunayo	1	2	3	4
7	Ndiye ndijolise koko ndikufunayo ukwenzela ukuba ndiphumelele.	1	2	3	4
8	Ndisoloko ndizama ukufumana indlela yokusebenza nokuba kukho izithinteli; akukho nto indoyisayo.	1	2	3	4
9	Ndisoloko ndizibona ndingaphumeleli ngoko ke andizithembisi kakhulu (-)	1	2	3	4
10	Xa ndenze isicelo somsebeni, ndiye ndizibone sendiwenza loo msebenzi	1	2	3	4
11	Izithinteli ndiye ndizijike zibe zizinto ezakhayo.	1	2	3	4
12	Xa kukho umntu ondixelela ukuba andinakho ukuyenza into, qiniseka ukuba kukhona ndiza kuyenza.	1	2	3	4
13	Xa ndinengxaki, ndiye ndizame indlela yokuyisombulula.	1	2	3	4
14	Xa ndinengxaki, Ndiye ndizibone ndisoyisakala. (-)	1	2	3	4

REFLECTIVE COPING SCALE (INDLELA YOKUMELANA NEZINTO EZICINGISISAYO)					
1	Ndiye ndibeneengcinga apho ndizibona ndisombulula iingxaki ezinzima.	1	2	3	4
2	Kunokuba ndenze izinto ngokungxama. Ndidla ngokucinga iindlela ngeendlela zokuyisombulula.	1	2	3	4
3	Engqondweni yam ndiye ndivavanye izinto ezahlukeneyo ukwenzela ukuba ndilungele iziphumo ezahlukeneyo.	1	2	3	4
4	Ndiye ndihlasele iingxaki ngokucinga ngenye indlela elindelekileyo.	1	2	3	4
5	Xa ndinengxaki nabantu endisebenza nabo, abahlobo, okanye ifemeli, ndiye ndicinge kwangaphambi kwexesha ukuba ndizakwenza ntoni na ukwenzela ukuba ndiphumelele.	1	2	3	4
6	Phambi kokuba ndihlasele umba onzima ndiye ndibeneengcinga ngezinto ezibeyimpumelelo.	1	2	3	4
7	Ndenza into emva kokucingisisa ngengxaki.	1	2	3	4
8	Ndiye ndibeneengcinga ndisombulula ingxaki enzima phambi kokuba ndijongane nayo.	1	2	3	4

9	Ndiyivelela kumacala onke ingxaki ndide ndiyazi into emandiyenze.	1	2	3	4
10	Xa kukho ukungavisisani okunzima nabantu endisebenza nabo, amaulungu efemeli okanye abahlobo, ndiye ndizilungiselele indlela endizakubavelela ngayo.	1	2	3	4
11	Ndiye ndicinge ngeziphumo ezinokubakhona kwingxaki phambi kokuba ndiyihlasele.	1	2	3	4

STRATEGIC PLANNING SCALE (INDLELA EYILWE NGOBUCHULE YOKUMETA IZINTO)					
1	Ndisoloko ndifuna iindlela zokucalucalula iingxaki ezinzima zibe ngamalungu anokulawuleka.	1	2	3	4
2	Ndiye ndenze uyilo (iplani) ndilulandele emva koko.	1	2	3	4
3	Ndiye ndiyicalucalule ingxaki ibengamalungu amancinci ndenze indawana encinci ngexesha.	1	2	3	4
4	Ndiye ndenze uluhlu ndize ndiqale ngoko kubalulekileyo kuqala.	1	2	3	4
PREVENTIVE COPING SCALE (INDLELA ETHINTELAYO YOKUMETA IZINTO)					
1	Ndiyilela oko kunokwenzeka kwixa elizayo kwangethuba.	1	2	3	4
2	Endaweni yokuchitha (yokusebenzisa) yonke imali endiyisebenzele nzima, Ndiyathanda ukulondolozela amaxesha anzima.	1	2	3	4
3	Ndilungiselela amaxesha kaxakeka.	1	2	3	4
4	Ndiyakulungisela okubi ngaphambi kokuba kwenzeke.	1	2	3	4
5	Ndilungisa ngobuchule ukutshintsha imeko ngaphambi kokuba ndenze into.	1	2	3	4
6	Ndibonakalisa ubuchule emsebenzini wam ukwenzela ukuba ndingaziboni ndingasaphangeli.	1	2	3	4
7	Ndiye ndiqinisekise ukuba ifemeli yam inakekelwe ukuyikhusela kumaxesha kaxakeka.	1	2	3	4
8	Ndicingela amaxesha asezayo ukuthintela iimeko ezinobungozi.	1	2	3	4
9	Ndilungisa izinto ngobuchule ndithembe ukuba kuyakubakho iziphumo ezincomekayo.	1	2	3	4
10	Ndizama ukuyilawula ngendlela efanelekileyo imali yam ukwenzela ukuba ndingahlupheki ebudaleni.	1	2	3	4
INSTRUMENTAL SUPPORT SEEKING SCALE (INDLELA YOKUSEBENZISA IZIXHOBO EZILUNCEDO)					
1	Xa ndisombulula iingxaki zam iingcebiso zabanye abantu ziba luncedo.	1	2	3	4
2	Ndiye ndizame ukuthetha ndicacise xa ndinzinyelwe engqondweni ukwenzela ukuba abahlobo bam bandinike iimpendulo.	1	2	3	4
3	Ulwazi endilufumanayo kwabanye abantu luye lundincede ndikwazi ukujongana nezam iingxaki.	1	2	3	4
4	Ndiqhele ukubakhetha abantu abanokundinceda ndiphuhlise iimpendulo kwiingxaki zam.	1	2	3	4
5	Ndiye ndibabuze abanye ukuba bangenza ntoni na xa benokuba kwimeko leyo ndikuyo.	1	2	3	4
6	Ukuthetha nabanye abantu kuyanceda kuba kunika omnye umbono kwingxaki leyo.	1	2	3	4
7	Phambi kokuba ndixakane nengxaki ndifowunela umhlobo ndithethe ngengxaki leyo.	1	2	3	4
8	Xa ndisengxakini ndiqhelile ukuza necebo ngokuncediswa ngabanye abantu.	1	2	3	4
EMOTIONAL SUPPORT SEEKING SCALE (UNCEDO OLUCHUKUMISA UVAKALELO)					
1	Xa ndinxunguphele emphefumlweni ndiyazi ukuba mandinxulumane nabani na ukuze ndizive ngcono.	1	2	3	4
2	Abanye bayandinceda ndizive ndikhathalelekile	1	2	3	4
3	Ndiyazi ukuba ndingathembela ngabanina xa umoya wam usezantsi.	1	2	3	4
4	Xa dinxunguphelee ndiyaphuma ndithethe nabanye.	1	2	3	4
5	Ndiyayikhupha imbilini yam kwabo ndibathembayo ukuqinisekisa ukuba ubuhlobo benene buyaqhubeka.	1	2	3	4
AVOIDANCE COPING SCALE (INDLELA YOKUMELANA NEZINTO NGOKUZIPHEPHA)					
1	Xa ndinengxaki ndiyalala ndiyicingisise.	1	2	3	4
2	Ngamanye amaxesha xa ndiyifumanisa inzima ingxaki ndiyibekela ecaleni ndide ndikulungele ukwenza into ngayo.	1	2	3	4
3	Xa ndinengxaki ndikholisa ukuyiyeka ndiyityhalele ngasemva okwexeshana.	1	2	3	4

Quality of life scale (Uhlahlelo lohlobo lokumeta ubomi bakho)

Olu vavanyo lubuza ngendlela oziva ngayo malunga nendlela eyiyo impilo yakho**, nangezinye izinto ezingobomi bakho**. Nceda uphendule yonke **imibuzo. Ukuba awuqinisekanga ukuba mawuphendule njani, nceda ukhethe leyo uyibona iyeyona ifanelekileyo impendulo**. Ingaba yimpendulo yakho yokuqala leyo.

Nceda ukhumbule izinga okulo, amathemba, oko kukonwabisayo kunye nezikhalazo. Sifuna ukuba ucinge ngobomi bakho **kwezi veki zimbini zidlulileyo.**

Nceda ufundele ngaphandle umbuzo ngamnye, baxelele abaphenduli ukuba bazivavanye ngokufanelekileyo iimvakalelo zabo, uze wenze isangqa kwinani esikalini kumbuzo ngamnye ophendulweyo.

Ungakuthelekisa njani ukulunga kwemo yobomi bakho?	**Kubi kakhulu**	**Kubi**	**Akukubanga kwaye akulunganga**	**Kulungile**	**Kulungile kakhulu**
	1	2	3	4	5

Woneliseke njani ngempilo yakho?	**Ayonelisi kakhulu**	**Ayonelisi**	**Andinakuthi iyonelisa okanye ayonelisi**	**Iyonelisa**	**Iyonelisa kakhulu**
	1	2	3	4	5

Le mibuzo ilandelayo imalunga ngezimvo zakho kwiimeko ezithile ohlangene nazo kwiiveki ezimbini ezidlulileyo

Iintlungu zomzimba zikuthintela kangakanani ekwenzeni oko ufanele ukuba ukwenze?	**Hayi akhange**	**Kancinci**	**Kancinane nje**	**Kakhulu**	**Ngokugqithisileyo kakhulu**
	1	2	3	4	5
Luncedo lonyango olungakanani olufunayo ukuze ukwazi ukwenza imisebenzi kubomi bakho mihla le?	1	2	3	4	5
Ubonwabela kangakanani ubomi?	1	2	3	4	5
Ububona ubomi bakho bunentsingiselo yokwenene engakanani?	1	2	3	4	5

	Hayi akhange	Kancinci	Kancinci nje	Kakhulu	Ngokugqithisileyo kakhulu
Ukwazi kangakanani ukuzikisa ingqondo?	1	2	3	4	5
Ububona ubomi bakho bukhuseleke kangakanani?	1	2	3	4	5
Busempilweni kangakanani ubume bendawo yakho?	1	2	3	4	5
Unawo amandla obomi bemihla ngemihla?	1	2	3	4	5
Uyayamkela inkangeleko yomzimba wakho?	1	2	3	4	5
Unemali eyaneleyo yezinto ozifunayo?	1	2	3	4	5
Lufumaneka kangakananina ulwazi olufunayo lwemihla ngemihla?	1	2	3	4	5
Unethuba elingakananina lezinto zolonwabo?	1	2	3	4	5

Ukufumanisa kunjani ukufikelela ezindaweni?	Kukubi kakhulu	Kukubi	Kungekubanga kwaye kungalungile	Kulungile	Kulungile kakhulu
	1	2	3	4	5

	Akonelisi kakhulu	Akonelisi	Andazi nokuba kuyonelisa okanye okonelisi	Kuyonelisa	Kuyonelisa kakhulu
Woneliseke kangakanani na ngendlela olala ngayo?	1	2	3	4	5

Woneliseke kangakanani na yindlela owenza ngayo izinto zemihla ngemihla?	1	2	3	4	5
Woneliseke kangakanani yindlela okwazi ukumelana ngayo nomsebenzi?	1	2	3	4	5
Woneliseke kangakanani na ngesiqu sakho?	1	2	3	4	5
Woneliseke kangakanani na ngonxulumano nezihlobo zakho?	1	2	3	4	5
Woneliseke kangakanani na ngobomi bakho bokwabelana ngesondo?	1	2	3	4	5
Woneliseke njani na yinkxaso oyifumana kubahlobo bakho?	1	2	3	4	5
Woneliseke njani na yimo yendawo ohlala kuyo?	1	2	3	4	5
Woneliseke njani na yindlela afikeleleka ngayo amaziko ezempilo?	1	2	3	4	5
Woneliseke njani na ngesithuthi sakho	1	2	3	4	5

Lo mbuzo ulandelayo ufuna ukwazi ukuba kukangakanani na apho uye wavakakalelwa ngohlobo oluthile kwisithuba seeveki ezimbini ezidlulileyo.

Kukangakanani apho ukhe uzive ngohlobo olungalunganga njengokungaziva kamnandi, ukuba lusisi, ukuxhalaba ,unxunguphalo?	**Azange** 1	**Amaxesha ambalwa** 2	**Amaxesha amaninzi** 3	**Amaxesha amaninzi kakhulu** 4	**Ngalo lonke ixesha** 5

Appendix H: Scatterplots displaying WHOQOL-BREF environment, social relationships, physical and psychological subscales

Figure 4. 3 Environment subscale scatterplot

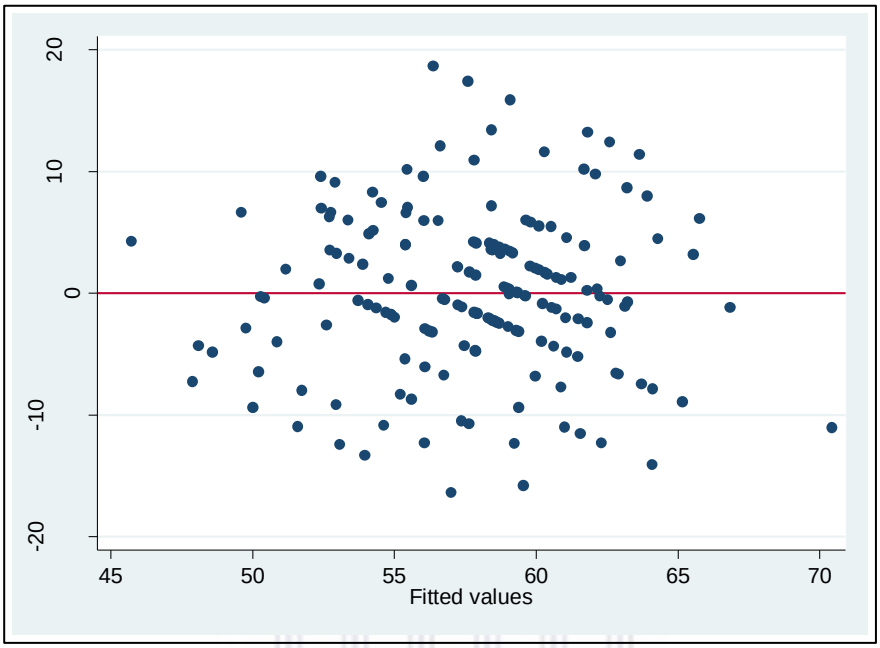


Figure 4. 4 Social Relationships subscale scatterplot

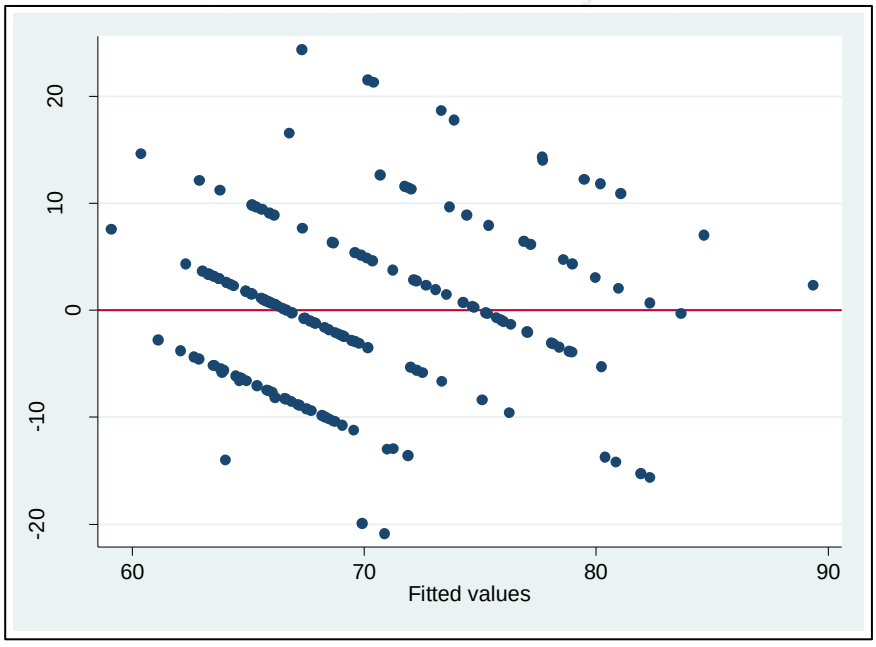


Figure 4. 5 Psychological subscale scatterplot

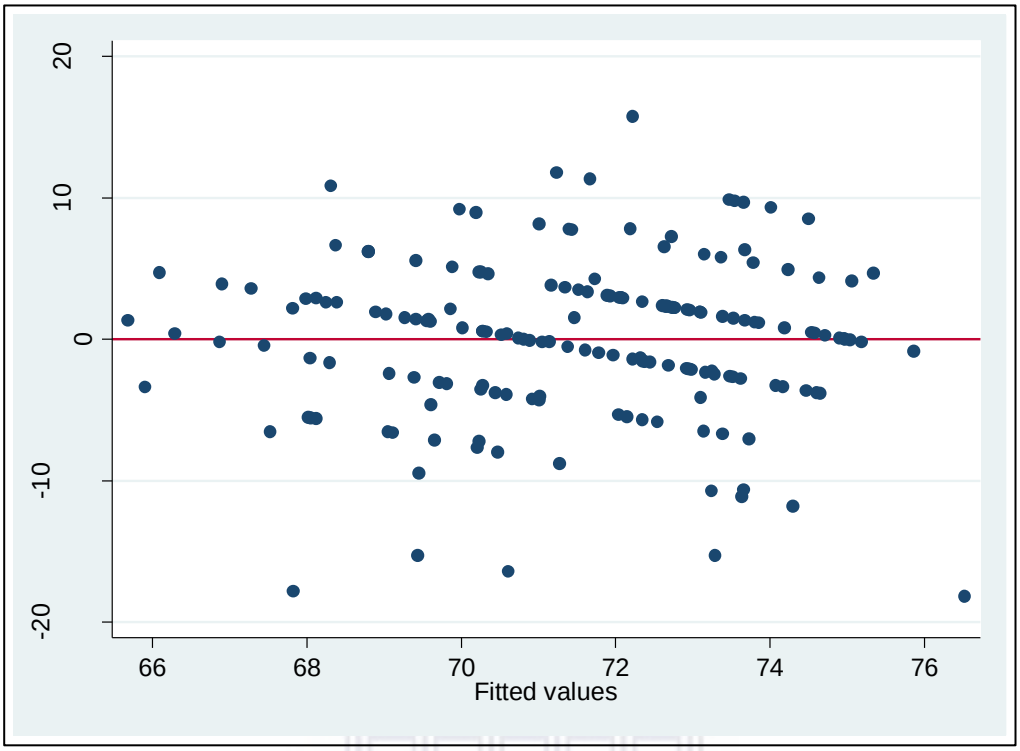
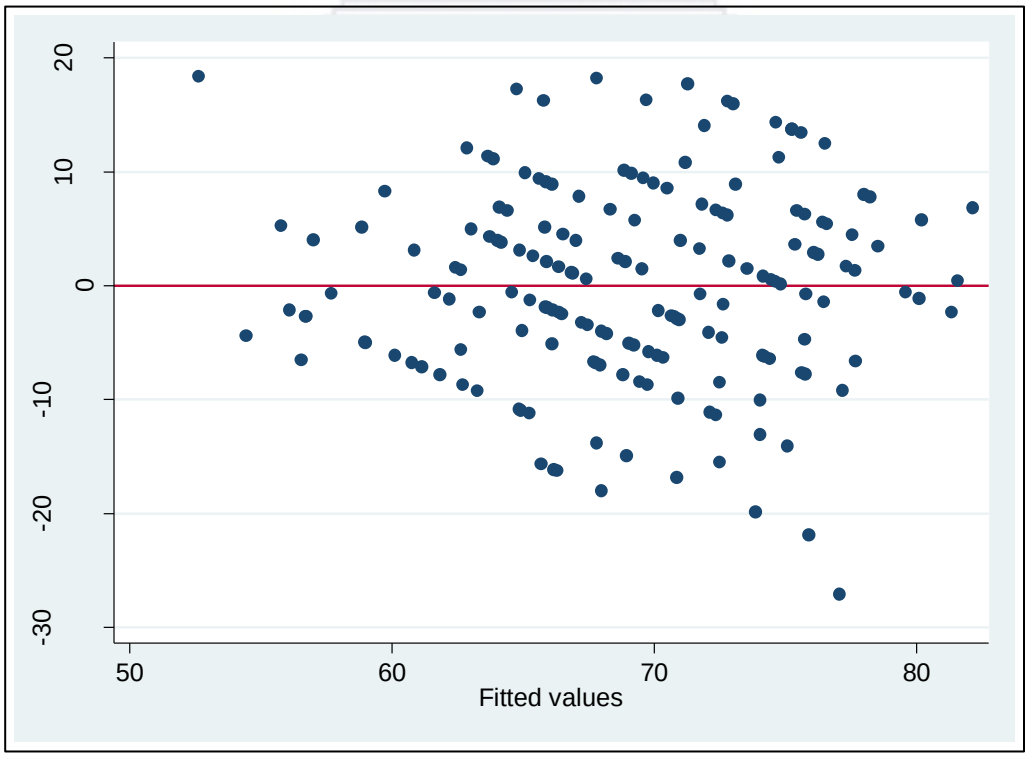


Figure 4. 6 Physical subscale scatterplot



Appendix I: Kernel density estimates and P-Plots of regression standardised residuals for WHOQOL-BREF subscales

Figure 4. 7 Environmental subscale histogram

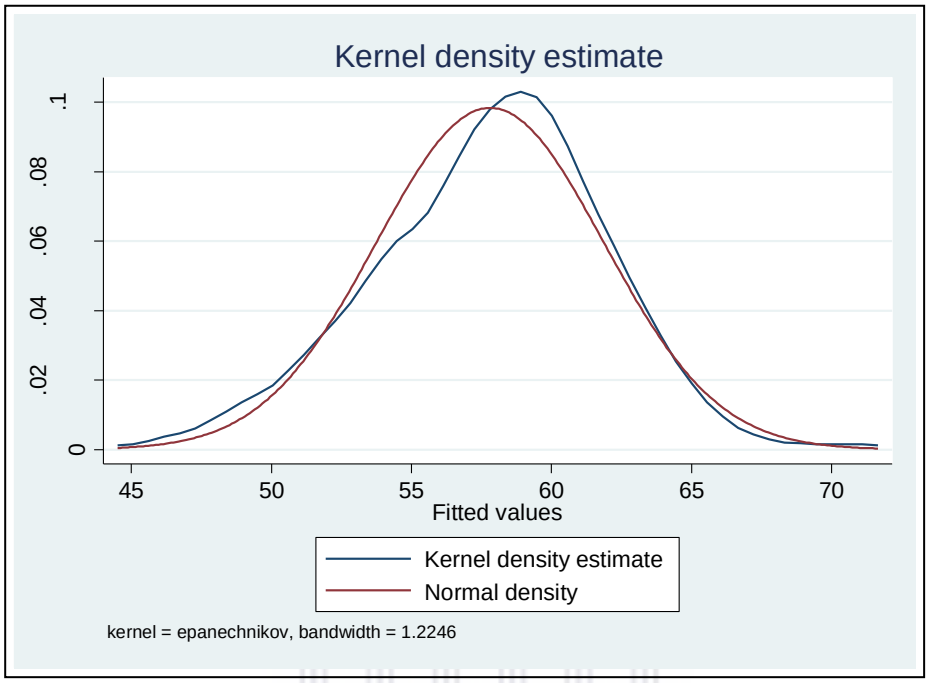


Figure 4. 8 Environmental P-P plot

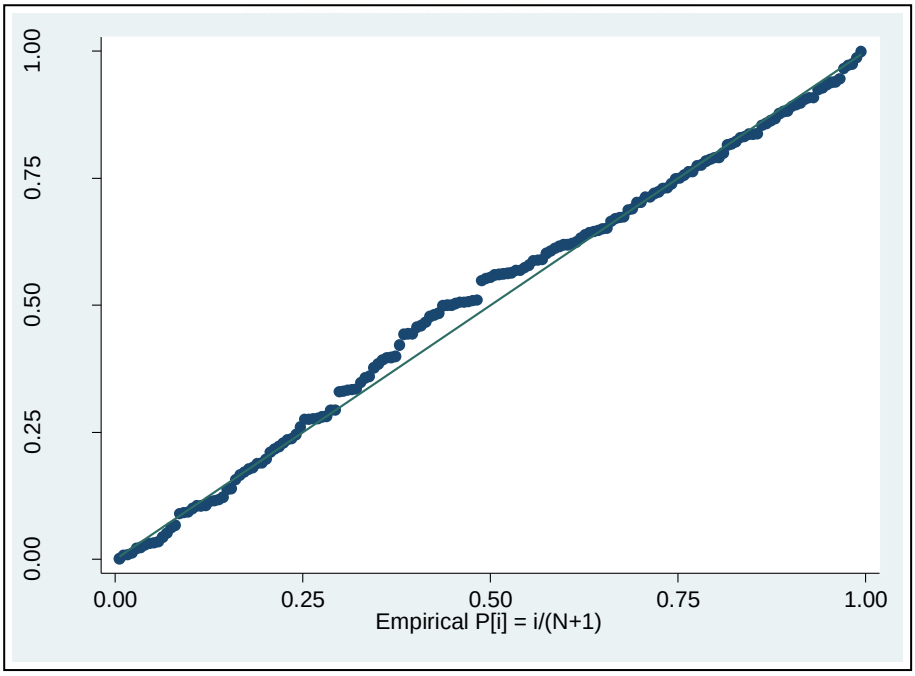


Figure 4. 9 Physical subscale histogram

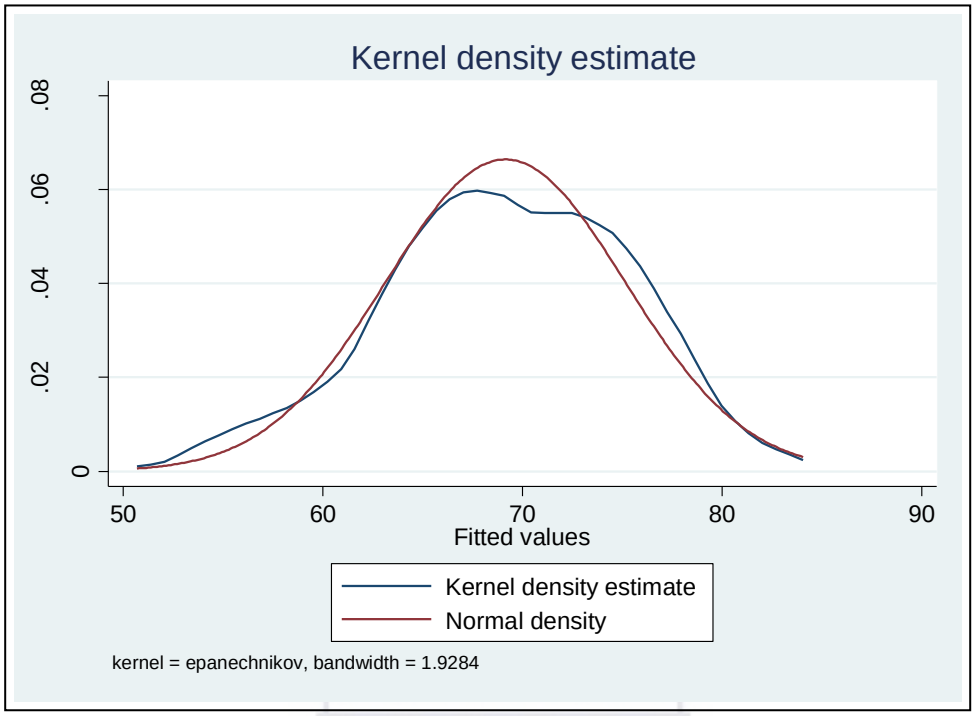


Figure 4. 10 Physical P-P plot

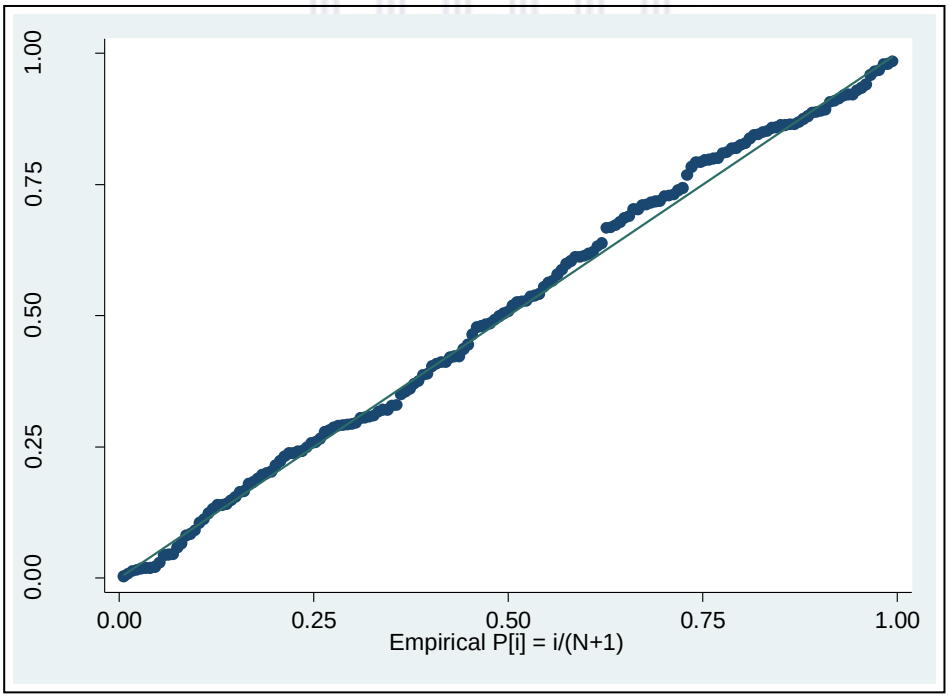


Figure 4. 11 Psychological Histogram

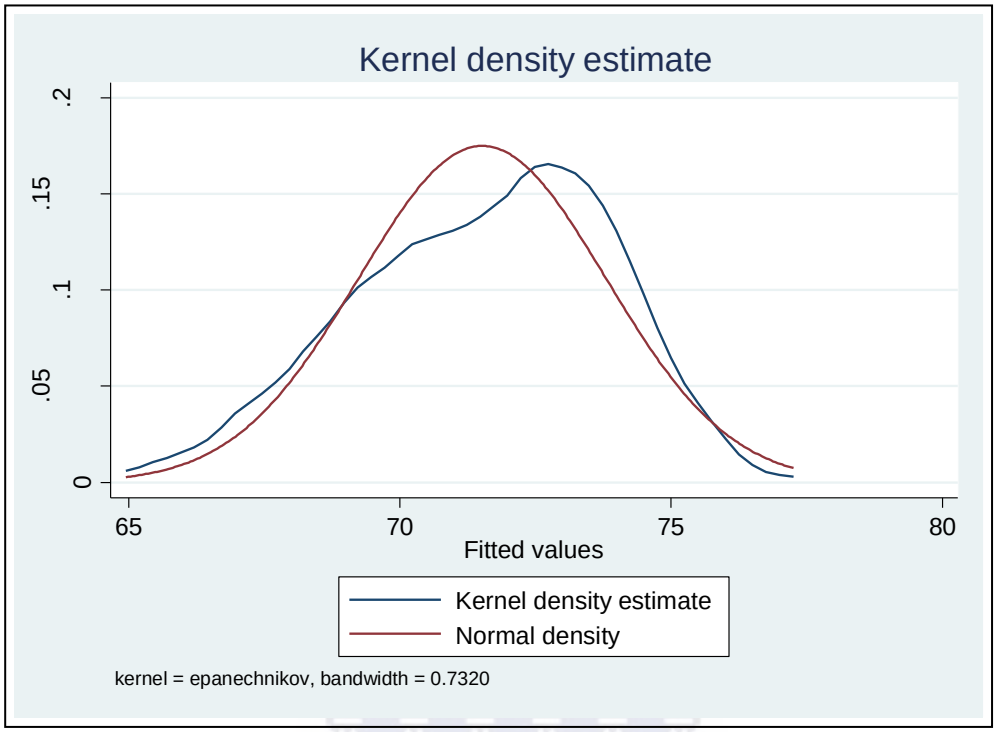


Figure 4. 12 Psychological P-P plots

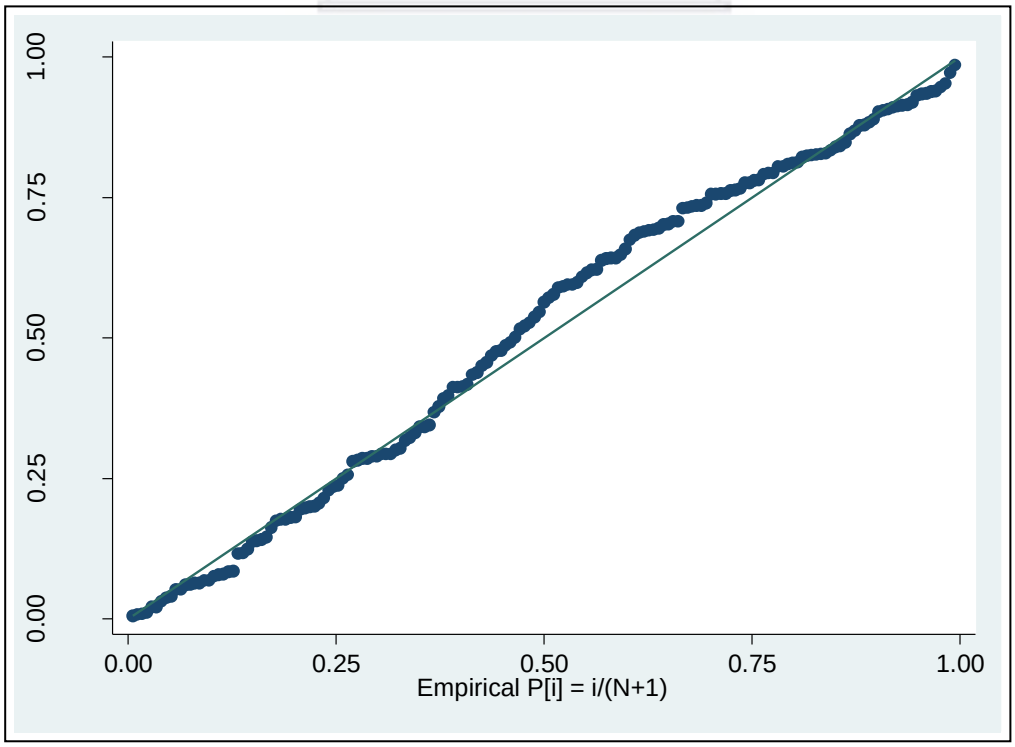


Figure 4. 13 Social Relationships histogram

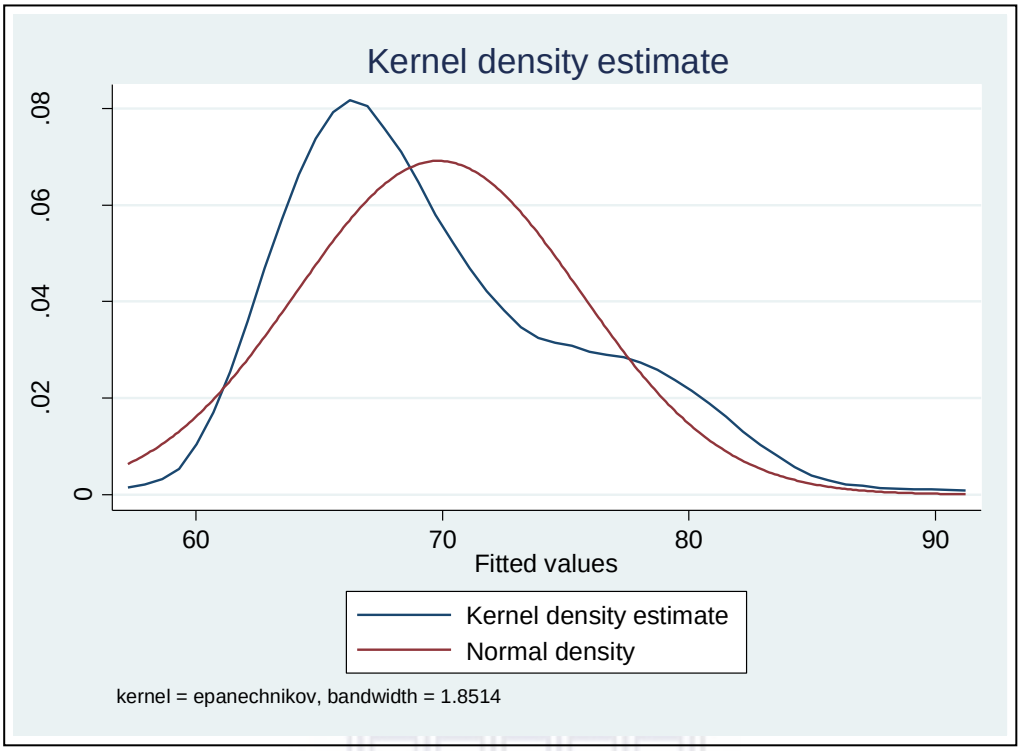
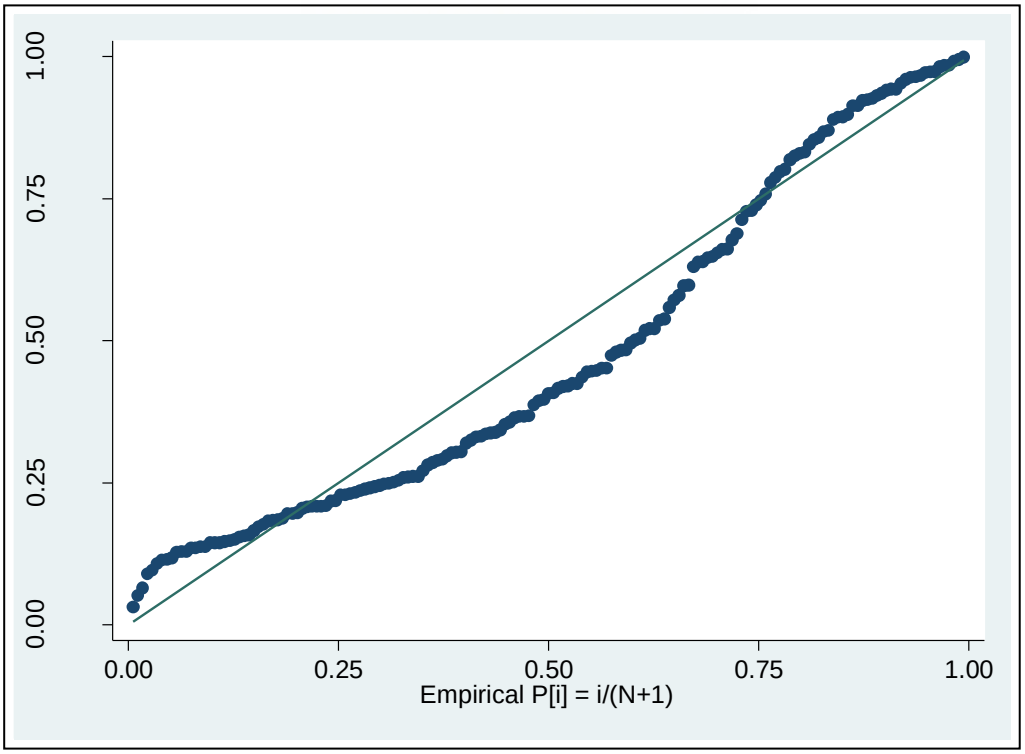


Figure 4. 14 Social Relationships P-P plots



Appendix J: Scatterplots: Functional and Physical Component summary scores

Figure 4. 15 Scatterplot of Mental Component summary score

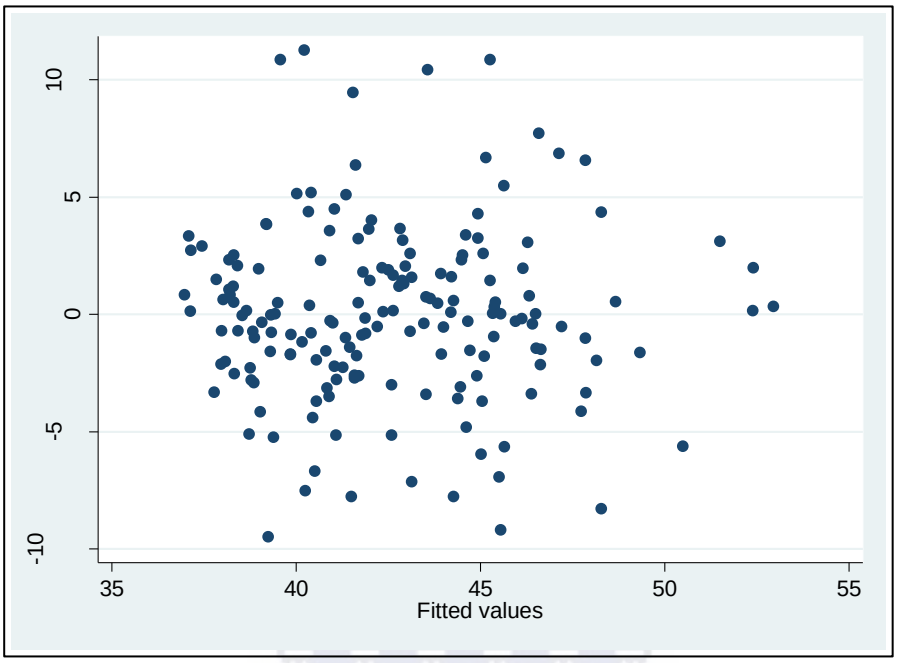


Figure 4. 16 Squared residuals of Mental functional status

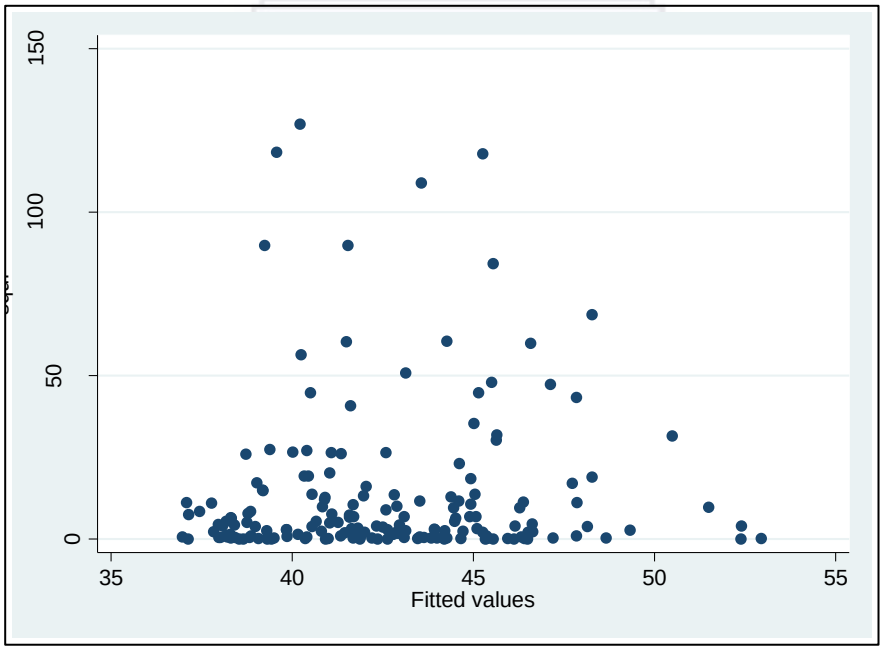


Figure 4. 17 Squared residuals of Mental functional status

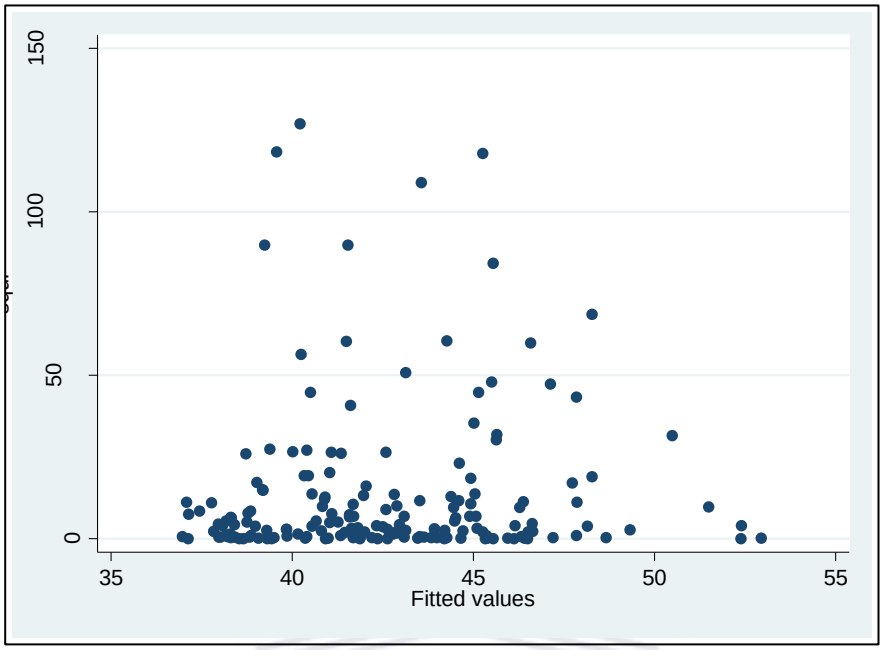


Figure 4. 18 Squared residuals of Physical functional status

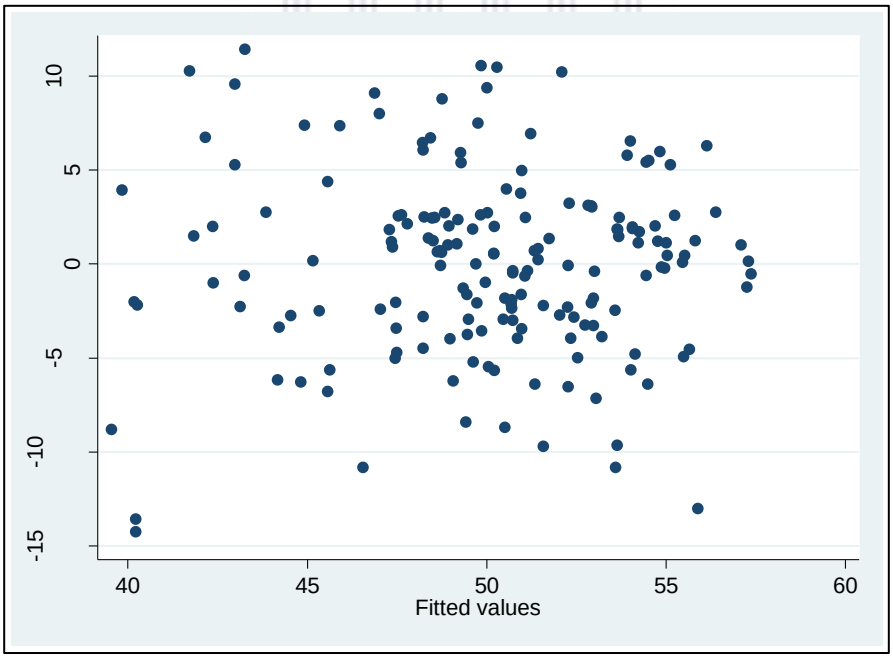
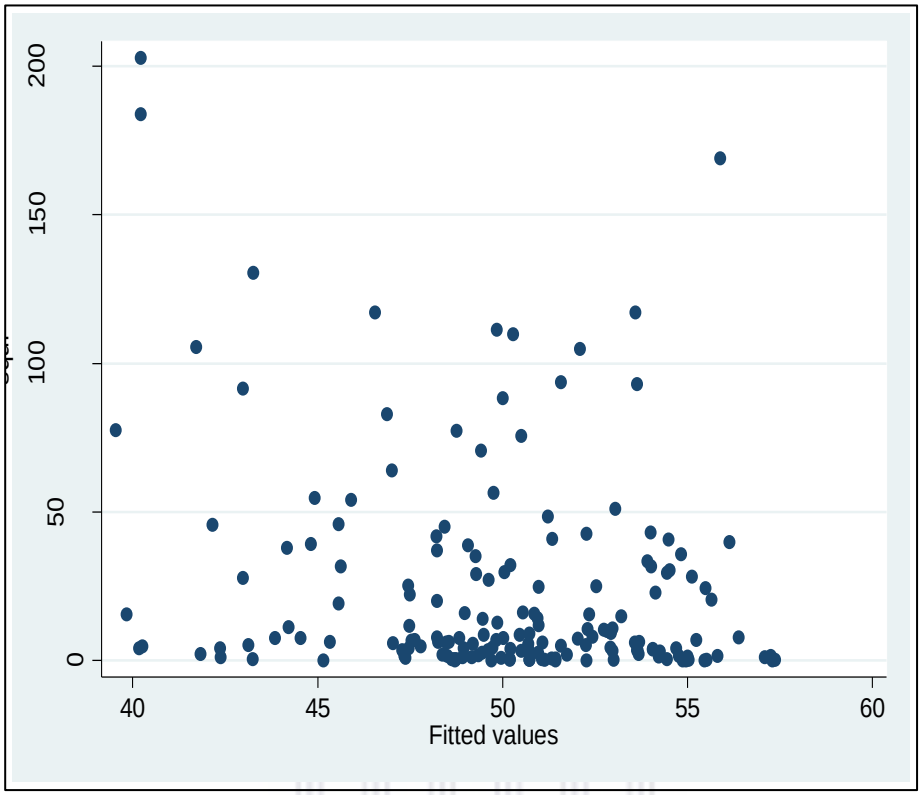


Figure 4. 19 Scatterplot of Physical functional status



Appendix K: Figure 4.18 – 4.21 Kernel density estimates and P-P Plots for Physical Functional status subscales

Figure 4. 20 Kernel density estimation of Physical functional status

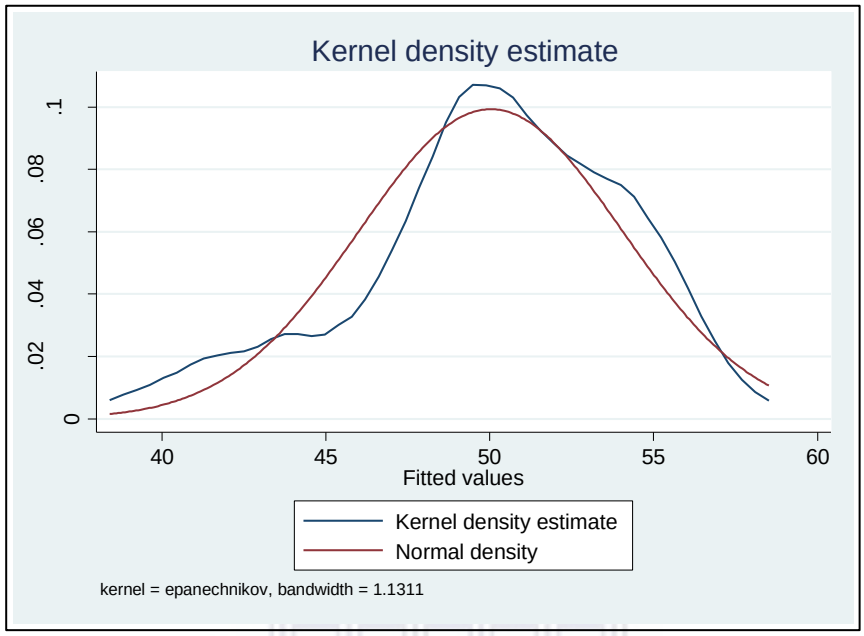


Figure 4. 21 P-P Plot of Physical functional status

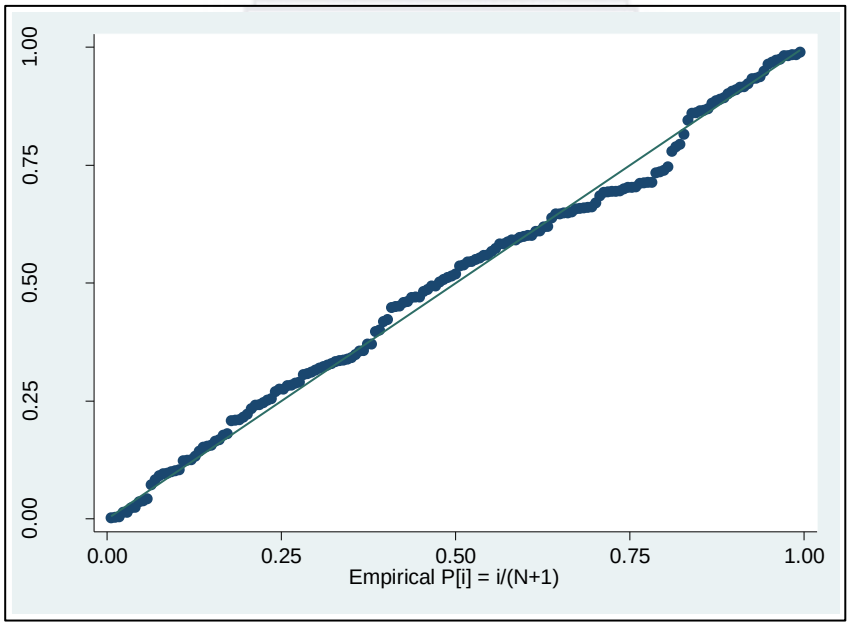


Figure 4. 22 Kernel density estimation of Mental functional status

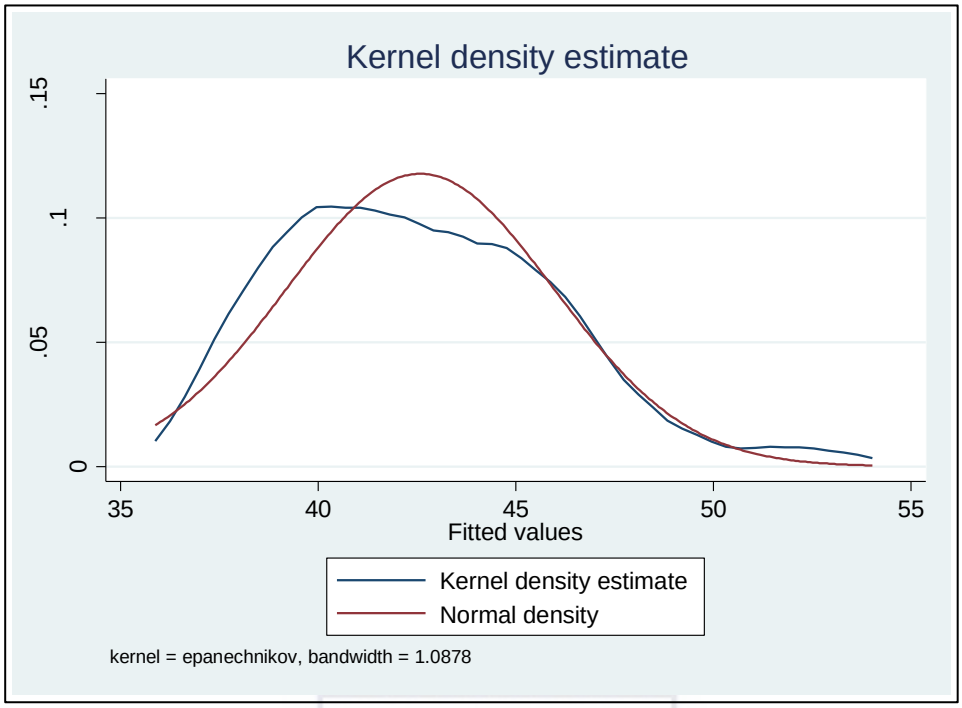


Figure 4. 23 P-P Plot of Mental functional status