The assessment of health promoting lifestyle knowledge, stroke related risk factors and quality of life of stroke survivors in the Mofolo, Chiawelo, and Stretford communities of Gauteng, South Africa.

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand Johannesburg in fulfilment of the requirements for the degree of Master of Science in Physiotherapy (by Dissertation).

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29 May 2023

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Declaration

I, Tshepang Chriseldah Sebulele declare that this dissertation is my own work except where indicated in the acknowledgement section. It is being submitted for the degree of Master of Science in Physiotherapy at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other university.

(Candidate's signature)

29 May 2023

Dedication

To my parents Mr. and Mrs. Sebulele all my loved ones in the now and hereafter (Babina Tau) my loving, patient and supportive family and friends.

Here lies the final manifestation of all our hopes, dreams and hard work. I hope to make you proud. Thank you for everything.

“Tloga tloga e tloga kgale, modiši wa kgomo o tšwa natšo šakeng.”

Acknowledgements

I wish to acknowledge the following people who were involved in the process of this MSC research:

My family and friends who were my greatest supporters and encouraged me when things were tough and gave me the strength to keep going.

My Supervisors Mr. Kganetso Sekome, Ms. Dineo Thupae and Ms. Sameera Haffejee for guiding me through this entire project. The feedback and support they gave me was incredibly valuable in putting this research project together my project would not have succeeded without their valuable input.

I wish to acknowledge Ms. Mathuto Sesoko for her tireless efforts working as my research assistant, she went above and beyond in her role as a research assistant. Her encouragement and diligence are deeply appreciated.

I also wish to acknowledge Dr. Zvifadzo Matsena Zingoni for her help and patience when assisting me with the statistics involved in this project.

I would also like to acknowledge and thank my colleagues at the Johannesburg Metropolitan Health district for all their help and support.

Most of all I would like to acknowledge and thank all the patients along with their friends and family members because without them, none of this would have been possible.

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LIST OF ABBREVIATIONS

AGE's	Advanced glycation end products
BMI	Body Mass Index
CE	Cardio Embolic
CHC	Community Health Centre
CHW	Community Health Worker
CT	Computerised Tomography
CMED	Community Mental Health Education and Detection Tool
CVA	Cerebrovascular Accident
DBP	Diastolic Blood Pressure
DM	Diabetes Mellitus
DoH	Department of Health
e.g.,	For example
HIV	Human Immunodeficiency Virus
HPL	Health Promoting Lifestyle
HPLPII	Health Promoting Lifestyle Profile II
HPT	Hypertension
HRQoL	Health Related Quality of Life
LAA	Large Artery Atherosclerosis
mmHg	Millimetres of mercury
NCD	Non-communicable Diseases
RTW	Return to Work
SA	South Africa
SBP	Systolic Blood Pressure
STATS SA	Statistics South Africa
SVO	Small Vessel Occlusion
TENS	Transcutaneous Electrical Nerve Stimulation
TIA	Transient Ischemic Attack
USA	United States of America
VAS	Visual Analogue Scale
WHO	World Health Organisation

ABSTRACT

Introduction

Factors that contribute to the risk of developing a stroke are largely modifiable such as eating a healthy diet, exercising, and having regular health screenings for early detection of disease. An understanding of the stroke survivor's level of health promoting lifestyle knowledge, assessing their risk factors for stroke, and assessing their quality of life will shed light into understanding the factors contributing to the increased rates of stroke and developing appropriate health promotion programmes.

Aim

To determine clinical and demographic factors, the prevalence and knowledge of stroke risk factors and health promoting lifestyle amongst stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng and how these factors affect the quality of life of stroke survivors in those communities.

Methodology

Demographic and clinical information was collected using a questionnaire, prevalence of stroke risk factors was assessed using the stroke risk card, health promoting lifestyle was assessed using the Health Promoting Lifestyle Profile II, quality of life was assessed using the EuroQol-5 Dimension, and knowledge of stroke risk factors and warning signs was assessed using the assessment of stroke risk factors and warning signs of stroke survivor's questionnaire. All data was collected at baseline and then again reassessed after three months. All data gathered were analysed using STATISTICA, categorical data from the demographic's questionnaire were analysed using percentages and frequencies, continuous data from the stroke risk card, EuroQol-5 Dimension (EQ-5D), HPLPII and the stroke risk knowledge questionnaires was analysed using descriptive statistics calculating mean and standard deviation as well as median and Interquartile ranges.

Results

A total of 156 participants were assessed at baseline with only 49 (31%) returning for three-months follow up. Hypertension was identified as the most prevalent risk factor for developing a stroke at baseline (65%) and at follow-up (73%). Eighty two percent had good health promoting lifestyle profiles at baseline and 78% at follow-up. Knowledge of stroke risk factors and warning signs was good (67%) at baseline and (53%) at follow-up. Sixty five percent of the participants were partially independent for mobility at baseline when compared to 73% at follow-up. Only 6% of participants rated their overall health as 100% at both baseline and follow-up.

Conclusion

Stroke survivors in the Chiawelo, Mofolo and Stretford communities of Gauteng are at an increased risk of stroke from clinical factors such as high prevalence of hypertension. Interestingly, stroke survivors in this study were shown to have good health promoting lifestyles and stroke risk factor knowledge. More research needs to be conducted in stroke survivors living in communities of similar profiles to understand the factors that increase their risk of stroke. Subsequently, the knowledge gained from further research can assist in the development of interventions such as continuous monitoring of stroke survivors blood pressure, cholesterol and blood glucose levels and creating health promotion campaigns specifically designed for stroke survivors to educate them on the lifestyle changes that assist to reduce the risk of stroke.

Key terms: stroke, health promotion, stroke prevention, health promoting lifestyles, stroke risk knowledge, quality of life

CHAPTER 1

1.1 INTRODUCTION

Stroke is defined as the: “brain, spinal cord or retinal cell death attributable to ischemia based on neuropathological neuroimaging and/or clinical evidence of permanent injury” (Saccor et al., 2013). A stroke is characterized by a rapid onset of unilateral muscle weakness, slurred speech, confusion and in more severe cases loss of consciousness (Dar et al., 2019). The functional fallout following a stroke can be devastating, with more than sixty-six percent of patients reporting dependency with personal care after their stroke for example, bathing, brushing of teeth, and mobilising independently (Connor et al., 2004).

According to the Global Burden of Disease Collaborators, stroke accounted for 5.5 million deaths and 116.4 million disabilities worldwide in 2016 (Owens Johnson et al., 2019). Additionally, twenty-six percent of stroke survivors in the United States of America (USA) remain disabled in activities of daily living and fifty percent have hemiplegia following a stroke (Katan and Luft., 2018). These figures indicate a public health crisis due to an increase in the number of new stroke cases (Katan and Luft., 2018). A global meta-analysis found that 11% of stroke survivors could experience a reoccurrence of stroke within the first year and 26% in the first 5 years post stroke (Flach et al., 2020). The rate of reoccurrence can be attributed to the type of stroke (Kolmos, Christoffersen and Kruuse, 2021). The literature shows higher rates of stroke reoccurrence in large artery atherosclerosis (LAA) and cardioembolic stroke (CE) as compared to small vessel occlusion (SVO) (Kolmos, Christoffersen and Kruuse, 2021). Stroke recurrence can also be as a result of increased prevalence of the modifiable risk factors of stroke. Modifiable risk factors such as diabetes mellitus, hypertension and previous transient ischemic attack were found to be independent risk factors that increase the risk of recurrent stroke (Kolmos, Christoffersen and Kruuse, 2021).

The current incidence rate of stroke in South Africa is standing at 349/ 100 000 as reported by Maredza et al., (2018). This shows a notable increase from the 300/100 000 that was previously reported by Connor et al., (2007). Stroke is now a common cause of death in developing countries which indicates a need for our health sector to focus on prevention of strokes on a primary healthcare level (Dar et al., 2019). In addition, research shows that the incidence of

stroke is increasing amongst the younger population in low and middle-income countries due to increased prevalence of hypertension and obesity in the younger population which increases their risk of stroke (Katan and Luft., 2018). The prevalence of recurrent stroke has been poorly researched in the South African context. More research needs to be conducted in order to determine the prevalence of recurrent stroke and causative factors thereof in our context.

Stroke prevalence is increasing within the South African population and has a significant impact on a person's life and their ability to participate in important life roles during their most productive years (Owolabi et al., 2015). The increasing burden of disease and subsequent disability following the initial stroke, necessitates further investigation on the prevalence within the South African Context (Connor et al., 2004). It is important to determine the knowledge of stroke risk factors and health promoting lifestyles to assess if these factors contribute to increasing stroke incidence in South Africa (Connor et al., 2004). A study to determine stroke survivors' awareness on health promoting lifestyles and their knowledge of stroke risk factors could provide an insight as to the reason for the increase in stroke rates in South Africa.

Lifestyle choices such as poor eating habits, irregular screenings of general health e.g. (blood pressure, glucose and cholesterol levels) and lack of exercise contribute to developing a stroke (Boehme, Esenwa and Elkind, 2017). These choices are modifiable and can be used as a tool to reduce the level of risk for stroke. Improvements in lifestyle can facilitate the reduction of stroke risk through regular exercise, good nutrition and improving health awareness (Boehme, Esenwa and Elkind, 2017). Regular screening of blood pressure and glucose levels assists with early detection of risk factors and provides an opportunity for early intervention before serious health issues arise (Yang et al., 2016).

Once haemodynamic stability is achieved, the focus for a stroke patient should be on rehabilitation and return to function (Vestling et al., 2003). Stroke rehabilitation is conducted in different settings -within the South African healthcare system- depending on the severity of the stroke. Patients will be cared for using a system of down-referral, from the highest (Tertiary Hospital) to lowest (Community Clinic) level of care depending on the individual requirements of the patient (Makheta, 2018).

The rehabilitation process is progressive and dependent on the severity of the stroke. Rehabilitation will focus on improvement of joint range of motion and muscle strength, and then slowly incorporate functional exercises ranging from bed mobility to gait rehabilitation and ultimately into community re-integration and vocational training.

South Africa is regarded as a developing country and is not well equipped to handle the post stroke disablement as rehabilitation facilities and healthcare providers are insufficient for our population as it stands (Smythe et al., 2022). Therefore, the rapid increase of stroke prevalence places an even larger burden on an already overburdened healthcare system where stroke survivors need to access long-term health care and rehabilitation services throughout their recovery (Smythe et al., 2022). In South Africa, stroke survivors face significant barriers to healthcare access such as complex referral pathways high personal costs for travel to healthcare facilities, and long waiting periods to be seen by health care providers (Smythe et al., 2022). Considering these challenges, the socioeconomic consequences of stroke need to be considered when planning health promotion campaigns that aim to reduce the prevalence of stroke in the country.

Stroke has been identified as the leading cause of long-term disability in adults and the subsequent disability caused by stroke can result in an inability to return to work (Palstam et al., 2019). The inability to return to work may have a negative impact on the financial lives of stroke survivors and their families (Ashley, Lee and Heaton, 2019). The loss of income can limit the patient's ability to access quality healthcare and nutrition, which are vital in maintaining good health and reducing the risk of recurrent stroke (Ashley, Lee and Heaton, 2019).

Research shows that stroke is no longer solely associated with the elderly. Studies globally are showing an alarming trend of increased rates of stroke in patients between the ages of 18 and 50 years old, with incidence of ischemic stroke estimated between 15-18% in this cohort (van Alebeek et al., 2017) There are a variety of reasons for the increased incidence of stroke in young adults, those identified in the literature mainly include increased prevalence of modifiable risk factors e.g. lifestyle related diseases along with the recreational use of illicit drugs (Ekker et al., 2018). The role of gender in stroke is still widely debated in the literature.

However, women seem to be at a slightly higher risk of ischemic stroke as they are more likely to have autoimmune diseases and the use of oral contraceptives also predisposes them to the risk of stroke (Ekker et al., 2018).

In South Africa the Western Cape Rehabilitation Centre has seen an increase in the admission of younger patients between the ages of fifteen to forty years presenting with stroke (Chowles, 2017). This group now makes up twenty-six percent of their annual admissions, indicating the increasing rate at which stroke is affecting the younger population in South Africa (Chowles, 2017). Human Immunodeficiency Virus (HIV) is closely associated with stroke (Tipping et al., 2007). In South Africa, rates of HIV infection are also high in the younger population (Tipping et al., 2007). It is important to investigate how pre-existing medical conditions can contribute to increased risk of stroke. In young patients with HIV, stroke was even more prevalent in those who experienced opportunistic infections like Kaposi Sarcoma or tuberculosis (Tipping et al., 2007). This finding was as a result of a compounded effect of a weakened immune system. Considering the high incidence of HIV amongst the youth of South Africa, it is important to consider how pre-existing conditions and lifestyle choices, can increase the risk of having a stroke in the future (Tipping et al., 2007).

Pre-existing health conditions are important contributing factors to the risk of stroke. However, there are other factors that can increase the risk of having a stroke (Yang et al., 2016). Obesity and diabetes are also on the rise amongst the youth which leads to increased incidence of stroke as these conditions are linked to higher rates of ischemic strokes (Fegal et al., 2010).

Hypertension is identified in seventy-one percent of strokes as the most significant modifiable cause for stroke (Dar et al., 2019). Other illnesses such as diabetes, smoking and hyperlipidaemia have also been attributed to increased risk of stroke (Dar et al., 2019). Increasing rates of obesity in the youth is a significant contributing factor causing stroke (Yang et al., 2016).

The World Health Organisation recommends that patients practice health promoting lifestyles by getting regular moderate aerobic exercise (minimum of 150 minutes a week), healthier diets including more fresh fruit and vegetables, with less refined sugars and processed food (WHO | Physical Activity and Adults, 2020). Smoking is another risk factor which can be managed

by cessation of smoking- or continued abstinence for people who have never smoked (Yang et al., 2016). According to Dar et al., (2019) eighty percent of strokes can be prevented through well curated health promotion campaigns and activities, that focus on the precautions that can be taken to avoid having a stroke.

In order to decrease the number of new cases of stroke, vigorous health promotion activities need to be conducted in communities in order to educate them about the risks and modifiable behaviours that are associated with stroke (Dar et al., 2019). The WHO has called on developing countries to allocate more resources to reduce vascular risk factors of stroke and focus on preventative care (Connor et al., 2004). Therefore, in order for prevention campaigns to be successful, knowledge on the different types of strokes as well as prevention of each one (ischemic and haemorrhagic) need to be emphasized during health promotion campaigns as these factors can vary between the two types of strokes (Esenwa and Gutierrez, 2015). The consequences of low rate of understanding of stroke risk factors and health promoting lifestyle meant that people believe that stroke resulted from spiritual wrongdoing or classified it as a communicable disease, instead of classifying it as a medical condition (Dar et al., 2019). Health care providers need to educate patients in order to demystify these misconceptions to further decrease the risk of stroke prevalence.

South Africa is undergoing a health prevalence transition, from communicable to non-communicable diseases (Dar et al., 2019). Therefore, it is important to educate patients about the differences between communicable diseases such as tuberculosis and influenza and non-communicable diseases like hypertension and diabetes. Education to reduce the risk of recurrent stroke should include health promoting behaviours that emphasize long term management of hypertension. Hypertension has been identified as an independent risk factor for stroke and diabetes, for recurrent stroke (Kronish et al., 2014). Education can be done by community health workers who are trusted members of the communities in which stroke survivors reside (Kronoish et al., 2014). Research conducted by Saengsuwan, Suangpho and Tiamkao (2017) found that lack of knowledge and cultural differences contributed to patients not taking responsibility for their own health. This predisposes patients to having a primary stroke and reoccurrence of stroke due to insufficient information about their current health

status. Intensive health education on stroke and health promoting lifestyles could assist in reversing this phenomenon and patients will feel empowered to take more control and responsibility for their health (Esenwa and Gutierrez, 2015).

1.2 Problem Statement

The prevalence of stroke in South Africa is gradually increasing, and in order to understand why this is so, research needs to be conducted. Stroke is part of the top ten leading causes of mortality where it is estimated that five people in South Africa have a stroke every hour (Abdelatief, Peer and Manda, 2021). In South Africa there is insufficient research regarding stroke survivors' knowledge of stroke risk factors and how these factors can increase the risk of stroke reoccurrence. It is possible that the cause of the increase in stroke cases and its reoccurrence amongst stroke survivors in this country could be related to demographic and clinical factors, health promoting lifestyles and level of stroke risk factor knowledge and warning signs. Demographics such as lower socioeconomic status and lower levels of basic education could play a role in determining the level of health care that patients in these communities have access to. Research conducted by Smythe et al., (2022) suggested that barriers to accessing healthcare such as poor mobility and high personal costs contribute to the increased risk of stroke reoccurrence amongst stroke survivors. This in turn, can affect the quality of life of stroke survivors particularly in under-resourced communities. It is therefore important to examine the health promoting lifestyles and stroke risk factor knowledge of stroke survivors in these communities in order to determine how these factors contribute to increased risk of stroke and how their quality of life could subsequently be affected. This study will endeavour to gain more insight into how demographic and clinical factors, health promoting lifestyle behaviours and stroke risk knowledge contribute to the increased risk of recurrent stroke in the Chiawelo, Mofolo and Stretford communities of Gauteng and how these abovementioned factors affect the quality of life of stroke survivors in these communities.

1.3 Significance of the study

The data gathered from this study will assist in generating a body of knowledge related to health promoting lifestyles, stroke prevention knowledge and quality of life in the Mofolo, Chiawelo and Stretford communities of Gauteng as research in this field has not yet been conducted in these communities.

The Mofolo, Chiawelo and Stretford communities of Gauteng are being observed as part of the Alexandra community study as control sites. The importance of having the control aspect is to establish whether there are any similarities or differences in the profiles and outcomes of stroke survivors between the Alexandra, Mofolo, Chiawelo and Stretford communities of Gauteng.

This study is a control study for a larger study (The effect of the Alexandra community stroke awareness campaign on knowledge and lifestyle modification after primary stroke), therefore no intervention was provided for the patients in this study. They continued with their existing medical and rehabilitation interventions at the CHCs. The communities in this study were chosen due to their similarity in profiles to Alexandra community where the larger intervention study is conducted. The comparison of communities will assist in the creation of stroke programmes to decrease the risk of stroke in communities that have similar profiles.

This study could also assist in raising awareness about the importance of regular health screenings (e.g. blood pressure, glucose and cholesterol levels) amongst stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng. This will encourage them to maintain a regular health screening routine and facilitate early detection of any health problems that may arise. Furthermore, the data collected from this study could assist to inform the necessary modifications to existing stroke prevention and healthy lifestyle campaigns.

This research will assist to uncover the main factors that are part of an in increased risk of stroke, subsequently health promotion campaigns can be modified and used to address these specific factors. Using data from this research, new guidelines and frameworks can be developed and used in stroke awareness campaigns with the aim of decreasing the incidence of stroke in South Africa.

1.4 Research questions

1.4.1) What demographic and clinical factors of the stroke survivors from the Mofolo, Chiawelo and Stretford communities of Gauteng affect their risk of stroke reoccurrence?

1.4.2) What is the prevalence of stroke risk factors of the stroke survivors of the Mofolo, Chiawelo and Stretford communities of Gauteng?

1.4.3) What level of knowledge do stroke survivors from the Mofolo, Chiawelo and Stretford communities of Gauteng have regarding health promoting lifestyles and their risk of recurrent stroke?

1.4.4) How does the knowledge regarding stroke risk factors and health promoting lifestyles affect the quality of life of stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng?

1.5 Research Aim

To determine the prevalence and knowledge of stroke risk factors and health promoting lifestyles amongst stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng and to assess the quality of life of stroke survivors in these communities.

1.6 Research Objectives

1.6.1) To determine demographic and clinical factors of stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng at baseline assessment and three-month follow up.

1.6.2) To establish the prevalence of stroke risk factors in stroke survivors within the Mofolo, Chiawelo and Stretford communities of Gauteng at baseline assessment and three-month follow up.

1.6.3) To determine health promoting lifestyles of stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng at baseline assessment and three-month follow up.

1.6.4) To determine stroke risk factor knowledge of stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng at baseline assessment and three-month follow up.

1.6.5) To assess the quality of life of stroke survivors in the Chiawelo, Mofolo and Stretford communities of Gauteng at baseline and three-month follow up.

CHAPTER 2

2. LITERATURE REVIEW

2.1 Introduction

The scope of this literature review covers studies related to the knowledge that stroke survivors have regarding health promoting lifestyles and how health promoting lifestyles (HPL) can reduce their risk of stroke. Additionally, this review discusses the increasing global and local prevalence of stroke among the younger population and the reasons for this increase. Literature included in this review also looks at how stroke at a young age can affect the socioeconomic aspects of young stroke survivors and how stroke prognosis influences the rate of return to work of young stroke survivors. The literature review further explores the effects that increasing rates of stroke have on public health services and the economy of the country at large.

The literature review follows the following format:

2.1) Definition of stroke

2.2) Impact of stroke on function

2.3) Global and local prevalence of stroke

2.4) Stroke in younger population

2.1) Definition and background of stroke

Stroke is defined as "brain and spinal cord or retinal cell death attributable to ischemia based on neuropathological, neuroimaging and/or clinical evidence of permanent injury" (Sacco et al., 2013). A stroke is characterized by a rapid onset of unilateral muscle weakness, slurred speech, confusion and in more severe cases loss of consciousness (Dar et al., 2019). The functional fallout following a stroke can be devastating, with more than sixty-six percent of patients reporting dependency with personal care after their stroke for example: bathing, brushing of teeth and mobilising independently (Connor et al., 2004).

Stroke prevalence is increasing within the South African population and has a significant impact on a person's life and their ability to participate in important life roles during their most productive years (Owolabi et al., 2015). The increasing burden of disease and subsequent disability following the initial stroke necessitates further investigation on the prevalence within the South African context (Connor et al., 2004).

It is important to determine the knowledge of stroke risk factors and health promoting lifestyles among stroke survivors to assess if these factors contribute to increasing stroke incidence in South Africa (Connor et al., 2004).

A study to determine stroke survivors' awareness on health promoting lifestyles and their knowledge of stroke risk factors could provide insight into the reasons for the increase in stroke rates in South Africa and also provide insight into the quality of life of stroke survivors pertaining to how having a stroke affects their socioeconomic status and ability to access quality healthcare (Connor et al., 2004).

The health-related quality of life of stroke survivors can be affected by the functional impairments that they experience after surviving a stroke where the disabilities resulting from the stroke can affect the ability of stroke survivors to perform their activities of daily living independently (Wondergem et al., 2017). The literature also shows that post-stroke depression and anxiety can contribute to decreased quality of life in stroke survivors (Nickel and Thomalla, 2017).

2.2) Global and local prevalence of stroke

According to the Global Burden of Disease Collaborators, stroke accounted for 5.5 million deaths and 116.4 million disabilities worldwide in 2016 (Owens Johnson et al., 2019). The death rate from stroke is expected to continue increasing with a projected increase to 7.8 million stroke related deaths in 2030 (Smajlović, 2015). Additionally, twenty-six percent of stroke survivors in the United States of America (USA) still present with disabilities and have challenges with performing their activities of daily living independently, while fifty percent have hemiplegia following a stroke (Katan and Luft., 2018). These figures indicate a public health crisis given an increase in the number of new stroke cases (Katan and Luft., 2018).

The current incidence rate of stroke in South Africa is 349/ 100 000 as reported by Maredza et al., (2018). This shows a notable increase from the 300/100 000 that was previously reported by Connor et al., (2007).

Stroke is now a common cause of death in developing countries thereby indicating a need for our health sector to focus on prevention of stroke on a primary healthcare level (Dar et al., 2019). In addition, research shows that the incidence of stroke is increasing amongst the younger population in low and middle-income countries (Katan and Luft., 2018).

2.3) Stroke in younger population

Research shows that stroke is no longer classified as a disease of the elderly with higher incidences reported in people aged fifty years old and younger (Maaijwee et al., 2014). Originally the observation of "young stroke" was first seen in publications resulting from hospital-based research studies where majority of young stroke survivors were also diagnosed with rare illnesses that predisposed them to stroke such as patent foramen ovale, illicit drug use and Moya-Moya disease which is largely documented in Japan (Maaijwee et al., 2014). It is however, well documented that traditional modifiable stroke risk factors are becoming more prevalent in young adults with hypertension documented in 19-39% of the population. The increase in prevalence of stroke in young adults has led to more research being conducted in order to understand the cause of this shift (Abdelatif, Peer and Manda, 2021) The knowledge gained from studies involving older patients cannot always be applied to the younger population therefore research needs to specifically focus on this cohort to understand the unique causes of stroke in this group (Smajlović, 2015). In addition, increasing stroke rates in younger patients have led to more research being conducted in order to understand the causes of this new change (Nedeltchev et al., 2005).

It is important to emphasize the importance of practicing HPLs to young stroke survivors and those who have never experienced stroke as they have significantly high rates of modifiable vascular risk factors (Singhal et al., 2013). It is also important to educate them on abstinence from recreational drug use and smoking of marijuana to reduce the risk of stroke (Singhal et al., 2013). Studies have found that haemorrhagic stroke accounts for nearly 50% of strokes that occur under 45 years of age, and they have also shown that the use of cocaine and amphetamine results in increased risk of haemorrhagic stroke in young adults (Smajlović, 2015).

In South Africa, the Western Cape Rehabilitation Centre has seen an increase in the admission of younger patients between the ages of fifteen to forty years presenting with stroke (Chowles, 2017). This group now makes up twenty-six percent of their annual admissions, indicating the increasing rate at which stroke is affecting the younger population in South Africa (Chowles, 2017).

The global incidence of HIV infections is on the rise with an estimated 38.4 million people living with HIV globally and an estimated 8.4 million in South Africa (Om Manda et al., 2021). Therefore, South Africa accounts for 20% of new HIV infections globally (Om Manda et al., 2021). The rate of HIV infections amongst young people aged 15-27 is on the rise with an estimated 720 000 young people in this age group living with HIV in South Africa (Zanoni et al., 2016). This is particularly important to note as HIV infection has been identified as one of the main contributing risk factors for stroke in young people (Namaganda et al., 2022).

HIV is closely associated with stroke; in South Africa, rates of HIV infection are also high in the younger population (Tipping et al., 2007). It is important to investigate how pre-existing medical conditions can contribute to increased risk of stroke. In young patients with HIV, stroke was even more prevalent in those who experienced opportunistic infections like Kaposi Sarcoma or tuberculosis (Tipping et al., 2007). This finding was as a result of a compounded effect of a weakened immune system (Yang et al., 2016).

In South Africa the rates of HIV infection in the youth are higher amongst black males and females (Mabaso et al., 2019). This is attributed to the known socioeconomic inequalities that exist in South Africa which directly translate into less health education for black youths and reduced access to quality health care (Mabaso et al., 2019). Pre-existing health conditions are important contributing factors to the risk of stroke. However, there are other factors that can increase the risk of stroke and in order to reduce the risk it is important to manage modifiable risk factors timeously (Yang et al., 2016).

2.4) Modifiable and non-modifiable stroke risk factors

The potential risk factors for stroke vary and can be classified into two groups namely modifiable and non-modifiable risk factors. Modifiable risk factors refer to factors that can be changed to reduce the risk of a person experiencing a stroke for example blood pressure levels, glucose levels, levels of physical activity and smoking (Boehme et al., 2017). Non- modifiable risk factors for stroke are factors that cannot be changed to reduce the risk of stroke for example age, gender, and race (Boehme et al., 2017). The understanding of modifiable risk factors and their impact on the risk of stroke is important as this will assist stroke survivors to prevent the recurrence of stroke (Yang et al., 2016).

2.5.1) Hypertension and risk of stroke

The WHO defines hypertension as a systolic blood pressure of 140 mm Hg or above and a diastolic blood pressure of 90 mm Hg or above. It is recommended by the WHO that anybody who has higher readings should see their physician for a formal diagnosis.

Hypertension has been identified as the single most significant modifiable risk factor for stroke as compared to the other modifiable risk factors (Sarikaya et al., 2015). The relationship between risk of stroke and hypertension is directly proportional and can be used as an effective tool in the reduction of risk of stroke. The reduction of systolic blood pressure by 2mmHg was associated with a 25% decrease in stroke risk and reduction of diastolic blood pressure by 2mmHg reduced stroke risk by 50% (Sarikaya et al., 2015). It is recommended that young adult stroke survivors need to maintain a blood pressure of 130/80 mmHg in order to prevent a recurrent stroke (Smajlović, 2015).

The management of hypertension could assist to drastically reduce the global burden of stroke (Sarikaya et al., 2015). A study that was conducted by Mills et al., (2016) found that 31.1% of adults globally were hypertensive (Mills et al. 2016).

In South Africa the prevalence of uncontrolled hypertension is estimated to be between 13.3-75.5% of the population (Masilela et al., 2020). However, more studies need to be done in order to accurately determine these figures (Masilela et al., 2020).

The pathophysiology of hypertension and how it can lead to stroke has been studied extensively. Cerebral small vessel disease is primarily caused by hypertension and can lead to cerebral decline and lacunar stroke (Cipolla et al., 2018). The prolonged repetition of mechanical stress caused by hypertension can lead to degradation of elastin fibres in the vascular wall stiffening the large arteries which subsequently transmits the pulsatile load downstream into the parenchyma of the brain. It has been shown that diminished nitric oxide availability and endothelial dysfunction that are associated with hypertension can also lead to increased cerebrovascular blood flow which can subsequently lead to stroke.

Increased shear stress on the cerebral endothelium as a result of hypertension can result in the formation of atheroma which is a precursor for atherosclerosis which can cause stroke by occluding the larger or smaller vessels of the brain (Cipolla et al., 2018). Furthermore, chronic hypertension contributes to pathogenesis of stroke by accelerating intracerebral vasculopathy and by facilitating the development of micro atheroma in small arteries and atherosclerotic disease in the medium and large arteries (Hisham and Bayraktutan, 2013).

A high degree of arterial stenosis, which is a consequence of chronic high blood pressure can be aggravated by thrombotic obstruction or cardio embolism which can subsequently lead to stroke (Hisham and Bayraktutan, 2013).

In order to reduce blood pressure a healthy diet is recommended; the Mediterranean diet has been shown to reduce cardiovascular events in patients who are at risk of stroke (Sherzai and Elkind. 2015). Additionally, the Dietary Approaches to Stop Hypertension (DASH) diet which is a combination diet which reduces dietary fats and is rich in fruit and vegetables has been shown to reduce both diastolic and systolic blood pressures (Filippou et al., 2020). Reducing the amount of salt consumed daily is another dietary measure that can be taken to reduce the risk of stroke (Sherzai and Elkind. 2015). It is recommended to have an average daily salt intake of between 5-6g to reduce the risk of stroke as higher daily salt consumption is associated with an increased risk of ischemic and haemorrhagic strokes (Sarikaya et al., 2015).

The reduction of salt by 1 teaspoon daily has shown efficacy in reducing both SBP and DBP by 7mmHg and 4mmHg respectively in hypertensive patients (Pheiffer et al., 2018). The WHO recommends healthier diets which include more fresh fruit and vegetables and less refined sugars and processed food (WHO | Physical Activity and Adults, 2020).

2.5.2) Diabetes Mellitus (DM) and risk of stroke

The presence of diabetes mellitus carries an associated risk of stroke as patients with DM are at high risk of having vascular events. According to recent studies the current global prevalence of diabetes estimated in 2010 was 285 million individuals being diagnosed as diabetic with numbers expected to rise to 439 million by 2030 (Chen et al., 2016).

Furthermore, it is expected that the prevalence of diabetes will rise by 69% in individuals living in developing countries and 20% for those living in developed countries (Chen et al., 2016). In the South African population, the prevalence of DM is estimated at 9% and this is attributable to several factors such as urbanisation and related nutritional changes along with increased rates of adult obesity (Pheiffer et al., 2018).

The pathophysiological role that diabetes has in the cause of stroke is broad and multifactorial and can be related to causing vascular endothelial dysfunction, inflammation and thickening of the capillary basal membrane and early-age arterial stiffness (Chen et al., 2016). Another pathophysiological mechanism that diabetes has in stroke is causing microvascular disease that can affect the small vascular structures in the brain (van Sloten et al., 2020). The morphological changes to the cerebral microcirculation caused by diabetes results in thickening of the basement membrane and increased angiogenesis which leads to increased blood-brain permeability and altered blood flow that can also result in stroke (van Sloten et al., 2020).

Chronic hyperglycaemia increases intracellular and extracellular formation of advanced glycation end products (AGEs) resulting in upregulating the expression of AGE receptor cells in most cells of the brain, including astrocytes, pericytes and endothelial cells (van Sloten et al., 2020).

This change in the neurophysiology of the brain can have detrimental effects on the brain cells such as production of inflammatory cytokines and oxidative stress which are closely linked to the contribution of microvascular endothelial dysfunction by reducing the availability of nitric oxide, which disrupts the blood-brain barrier and can contribute to the risk of stroke (van Sloten et al., 2020). The decreased availability of nitric oxide causes dysfunction in the normal vasodilation of the blood vessels, which can then cause endothelial dysfunction in the blood vessel which can catalyse the development of atherosclerosis and subsequently cause a stroke (Chen et al., 2016). Diabetes has also been associated with an increased inflammatory response where inflammation plays an important role in the development of an atherosclerotic plaque which causes further predisposition to stroke (Chen et al., 2016).

Obesity has been established as a risk factor for DM and is associated with a 5% increased risk of stroke for every 1 kilogram per square metre of the patient's body mass index (BMI) over 20 kilograms per square meter of the patients BMI, these risk factors can be managed through eating a balanced diet and increasing physical activity (Oza et al., 2017). Moreover, those who have type 2 DM are more likely to suffer from a stroke as DM promotes cerebral microangiopathy leading to lacunar type strokes (Sarikaya et al., 2015).

2.5.3) Smoking and risk of stroke

Cigarette smoking has been identified as an independent risk factor for stroke and contributes to 4% of premature deaths of the total global disease burden and 6.3% for disability-adjusted life-years lost (Boachie et al., 2021). Furthermore, research has found that the global economic cost of smoking amounted to 1.8% of the global gross domestic product (GDP) while health expenditures of the global GDP amounted to 5.7% being used for illnesses that are directly attributed to smoking (Boachie et al., 2021). The prevalence of cigarette smoking in South Africa was estimated to be 17.6% in adults with men being four times more likely to smoke than women and the Western Cape having the highest reported rate of smoking at 32.9% (Reddy et al., 2015). The 2016 Demographic and Health Survey found that 8% of women and 37% of men in South Africa aged 15 years and older reported smoking tobacco products with the majority reporting daily smoking (Boachie et al., 2021).

Smoking, like hypertension is an independent risk factor for stroke and increases the risk of silent brain infarction (Oza et al., 2017). There are two phases of smoking namely the tar phase and gas phase, where the radicals associated with the tar phase are long lasting (months to years) while the gas phase radicals have a short life span of only a few seconds (Ambrose and Barua, 2004). Cigarette smoking contributes to the development of vasomotor dysfunction which is a precursor to atherosclerosis which decreases vasodilatory function causing an increased risk of stroke (Ambrose and Barua, 2004). Furthermore, smoking has been shown to increase the inflammatory response which facilitates the pathogenesis of atherosclerosis subsequently increasing the leukocyte count by 20-25% (Ambrose and Barua, 2004).

Cigarette smoking leads to stroke by reducing endogenous fibrinolysis leading to increased thrombocyte activity resulting in ischemic stroke (Sarikaya et al., 2015). It has also been established that passive smoking can also contribute to increased risk of stroke.

Therefore, patients who are at high risk of stroke or have had a previous transient ischemic attack (TIA) need to be advised to cease smoking and avoid passive smoking altogether (Oza et al., 2017). It is important to note that patients who were active smokers at the time of their stroke had worse outcomes than non-smokers. Furthermore, active smokers were also at higher risk of experiencing recurrent vascular events (Sherzai and Elkind 2016).

2.5.4) Sedentary lifestyle and rehabilitation of stroke

The World Health Organisation recommends that people practice health promoting lifestyles by getting regular moderate aerobic exercise (minimum of 150 minutes a week) to reduce the risk of stroke (WHO | Physical Activity and Adults, 2020). Regular physical activity is known to reduce stroke risk by 25%-30% through reducing vascular risk factors of stroke e.g., hypertension and obesity (Sarikaya et al., 2015). Patients with previous TIA should be encouraged to perform 120-150 minutes of moderate intensity aerobic exercise weekly e.g., brisk walking (Oza et al., 2017). Patients with stroke may have difficulties participating in normal exercises if they have residual muscle weakness or loss of balance and accommodations need to be made for their functional capacities in order for them to fully participate in Physiotherapy or Cardiac Rehabilitation (Oza et al., 2017).

Once haemodynamic stability is achieved, the focus for a stroke patient should be on rehabilitation and return to function (Vestling et al., 2003). Stroke rehabilitation is conducted in different settings -within the South African healthcare system- depending on the severity of the stroke. Patients will be cared for using a system of down-referral, from the highest (Tertiary Hospital) to lowest (Community Clinic) level of care depending on the individual requirements of the patient (Makheta, 2018). The rehabilitation process is progressive and dependent on the severity of the stroke. Rehabilitation will focus on improvement of joint range of motion and muscle strength, and then slowly incorporate functional exercises ranging from bed mobility to gait rehabilitation. (Lennon and Hastings, 1996). It is important to note that stroke not only has long term effects on the functional ability of survivors but can also affect them socioeconomically as well (Kobylańska et al., 2019).

2.6) Stroke and return to work

Stroke is the leading cause of long-term disability in adults worldwide due to the physical impairments that result after a stroke (Palstam et al., 2019). The functional deficits resulting from stroke lead to decreased participation in activities of daily living, reduced community participation and in some cases loss of income due to prolonged sick leave taken by the stroke patient in order to receive medical care and rehabilitation. This can ultimately lead to income loss especially for young stroke survivors (Palstam et al., 2019). Some of the long-term disabilities that stroke patients can have include “weakness of one side of the body typically affecting the upper limb (77% of survivors), urinary incontinence (48%), impaired consciousness (45%), dysphagia (45%) and impaired cognition (44%)”. All the residual impairments can render a stroke survivor unable to return to work if unresolved (Wang et al., 2014).

It is therefore important to prevent stroke in young patients who still have many productive years ahead of them to mitigate the economic losses that result from stroke (Westerlind et al., 2020). The total loss of economic productivity from stroke varies worldwide with a reported 1.9-billion-dollar loss in the United Kingdom (Jarvis et al., 2019) and 27 billion euros spent by 32 countries across Europe in 2017 on health care costs related to stroke alone (Luengo-

Fernandez et al., 2020). There are very few studies conducted in Africa on the total cost and economic burden resulting from a stroke. One study conducted in Togo revealed that the cost of care for a stroke patient was 936 Euros for 17 days for an in hospital stay (Owolabi et al. 2015). In South Africa the total costs of stroke were estimated to be between 2.5-4.2 million Rands in health expenditure, 80% of which was used on in-patient hospital care. More studies need to be conducted in Africa and South Africa to determine the true cost to the economy resulting from stroke (Maredza and Chola 2016).

The ability for stroke survivors to return to work is dependent on numerous variables that need to be assessed upon hospital discharge to determine the possible functional prognosis of the patient (Ashley et al., 2019).

Stroke severity is the most consistent predictor for return to work where survivors of mild to moderate strokes are more likely to return to work than their counterparts who survive a more severe stroke. Additionally shorter periods of hospitalization – ten days or less- was also found to predict earlier return to work (Ashley et al., 2019). Individuals who were found to be more dependent on their care givers for assistance with activities of daily living were found to be less likely to return to work (Ashley et al., 2019). Cognitive impairment is also an important predictor for return to work, some stroke survivors are left unable to return to work even after regaining their functional ability as a result of permanent cognitive or psychological impairment (Wang et al., 2014). Patients who have supportive and more accommodating working environments along with good social support were found to have higher return to work rates than those who did not (Wang et al., 2014).

It is important to note that socioeconomic factors also play a large role in the return to work of stroke survivors (Ashley et al., 2019). There have been numerous studies that have found increased rates of return to work for people who have higher levels of income, education and who are Caucasian (Ashley et al., 2019). It is noteworthy that males have a higher return to work rate than females and that stroke survivors who are office workers are more likely to return to work than people who do manual labour (Edwards et al., 2018). Furthermore, self-employed stroke survivors and those working for larger corporations were also found to have higher rates of return to work which could be attributed to the ability of the self-employed

stroke survivor to modify their own working environment to accommodate their changed functional capacity and the ability of large corporations to afford intensive individualized post stroke rehabilitation for their employees and their capacity to modify the work requirements of their employees post stroke (Fukuda et al., 2019).

Psychological and emotional factors can also influence the rate at which stroke survivors return to work with decreased rates being reported in people who suffer from depression and anxiety post stroke (Ashley et al., 2019). Moreover, symptoms of depression and anxiety can be exacerbated by the inability to return to work and subsequent loss of income (Ashley et al., 2019).

It has been identified that a strong sense of professional identity, thorough management of the disability along with the therapeutic relationship that stroke survivors have with their doctors and rehabilitation therapists also play a key role in the rate at which stroke survivors return to work (Westerlind et al., 2020).

Time taken for return to work varies and is also dependent on the severity of the stroke, age and gender of the stroke survivor. In some cases, stroke survivors can return to work as early as six to twelve months after stroke (Wang et al., 2014). However, the range for time taken to return to work is broad and can even go up to three years post stroke (Westerlind et al., 2020).

2.7) Effects of stroke on public health services

The rates at which stroke survivors return to work vary globally and this is attributable to the definition of "work" -that is used in each study respectively (Kobylańska et al., 2019). Moreover, studies have shown a RTW average of 10%-70% (Westerlind et al., 2020). Studies indicated average RTW rates of 44% in countries like Sweden, Japan and Poland (Kobylańska et al., 2019). In South Africa, (Duff et al., 2014) conducted a study in Johannesburg ascertaining the return-to-work rates and found that 34% of stroke survivors were able to return to work which falls within the global range of 1-91% in countries such as Japan, Singapore the United Kingdom, and United States of America (Duff et al., 2014).

The determinants found to contribute to stroke survivors' inability to return to work in the research conducted by (Duff et al., 2014) showed that the most common reasons were upper limb dysfunction and walking difficulties. Furthermore, the lack of life insurance and depression were also found to negatively affect return to work in stroke survivors.

In order to reduce time taken for stroke survivors to return to work, rehabilitation needs to focus more on improving functional abilities and less focussed on management of their disability as this has shown to be key motivators for people recovering from severe illness (Wang et al., 2014). Psychological factors also play a key role in the rates at which stroke survivors return to work, not only because employment provides a source of income but also plays a role in the social and professional identity of a person (Palstam et al., 2019).

The prospect of returning to normal activities (social and professional) have shown to be significant motivators for stroke survivors in their return-to-work process (Palstam et al., 2019). It is important to note that even though stroke does have a large impact on the function and finances of stroke survivors', it also has an impact on their quality of life.

The ability to return to work post stroke has shown to have a positive effect on the quality of life of stroke survivors and sustained wellbeing which results in decreased rates of depression and anxiety in stroke survivors (Westerlind et al., 2020).

South Africa is regarded as a developing country and is currently ill-equipped to provide the necessary long term rehabilitation services needed by stroke survivors following a stroke (Smythe et al., 2022). The rapid increase in the prevalence of stroke places an even larger burden on the healthcare system where stroke survivors are already experiencing difficulty with accessing health care services (Smythe et al., 2022). The increasing prevalence of stroke and other cardiovascular diseases in South Africa place more strain on an already overburdened health system, which if left unmanaged can result in dire socioeconomic consequences (Hamid et al., 2019). In order to better manage the potential consequences that can result from stroke, intensive health promotion and prevention campaigns and activities need to be undertaken to educate the public about the reduction of stroke risk factors (Hamid et al., 2019).

Health promoting lifestyles can be defined as “health promotion through lifestyle which consists of six aspects: namely physical activity, nutrition, health responsibility, spiritual growth, interpersonal relations and stress management” (Tol et al., 2013). Placing an emphasis on healthy living can aid in the reduction of stroke occurrence by 50% (Ashley, Lee and Heaton, 2019). A subsequent reduction in stroke reoccurrence may yield positive effects by facilitating a decreased burden of disease and can prevent the associated socioeconomic loss that follows after a stroke (Ashley, Lee and Heaton, 2019).

In order to decrease the number of new cases of stroke, vigorous health promotion activities need to be conducted in communities in order to educate them about the risks and modifiable behaviours that are associated with stroke (Dar et al., 2019). In order for prevention campaigns to be successful, knowledge on the different types of strokes as well as prevention of each one (ischemic and haemorrhagic) need to be emphasized during health promotion campaigns as these factors can vary between the two types of strokes (Esenwa and Gutierrez, 2015). Additionally as a response to the rising prevalence of non-communicable diseases and stroke, the South African Department of Health has prioritized prevention of NCD’s according to the United Nations resolution seeking to stop the increasing trends of early death caused by NCDs (Hamid et al., 2019).

The consequences of low rate of understanding of stroke risk factors and health promoting lifestyle meant that people believe that stroke resulted from spiritual wrongdoing or classified it as a communicable disease, instead of classifying it as a medical condition (Dar et al., 2019). Health care providers need to educate patients in order to demystify these misconceptions to further decrease the risk of stroke prevalence. Additionally, successfully educating stroke survivors about stroke risk factors can drastically reduce the prevalence of recurring strokes in this population as 3-4% of stroke survivors are at risk of experiencing stroke reoccurrence (Smajlović, 2015).

South Africa is undergoing a health transition, from communicable to non-communicable diseases. Therefore, it is important to educate patients about the differences between modifiable and non-modifiable stroke risk factors (Smajlović, 2015).

Health education can be used to reduce the risk of stroke and this can be done by educating stroke survivors about the association between vascular conditions such as hypertension and how these factors can increase the risk of stroke (Samodien et al., 2021). Eales and Stewart (2001) found that lack of knowledge and cultural differences contributed to patients not taking responsibility for their own health. This predisposes patients to having a primary stroke, or secondary stroke due to insufficient information about their current health status.

Intensive health education on stroke and health promoting lifestyles could assist in reversing this phenomenon and patients will feel empowered to take more control and responsibility for their health (Esenwa and Gutierrez, 2015).

2.8 Effect of stroke on quality of life

Health Related Quality of life is defined as "how well a person functions in their life and his or her perceived in physical, mental and social domains of health" (Karimi and Brazier, 2016). In this study the quality of life in stroke survivors was assessed using the EQ-5D which measures QOL by assessing and scoring mobility, anxiety/depression, level of independence with activities of daily living, pain/discomfort and the patient's perception of their own health using the Visual Analogue Scale (VAS). The quality of life of stroke survivors is then determined by assessing the score and higher scores are associated with having a higher quality of life.

2.8.1 Effects of Activities of daily living and Mobility on QOL

Langhorne et al (2017) created a hypothetical functional recovery model for stroke survivors postulating that the recovery of bodily functions and improvement in independent execution of activities of daily living reaches a plateau between three- and six-months post stroke. Furthermore, they postulate that after six months a small number of patients may see a decline in their regained functions while – on average- others will remain stable or see an improvement (Wondergem et al., 2017). The early identification of patients who are at risk of ADL decline can assist health professionals to provide the appropriate care for these patients in order to

reduce the risk of ADL decline and also potentially avoid the decline of patients QOL by facilitating and maintaining the patient's highest independent functional level (Wondergem et al., 2017). Other studies have also found that stroke survivors who are more dependent in their ADL's are at higher risk of functional decline and this decline can be catalysed by impaired motor function of the leg as this can also contribute to a more physically inactive lifestyle that can negatively affect their rehabilitation progress (Wondergem et al., 2017).

Stroke survivors often live with long-standing comorbidities resulting from their stroke with hemiparesis being one of the most common affecting their functional outcomes and general health (Appelros et al., 2021). A recent systemic review on physical activity post stroke found that chronic stroke survivors take 4078 steps daily which is substantially lower than their healthy counterparts, who were found to take 8338 steps daily. Additionally, stroke survivors were found to be taking less steps than the required amount for persons living with disabilities which is ≥6500 steps daily (Joseph, Rhoda and Conradsson, 2020). There is currently limited research on how much moderate-to-vigorous physical activity (MVPA) stroke survivors in developing countries get as this kind of physical activity is beneficial for cardiovascular health (Joseph, Rhoda and Conradsson, 2020). Furthermore, the impaired ambulatory capacity of stoke survivors also affects their ability to participate in physical exercise and hinders the favourable physiological benefits of aerobic exercise which assists in reducing cardiovascular risk factors related to mortality (Lamberti et al., 2017).

In order to improve and maintain independent ADL function and mobility in stroke survivors' health professionals can develop community-based rehabilitation programmes that incorporate aerobic exercise and resistance strength training as these exercise modalities improve aerobic capacity, muscle strength, walking distance and physical function in stroke survivors (Lamberti et al., 2017). South Africa is yet to fully implement a systemic approach to stroke management in the public health care sector. Furthermore, lack of resources prevents all stroke survivors from receiving appropriate healthcare in the acute and chronic stages of stroke (Joseph, Rhoda and Conradsson, 2020).

2.8.2 Effects of depression/Anxiety on QOL

Post stroke depression (PSD) is prevalent and an important determinant of functional recovery in stroke survivors and can be defined as “depression that was not existent before the stroke and occurred in chronological context to a stroke” (Nickel and Thomalla, 2017). Neuropsychiatric complications following stroke have been documented for years. However, treatment has been centred around the motor impairments with little consideration given to the psychiatric impairments following stroke (Sarkar et al., 2021).

PSD is considered an “emotional, psychosomatic and death perpetuating condition following a stroke that develops early and contributes to long term ailment and jeopardizing the quality of life of a patient (Sarkar et al., 2021).

The prevalence of PSD is gradually on the rise and is estimated to be present in 18%-33% of the population. This variation in prevalence can be attributed to the fact that studies are conducted in different settings finding higher rates of PSD in acute care and outpatient facilities as compared to studies conducted in community dwelling stroke survivors (Medeiros et al., 2020). It is reported that majority of PSD cases are diagnosed after the first few weeks and up to four months post stroke (Sarkar et al., 2021). Stroke survivors who are diagnosed with PSD tend to have higher mortality rates, more pronounced cognitive impairments, higher rates of suicidal ideation and decreased quality of life (Medeiros et al., 2020).

There are numerous factors that can cause depression after a stroke and research has shown that the location of the lesion after stoke has an effect on depression (Sarkar et al., 2021). PSD is associated with left hemispheric lesions around the frontal and basal ganglia, occlusion at the deeper hemisphere forming lacunae at endogenous penetrating arteries and other medical conditions such as previous history of depression, diabetes mellitus and aphasia have inherent connections to the development of PSD (Sarkar et al., 2021).

The functional outcomes of patients who are diagnosed with PSD can be negatively affected if the condition is not managed as PSD is associated with decreasing cognitive abilities and motivation (Ezema et al., 2018). This postulation is supported by the fact that motor function recovery after stroke requires cognitive domains such as working memory attention and

executive function to be functional in order to achieve functional rehabilitation outcomes (Ezema et al., 2018).

Early identification of PSD is important in order to minimize the negative functional outcomes that the condition can have on stroke survivors' rehabilitation progress (Ezema et al., 2018). This can be done through screening by health care professionals at the initial physical therapy examination in order for patients to be referred to mental health professionals for early intervention (Ezema et al., 2018).

2.8.3 Effects of chronic pain on QOL

Chronic pain is one of the longstanding comorbidities that some stroke survivors can suffer from following a stroke. The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional experience associated with or resembling that associated with, actual or potential tissue damage" (Gandolfi et al., 2021). Pain is a common and highly disabling condition experienced by most stroke survivors and is frequently reported in the chronic stage of stroke rather than the acute (Gandolfi et al., 2021). Chronic pain in stroke survivors can present in several ways such as: central post-stroke pain (CSPS), complex regional pain syndrome (CRPS), pain related to spasticity, musculoskeletal pain, headaches and hemiplegic shoulder pain (HSP)(Gandolfi et al., 2021). Chronic pain is reported as being experienced by 40-65% of stroke survivors in the chronic phase of stroke (Haslam et al., 2021).

Pain following a stroke can affect the quality of life of stroke survivors and has been associated with anxiety, fatigue, depression as well as impaired cognitive and physical function (Haslam et al., 2021). Psychological distress is associated with the exacerbation and maintenance of chronic pain in stroke survivors which in turn negatively affects the prognosis of the patient by hindering adherence to the rehabilitation process which consequently influences the functional outcomes of stroke rehabilitation (Gandolfi et al., 2021). In order to improve the quality of life of stroke survivors suffering from chronic pain a multidisciplinary approach needs to be taken to provide the patients with holistic care where chronic pain management is an integral part of the treatment plan in order to aid the outcomes of the rehabilitation process (Haslam et al., 2021).

2.9 Review of outcome measures

The information discussed below explains reasoning for the chosen data collection instruments for this research project. The chosen tools were shown to be the most appropriate to use for this study as they gathered the specific information required in this study.

2.9.1) Prevalence of stroke risk factors using the Stroke risk card (Appendix A): This aims to assess risk factors for developing a secondary stroke in stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng. The tool assesses measures such as blood pressure, glucose, cholesterol, and body mass index. The tool was an adaptation of the Canadian TIA Risk Scoring System which was validated in a study conducted by Perry et al., (2021). The tool is based on standardized parameters which have been validated to use in clinical assessments e.g., blood pressure is measured using a sphygmomanometer and BMI is assessed using a digital bathroom scale and tape measure followed by doing the BMI calculation (weight (kg/height (m^2). However, test results are different with every test for the same patient on the same day. Therefore, it is difficult to test reliability of the instrument.

2.9.2) Demographic and clinical information Questionnaire (Appendix B): The questionnaire was administered by the researcher. This questionnaire was developed by the researchers in the intervention study (The effect of the Alexandra community stroke awareness campaign on knowledge and lifestyle modification after primary stroke) and was used to determine the demographic and clinical characteristics of stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng. The questionnaire is valid, measuring standard demographic factors which have been found to be valid and reliable. The methods used have been subjected to sufficient scientific peer review as was done for this questionnaire during its development (Swanson., 2004).

2.9.3) Health promoting lifestyle profile II (Appendix C): This researcher administered questionnaire, will be used to establish the stroke survivors' lifestyle: The original Health-Promoting Lifestyle Profile (HPLPII). This questionnaire became available in 1987. The HPLPII can be used for non-commercial research purposes as it has been proven to accurately

measure how lifestyle can contribute to risk of illness and can therefore, be reproduced as an appendix in a research proposal. (Sourced from the University of Nebraska Medical Centre.)

2.9.4) EuroQol five-dimension scale (EQ-5D) (Appendix D): Self-administered (with assistance given to participant, by researcher where required). This is a standard instrument used to measure generic quality of life measures using quality adjusted life years (QALY) focussing on five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. This tool is valid and reliable and has good construct validity based on its discriminant ability to distinguish among health-related known groups (Hernandez et al., 2019). Moreover, it has been effectively used to measure health status in many studies over the past 20 years (Ravens-Siebereret al., 2010).

2.9.5) Knowledge of stroke risk factors and warning signs questionnaire (Appendix E): This is a researcher administered questionnaire that is aimed at assessing the knowledge of stroke risk factors and warning signs of stroke survivors. This questionnaire was developed by researchers in Thailand for the study (Knowledge of Stroke Risk Factors and Warning Signs in Patients with Recurrent Stroke or Recurrent Transient Ischaemic Attack in Thailand) This tool is valid as it was shown to effectively measure the knowledge of risk of stroke in the participants of that study (Saengsuwan, Suangpho and Tiamkao, 2017).

2.10) Conclusion

The current body of knowledge that exists regarding the depth of knowledge that stroke survivors have related to health promoting lifestyles and risk of stroke indicates that more education needs to be done with stroke survivors in order to equip them with the necessary skills to prevent a second stroke. In South Africa more research needs to be conducted in order to clearly understand stroke survivors' knowledge of stroke risk factors as there has been insufficient research done in this area.

The research also indicates that the prevalence of stroke is not only on the rise globally, but that it is also affecting the younger population. This subsequently leads to more loss in productive years which affects the overall quality of life of stroke survivors and their families.

In order to reduce the risk of stroke and long-term disability caused by stroke the current literature suggests that intensive health promotion campaigns need to be conducted to educate people on what health promoting lifestyles are and how they can assist in reducing the risk of stroke.

2.11) Summary of the literature review

The purpose of this literature review was to indicate the current body of knowledge related to the degree of awareness that stroke survivors understand the effects that health promoting lifestyles have on their risk of experiencing another stroke, along with the various behaviours that form part of a health promoting lifestyle and the modifiable and non-modifiable risk factors for stroke.

The current literature indicates that the prevalence of stroke is on the rise globally and locally. Moreover, there has been an increased prevalence of stroke amongst the younger population which subsequently influences the socioeconomic aspect of the stroke survivor's life as they have experienced a stroke early on in life while they still have many productive years ahead of them. The rates of return to work have been shown to be dependent on numerous factors, chief amongst them being the level dependence that the stroke survivor has on their caregiver for assistance with ADL's following hospital discharge.

The literature indicates that stroke survivors who practice HPLs are less likely to experience a second stroke and that these HPL behaviours also have a positive effect on the stroke survivor's quality of life. However, the literature also indicates that more research needs to be done to better understand the level of knowledge that stroke survivors have regarding HPL's.

This study was designed to better understand the level of health promoting lifestyle knowledge, stroke related risk factors and quality of life of stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng in order to add to the existing body of knowledge in this area more specifically in the South African context.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter explains the methodology that was used in the implementation of this research project and details the study population and data analysis methods that were used in this project.

3.2 Study Design

The study is a descriptive quantitative study.

3.3 Research Setting

The study was conducted in the Community Health Centres in Mofolo, Chiawelo and Stretford communities of Gauteng Province, South Africa. This group is the control group of a concurrently running intervention study in Alexandra namely: “The effect of the Alexandra community stroke awareness campaign on knowledge and lifestyle modification after primary stroke”.

3.4 Research Participants

3.4.1 Sample Size

Sample size was calculated using statistical data provided by Johannesburg Metropolitan Health District Rehabilitation department. Monthly statistics were collected between the months of September to November 2019.

The combined average monthly number of out-patient stroke survivors at the study sites (Community Health Centres) over these months was 253, as provided by the Johannesburg Metropolitan Health District monthly community health centre patient statistics. An online sample size calculator named Qualtrics was used to determine the required sample for the population of stroke survivors who attend physiotherapy at the Chiawelo, Mofolo and Stretford

communities of Gauteng. For a population of 253 stroke survivors with a confidence interval of 95% a sample size of 153 participants was calculated by Qualtrics (Qualtrics XM // the Leading Experience Management Software, 2021).

3.4.2 Sampling Method

All stroke survivors attending out-patient physiotherapy at the Mofolo, Chiawelo and Stretford community health centres were contacted and invited to participate in the study. Response rate was maximized by contacting participants to remind them of the three-month follow up period (Barclay et al., 2002).

3.4.3 Source of Participants

Stroke survivors were sourced from the Mofolo, Chiawelo and Stretford community health centres. These sites were chosen because of the similarities in the demographics and socioeconomic status of stroke survivors in the larger Alexandra intervention group and the profiles of stroke survivors in these communities were similar to that of the Alexandra community. This was a crucial factor as these communities would be compared to the Alexandra group as the control. Furthermore, these sites were selected because community health centres were large sites and could provide the required numbers for the study.

3.4.4 Inclusion Criteria

- Participants had to be living in the Mofolo, Chiawelo and Stretford communities of Gauteng communities (for a minimum of six months).
- Participants had attended their community health centres visits at either the Mofolo, Chiawelo and Stretford community health centres.
- Participants need to have survived a primary stroke.

- Participants need to be an adult (18 years or older).

3.4.5 Exclusion Criteria

- Stroke survivors who are cognitively impaired.
- Participants who had survived multiple strokes. Confirmation of number of strokes was received from participants during screening process as researchers did not have access to patient medical files.
- Participants who had attended the intervention from the main Alexandra based study.

3.5 Data Collection Tools

3.5.1 Demographic and clinical information Questionnaire (Appendix A): The questionnaire will be administered by the researcher. This questionnaire was developed by the researchers in the main study (The effect of the Alexandra community stroke awareness campaign on knowledge and lifestyle modification after primary stroke) and is aimed at understanding the demographic and clinical characteristics of stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng. Some of the questions assessing the clinical risk factors for stroke assess include asking if the participant has a diagnosis of hypertension, diabetes mellitus and any other illnesses that may contribute to the risk of stroke. The demographic risk factors were assessed by asking the age, gender and level of education of the participant as a means to assess the risk of stroke.

The questionnaire is valid, measuring standard demographic factors which have been found to be valid and reliable. The methods used have been subjected to sufficient scientific peer review as was done for this questionnaire during its development (Swanson., 2004).

3.5.2 Prevalence of stroke risk factors using the Stroke risk card (Appendix B): This aims to determine if stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng understand their own personal risk for developing another stroke. The tool was developed using

literature, while content validity established by sharing it with experts in the field of stroke rehabilitation. Furthermore, the tool is based on standardized parameters e.g., blood pressure etc that are measured using a sphygmomanometer. This outcome measure uses a risk-based scoring scale (low, medium and high). The patient is scored according to their level of risk which is determined by the assigned values in each category. A score of 7-9 ticks in the low-risk block= low risk of stroke. Score of ≥3 ticks in medium category= Medium risk of stroke. Score of ≥3 ticks in high-risk category= High risk of stroke. However, test results are different with every test for the same patient on the same day therefore it is difficult to test reliability of the instrument.

3.5.3 Health promoting lifestyle profile II (Appendix C): This researcher administered questionnaire, will be used to establish the stroke survivors' lifestyle: The original Health-Promoting Lifestyle Profile (HPLPII). A score for overall health-promoting lifestyle is obtained by calculating a mean of the individual's responses to all 52 items; six subscale scores are obtained by calculating a mean of the responses to subscale items.

This questionnaire became available in 1987. The HPLPII can be used for non-commercial research purposes as it has been proven to accurately measure how lifestyle can contribute to risk of illness and can therefore, be reproduced as an appendix in a research proposal. (Sourced from the University of Nebraska Medical Centre.)

3.5.4 EuroQol five-dimension scale (EQ-5D) (Appendix D): Self-administered (with assistance given to participant, by researcher where required). This is a standard instrument used to measure generic quality of life measures using quality adjusted life years (QALY). The EQ-5D assesses five categories to determine the overall health-related quality of life. The categories are mobility, self-care, usual activities, pain/discomfort and depression/anxiety. The total possible score for this questionnaire is 15.

The quality of life is assessed by looking at the score measured for each participant, higher scores in this questionnaire indicate that a participant has higher quality of life than those who

scored less in this questionnaire. Quality of life is assessed in five categories namely: mobility, self-care, usual activities, pain/discomfort and depression/anxiety. The results of the EQ-D5 will also include the Visual Analogue Scale (VAS) where participants score their own level of perceived status of their health at that time. The VAS in the EQ-D5 is measured on a scale of 0-100 where 0 will be indicative of "low" subjective perception of personal health status and 100 will indicate a "high" subjective perception of personal health status.

This tool is valid and reliable and has good construct validity based on its discriminant ability to distinguish among health-related known groups (Hernandez et al., 2019). Moreover, it has been effectively used to measure health status in many studies over the past 20 years (Ravens-Siebereret al., 2010). The quality of life will be assessed by looking at the score measured for each participant, higher scores in this questionnaire will indicate that a participant has higher quality of life than those who score less in this questionnaire.

3.5.5 Knowledge of stroke risk factors and warning signs questionnaire (Appendix E): This is a researcher administered questionnaire that is aimed at assessing the knowledge of stroke risk factors and warning signs of stroke survivors. This questionnaire was developed by researchers in Thailand for the study (Knowledge of Stroke Risk Factors and Warning Signs in Patients with Recurrent Stroke or Recurrent Transient Ischaemic Attack in Thailand) This tool is valid as it was shown to effectively measure the knowledge of risk of stroke in the participants of that study (Saengsuwan, Suangpho and Tiamkao, 2017).

The results of the stroke risk factors, and knowledge questionnaire will be divided into three categories that classify how much a participant scores. Participants' scores will be classified using a Likert scale where the scores are as follows: (0-9 out of 37= poor stroke risk knowledge; 10-18 out of 37= fair stroke risk knowledge; 19-28 out of 37= good stroke risk knowledge and 29-37 out of 37= excellent stroke risk knowledge). The questionnaire is divided into seven categories namely: understanding the meaning of stroke and TIA, stroke risk factors, stroke warning signs, signs and symptoms of stroke, treatment of stroke, prevention of stroke and actions participants would take if they had a stroke.

3.6 Procedure of the study

Permission to conduct the research was obtained from the Gauteng Provincial Department of Health as well as Mofolo, Chiawelo and Stretford clinics which was used as a recruitment base Participants were invited to participate in the study (see Appendix H), by informing them of the study during appointment bookings, group therapy sessions or individual treatment sessions in the physiotherapy department as well as the Chiawelo community practice centre.

A pilot study was not conducted for this research as the small sample size required would not be suitable for statistical analyses.

A registered Basic Life Support Ambulance Health care worker was trained by the researcher to administer the -researcher administered- questionnaires. Training of the research assistant was conducted in two intervals. The first was four weeks before data collection and the second training was conducted two days before data collection to ensure that the research assistant understood the outcome measures thoroughly before commencement of data collection. The research assistant conducted testing of cholesterol and glucose levels and the researcher tested body mass index, blood pressure and questioning regarding the amount of physical activity that the participants participated in. The questionnaires were administered by the researcher and research assistant while others were self-administered.

Nurses from all facilities (Chiawelo, Mofolo and Stretford Community Health Centres) had given verbal and written willingness to participate in the study in their capacity as health professionals who were appointed as permanent staff at the Community Health Centres and their permission was further approved by the facility managers at those sites. However, their participation fell away due to the high patient volumes that the community health centres were experiencing during the Covid-19 pandemic. Therefore, only the researcher and research assistant were present during the data collection of this study. The study was explained to the participants and written informed consent was obtained at both the initial and three-month assessments. Participants then answered self-administered, and interviewer (researcher or research assistant) administered questions. Participants were contacted for the three-month follow-up session where all the outcome measures were administered again. Outcome measures were readministered by the research assistant and not by the primary researcher to

avoid bias. Home visits and transport fee arrangements were made for participants who were unable to visit the community health centre for the three months follow up of the study.

Coronavirus safety measures (e.g., wearing masks, social distancing and adequate room ventilation) were implemented during the data collection process.

3.7 Ethical Considerations

Ethical clearance was received as part of the main study clearance number: (M171062) for the Alexandra based study, and ethical clearance was also received for this research project as part of a Master of Science in Physiotherapy degree (M201024). Permission to conduct the research was obtained from the Gauteng Provincial Department of Health, Mofolo, Chiawelo and Stretford community health centres which were used as recruitment bases (Ethics approval number: M201024). Participants were informed that their participation in the study was voluntary, and they may withdraw from the study at any time.

Information sheets (outlining the purpose of the study and participation requirements of the study) and consent forms were given to participants to sign prior to participation. Information sheets were written in English and for participants who could not read, explanations and translations were conducted by the researcher for Sesotho, Sepedi, Setswana, isiZulu and isiXhosa which are the most commonly spoken languages in the three communities. Information received from the participants was treated confidentially such that records cannot be linked to any individual participating in the study. Data collected (surveys/questionnaires) was stored off site in a secure container by the researcher. Only the researcher and the research assistants had access to information related to the study and its participants.

3.8 Data Analysis

Data was analysed using STATISTICA 14 (64-bit) for Windows and STATA 17 SE.

Data collection was done using survey tools that are listed and discussed, refer to Appendix F. The data was separated into different categories and then coded and populated onto an excel spreadsheet before being analysed using the appropriate statistical tests. Quantitative and categorical data was analysed using frequencies and percentages and quantitative continuous data was analysed using frequencies, percentages, mean and standard deviations, as well as median and interquartile ranges. It must be noted that there was no intervention done as this is a control study therefore it was not necessary to do any statistical comparison of parameters between the baseline and three months reassessments. This study was observational in nature and will present an outline of the measured observations.

Surveys and questionnaires were used to gather data from participants. The researcher and research assistant conducted interviews with the participants at initial assessment followed by another assessment three months later.

Table 1: Data collection tools, Types of data and Statistical tests

Objective	Outcome measure	Type of data	Statistical test/ Analysis	Scoring method	Data presentation
To determine demographic and clinical factors of stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng at baseline assessment and three-month follow up.	Demographic and clinical information questionnaire.	Quantitative Categorical data	Frequency and percentage	This three-section questionnaire is scored categorically to determine the demographic and clinical data of the participant	Frequency tables (demographic and clinical information) Bar graphs (co-morbidities and economic situation)
To determine stroke risk factors in stroke survivors within the Mofolo, Chiawelo and Stretford communities	Stroke Risk card	Quantitative ordinal Categorical data	Frequencies and percentages	Is a value determined, risk-based scoring scale (low, medium and high). The patient is scored according to their level of risk which is determined by the assigned values in each category. A score of 7-9 ticks in the low-risk block= low risk of stroke. Score of ≥3 ticks in medium category= Medium risk of stroke. Score of ≥3 ticks in high-risk category= High risk of stroke.	Bar graphs
Determine health promoting lifestyles of stroke survivors in the participants at Mofolo, Chiawelo and Stretford communities (initial	Health promoting lifestyle profile (ii)	Quantitative Continuous data	Frequencies, percentages and mean (SD)	A score for overall health-promoting lifestyle is obtained by calculating a mean of the individual's responses to all 52 items; six subscale scores are obtained by calculating a mean of the	Frequency tables and bar graphs

Objective	Outcome measure	Type of data	Statistical test/ Analysis	Scoring method	Data presentation
assessment and 3 months later).				responses to subscale items.	
Assessment of knowledge of stroke risk factors and warning signs of stroke survivors	Knowledge of stroke risk factors and warning signs questionnaire	Quantitative Discrete data	Frequencies and percentages. Median and Inter Quartile ranges (IQR)	This is a categorised questionnaire with 5 sections. One mark is given for the correct answer from questions 1-31. And then one mark is given by answering 2 from question 31-37.	Frequency tables and bar graphs.
To establish the quality of life of survivors of stroke survivors in the Mofolo/ Chiawelo and Stretford communities	EuroQol-5Dimension (EQ-5D)	Quantitative Continuous data	Frequencies and percentages Median and Inter Quartile Ranges (IQR).	This scale is numbered from zero to one hundred. One hundred indicates the highest possible level of health and zero, the worst. Each item is scored from one to five on its respective level to calculate the final score.	Frequency tables, bar graphs and histograms with box and whisker plots.

The results found from the implementation of this study will be presented in the next chapter.

CHAPTER 4 RESULTS

4.1 Introduction

In this chapter the results generated from the research are presented. This study aimed to determine the prevalence and knowledge of stroke risk factors and health promoting lifestyles amongst stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng and assess their quality of life.

The results are presented in the following five-part chronology: demographic and clinical data which will be represented using tables and bar graph followed by the results measured from the stroke risk card, HPLPII, stroke knowledge and risk factors questionnaire and EQ-5D. The results are presented using means, standard deviations, median, inter quartile ranges, percentages, frequency tables and histograms with bell curves to outline the distribution of the data.

4.2 Distribution of Study Sample

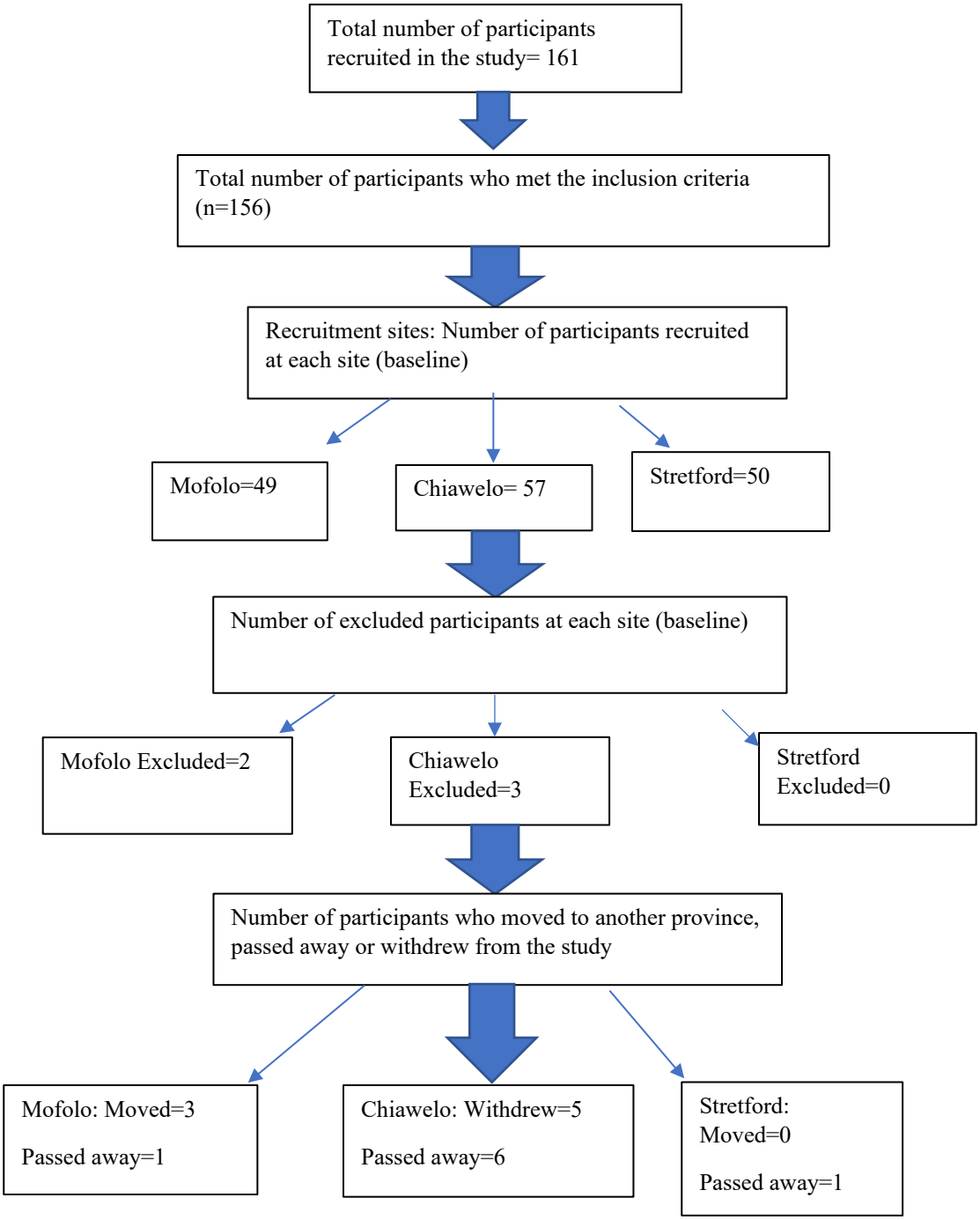
There was a total of 161 stroke survivors who were invited to participate in this study and 156 of them met the inclusion criteria and participated in the initial baseline assessment of the study. Five participants were excluded due to cognitive impairment.

Of the 156 participants who were assessed at baseline only 49 returned for the three-month reassessment. Eight participants passed away between the initial and three-month reassessments, three moved to different provinces and five chose to withdraw from the study. Ninety-one participants who attended the initial assessment did not arrive for their three-month reassessments even though researchers contacted them to remind them of their scheduled appointments for reassessment.

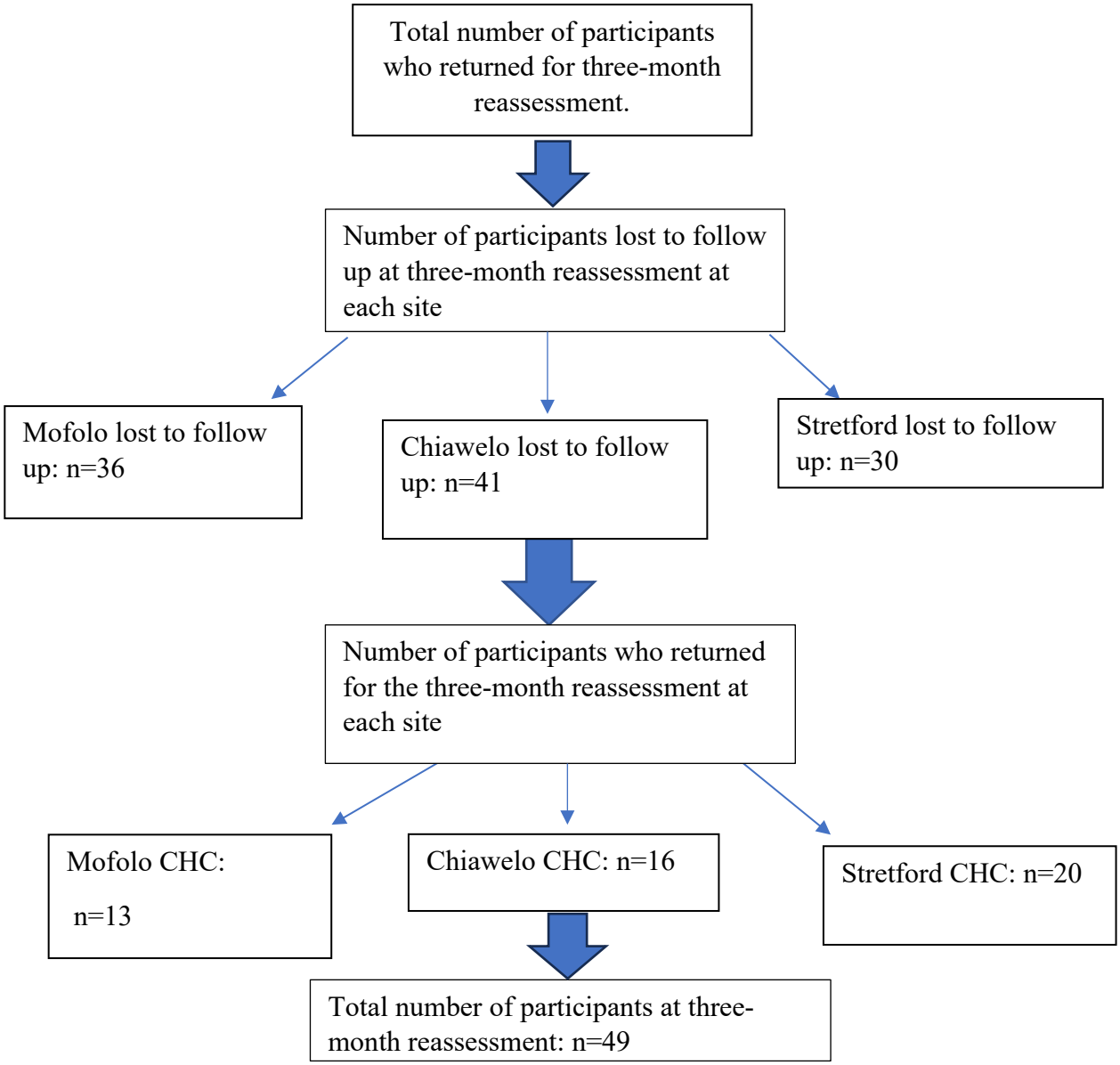
The loss to follow up is attributed to several factors such as: participants changing contact details and not updating the research team, participants losing their phones, participants using family and friends' cell phones as a means of contact and the owner of the phone not passing on the message, participants living transient lives in informal settlements and moving from one

area to another, having unreliable transport to come to their appointments, bad weather affecting their ability to come to the clinic on the scheduled days for the three-month reassessment and subsequently missing the alternative appointment that was given and others who cited socioeconomic difficulties such as not having transportation money to come for the follow up appointments because the transport money provided by the research team was insufficient to cover all their traveling costs.

The distribution of the study sample size along with the number of participants who did not meet the inclusion criteria, number of participants who moved to different provinces and the number of participants who passed away is illustrated in the flow diagram below (Flow diagram 1). There was a total of 5 participants who did not meet the inclusion criteria during participant recruitment. A total of 9 participants passed away and 8 moved to different provinces.



Flow Diagram A: Baseline assessment



Flow Diagram B (three-month reassessment)

4.3 Demographic Information

The participation distribution was as follows: of the 156 participants that were recruited 49 were from Mofolo CHC, 57 from Chiawelo CHC and 50 from Stretford CHC. There were 79 male and 77 female participants at baseline assessment. The mean age of the participants was 54 years (SD=14.46). The youngest participant was 19 years old with the oldest being 88 years old at baseline.

The majority n=63 (40.4%) of the population reported being single at baseline assessment while the category with the lowest marital status was those who reported having live-in partners which totalled n=8 (5.1%). The highest level of education that was measured in this study was n=64 (41.0%) of participants reporting grade 7 as their highest level of education while n= 3 (1.92%) of the participants reported having a university degree or post matric qualification.

Most of the participants in this study n=68 (43.5%) reported having had their stroke in the past year or less while only n=6 (3.84%) of the participants had their stroke 10 or more years ago. Additionally, the results show that, n=79 (50.6%) had a left sided hemiplegia as compared to n=77 (49.4%) right hemiplegia.

The demographic questionnaire also indicated n= 137 (87.2%) of the respondents reported dysphasic (expressive) speech as their main speech challenge post stroke.

Table 2: Demographic and clinical information (Baseline)

Demographic/ Clinical factors	**F (%)**
Gender	
Male	79 (50.6%)
Female	77 (49.4%)
Age	
18-28	6 (4.0%)
29-38	22 (14.0%)
39-48	30 (19.0%)
49-58	42 (27.0%)
59-68	36 (23.0%)
≥68	20 (13.0%)
Marital status	
Single	63 (40.4%)
Divorced	27 (17.3%)
Live-in partner	8 (5.1%)
Married	36 (23.1%)
Widowed	22 (14.0%)
Highest educational level	
University Degree	3 (1.9%)
Grade 12+3 years	14 (8.9%)
Grade 12 or equivalent	36 (23.0%)
Up to grade 11	39 (25.0%)
Up to grade 7	64 (41.0%)
Time since onset of stroke	

1 year or less	68 (43.5%)
2 years	25 (16.0%)
3 years	25 (16.0%)
>4 years	32 (20.5%)
>10 years	6 (3.8%)
Speech Problems	
Dysphasic(expressive)	137 (87.2%)
Aphasic (expressive)	18 (10.9%)
Dysarthria	1 (1.2%)
Hemiplegic side	
Left	79 (50.6%)
Right	77 (49.4%)

Key: F (Frequency)

Demographics (three-month reassessment)

The number of participants who returned for the three-month follow up were only 49 out of the 156 who participated at baseline. This translates to a total of 107 participants that were lost to follow up. Of the returning participants 13 were from Mofolo CHC, 16 from Chiawelo CHC and 20 from Stretford CHC. Stretford CHC has the highest rate of returning participants (40%).

The mean age was 54.9 years (SD=14.30). There were more male participants who returned for the three-month reassessment n=29 (59.2%) as compared to n=20 (40.8%) of females returning. The youngest participant at the three-month reassessment was 27 years old and the oldest was 83 years old. The marital status at the three-month reassessment showed that n=7 (14.0%) participants were married while n=21 (42.8%) of participants reported being single.

At the three-month reassessment n=23 (46.9%) of the participants reported their highest level of education to be up to grade 7 and none n=0 (0%) of the participants reported having a

university degree or post matric qualification. The majority of participants who returned for the three-month reassessment n=19 (38.8%) survived their stroke within the last year or less. Furthermore, n=5 (10%) had survived the stroke more than ten years ago. In the three-month reassessment the results showed that majority of the participants had a right sided hemiplegia n=26 (53.1%) with n=23 (47.0%) of participants having left sided hemiplegia. Of the returning participants n=13 (26.5%) reported having speech problems with expressive aphasia and dysarthria both reported in n=5 (10.2%) of the population respectively.

Table 3: Demographic and clinical information (three-month reassessment)

Demographic/Clinical information	**F (%)**
Gender	
Male	29 (59.2%)
Female	20 (40.8%)
Marital status	
Single	21 (42.9%)
Divorced	11 (22.4%)
Live-in partner	5 (10.2%)
Married	7 (14.3%)
Widowed	5 (10.2%)
Age	
18-28	2 (4.0%)
29-38	7 (14.0%)
39-48	2 (4.0%)
49-58	18 (37.0%)
59-68	13 (27.0%)
≥68	7 (14.0%)
Highest educational level	
University Degree	0 (0%)
Grade 12+3 years	3 (6.1%)
Grade 12 or equivalent	11 (22.4%)
Up to grade 11	12 (24.5%)
Up to grade 7	23 (46.9%)

Time since onset of stroke	
1 year or less	19 (38.8%)
2 years	9 (18.4%)
3 years	6 (12.2%)
>4 years	10 (20.4%)
>10 years	5 (10.2%)
Hemiplegic side	
Left	23 (46.9%)
Right	26 (53.1%)
Speech Problems	
Dysphasic (expressive)	3 (6.1%)
Aphasic (expressive)	5 (10.2%)
Dysarthria	5 (10.2%)

Key: F (Frequency)

4.4 Comorbidities (baseline)

Figure 1 below illustrates the results measured for comorbidities that were reported in the study. The results that were measured at baseline indicated that hypertension was the most common comorbidity/lifestyle related disease with n=101 (65%) of the population reporting being diagnosed with hypertension at the baseline assessment and only n=3 (2%) of the population reporting asthma as a comorbidity. HIV and diabetes were reported by n=44 (28%) of participants at baseline assessment respectively.

Figure 2 illustrates the results measured for comorbidities that were reported at three-month follow-up in the study. The results that were measured at the three-month reassessment indicated that hypertension was still the most common comorbidity/ lifestyle related disease where n=36 (73%) of the population were diagnosed with hypertension while asthma was still the least prevalent comorbidity reported at n=1 (2%). HIV infection was reported by n=16 (32%) of the research population. A total of n=16 (32%) participants were diagnosed as diabetic at the three-month follow up. Most participants in this study had more than one co-morbidity at the time of data collection, therefore the percentages represented in the figures exceed 100% as most participants fell into more than one category of co-morbidity.

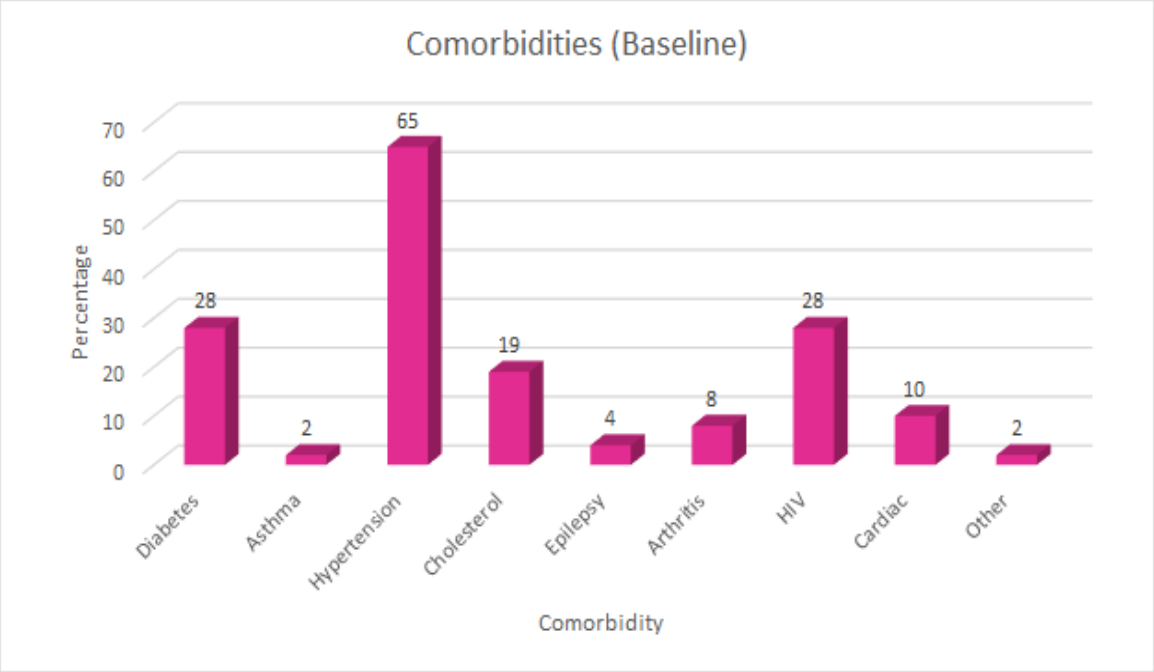


Figure 1: Comorbidities Bar Chart (Baseline assessment)

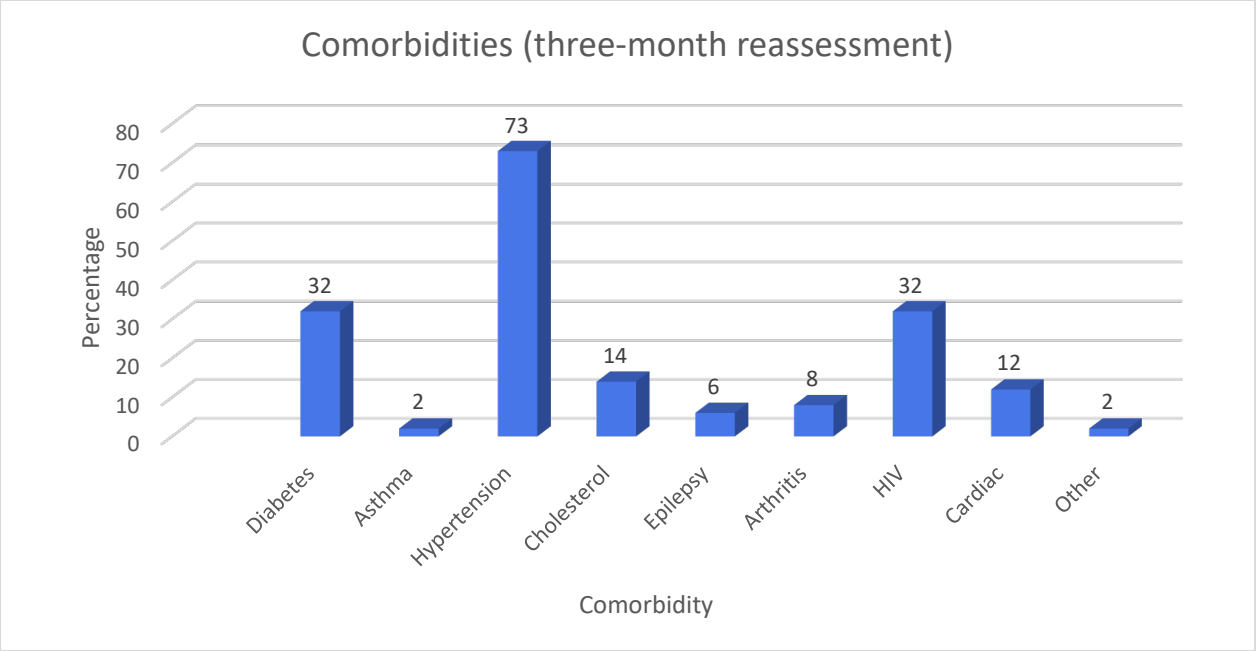


Figure 2: Comorbidities Bar Chart (three-month reassessment)

4.5 Economic situation (baseline)

The results measured at baseline for the economic situation of the participants indicated that 76% of the participants were contributing to the family by means of the disability grant received monthly from the government, while 6% reported that they were bread winners who were able to return to work. The results measuring the economic situation of the participants at baseline assessment is illustrated in figure 3 below.

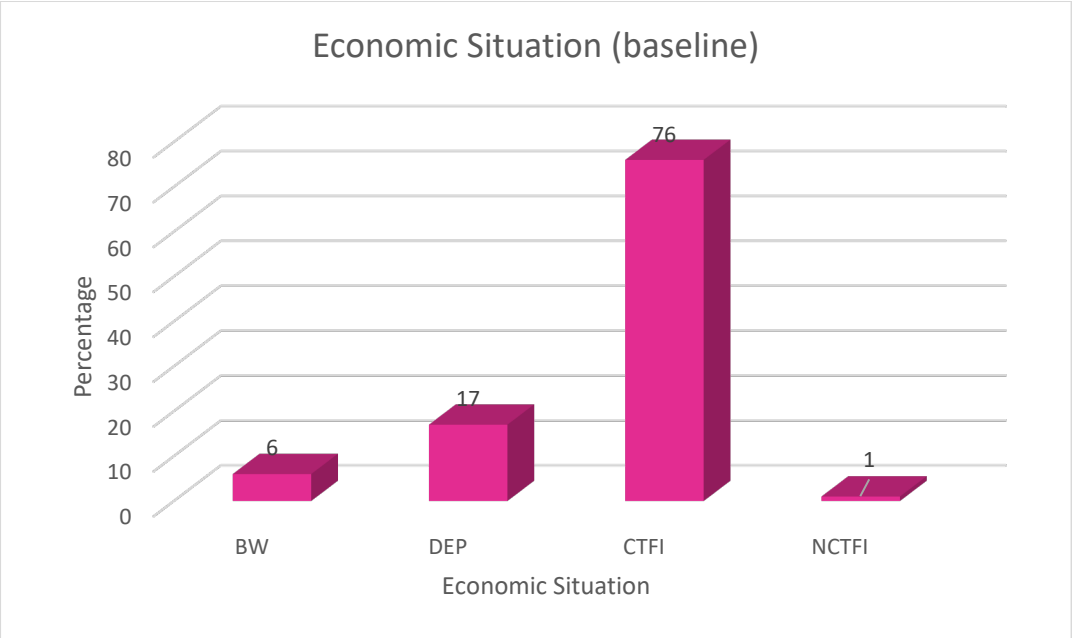


Figure 3: Economic situation Bar Chart (baseline)

Key: BW (Bread Winner) DEP (Dependent) CTFI (Contributing to family income) NCTFI (Not contributing to family income)

Economic situation (three-month reassessment)

The results measured at the three-month reassessment for the economic situation of the participants indicated that 80% of the participants were contributing to the family by means of the disability grant that they received monthly from the government and 6% reported that they were bread winners who were able to return to work. The results measuring the economic situation of the participants at three-month reassessment is figure 4 below.

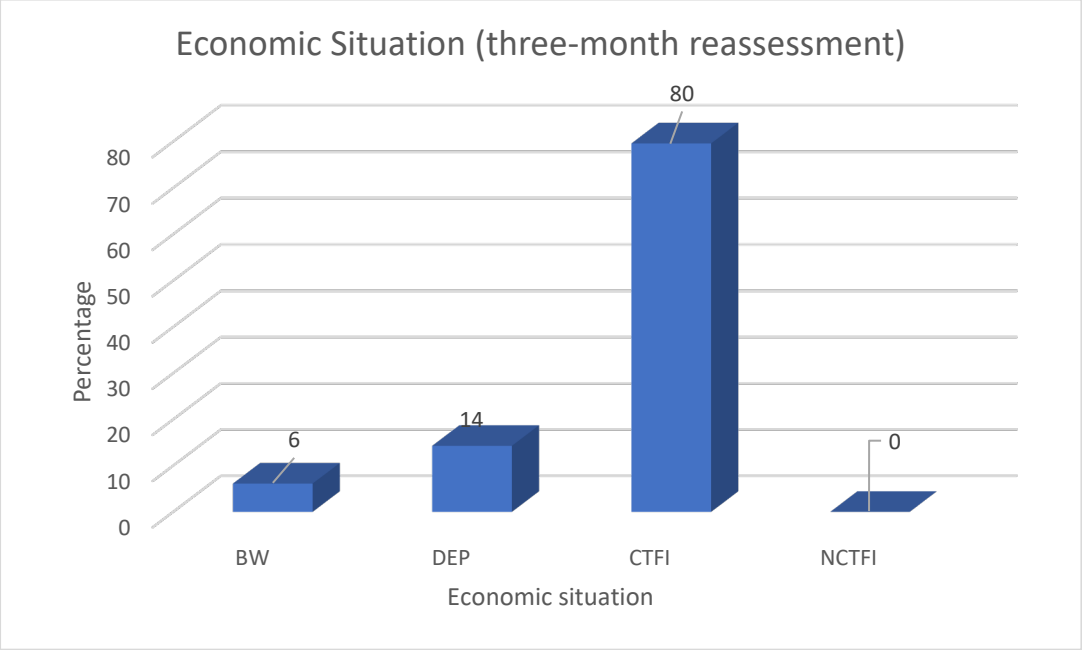


Figure 4: Economic Situation Bar Chart (three-month reassessment)

Key: BW (Bread Winner) DEP (Dependent) CTFI (Contributing to family income) NCTFI (Not contributing to family income)

4.6 Stroke Risk Card

The scoring of the stroke risk card is categorised into three aspects namely, low risk which is quantified as a score of between 7 and 9 ticks in the low-risk category, medium risk quantified as having three or more ticks in the medium risk category and high risk of stroke is quantified as having three or more ticks in the high-risk category. The results measured from the stroke risk card at baseline recorded the percentages of participants and categorized them as having low, medium or high risk of stroke based on their scores. The results from the stroke risk card categorise the severity of stroke risk for stroke survivors who were diagnosed with the comorbidities stated below. For example, a combined total of 25% of participants were recorded as having a medium to high risk of stroke for diabetes at baseline assessment while 75% of participants were categorised to be at low risk of stroke for diabetes on the stroke risk card at baseline assessment.

Figure 5 illustrates the results from the initial assessment. The results show that 85% of participants never consumed alcohol, 83% of participants never smoked, 81% measured <5.2 mmol/L for cholesterol and 75% measured <10 mmol/L for diabetes, thereby placing them at low risk or stroke. The results also show that stress (63%) and blood pressure (53%) had the most participants displaying a moderate risk of stroke. For high risk of stroke lack of exercise (35%) was the biggest contributor.

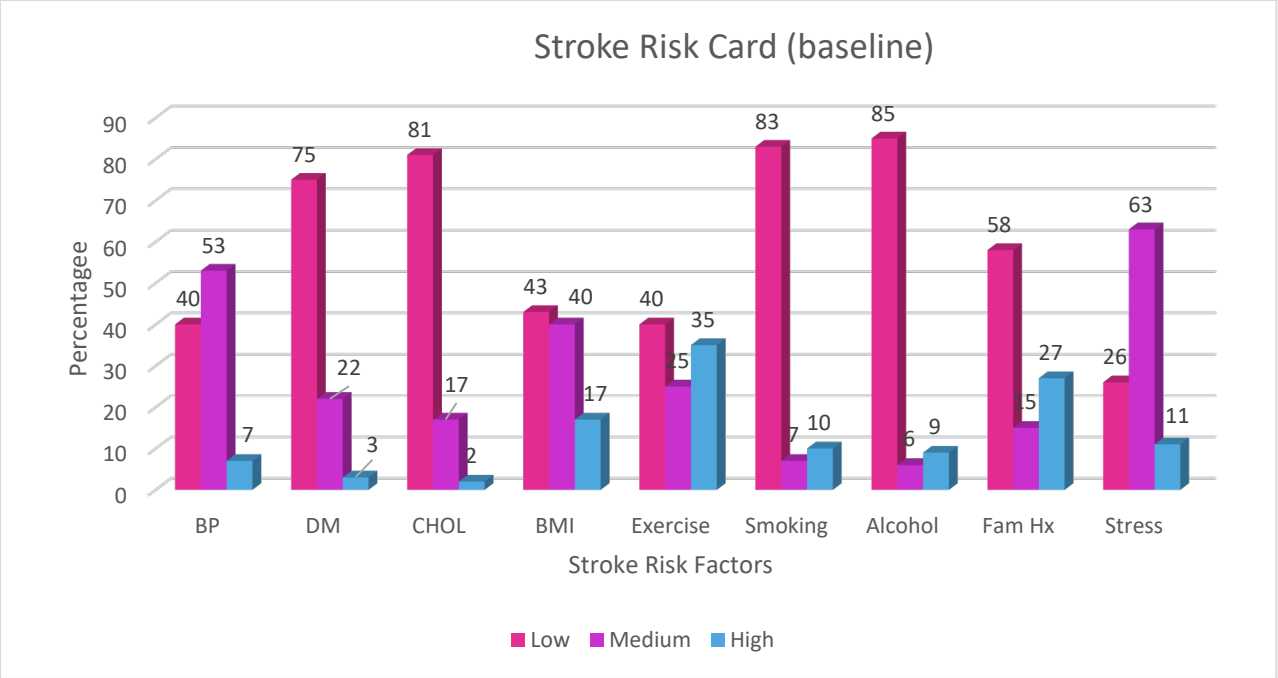


Figure 5: Stroke risk care bar chart (baseline)

Key: DM (Diabetes mellitus) ASTH (Asthma) CHOL (Cholesterol) BMI (Body Mass Index)

Figure 6 illustrates the results from the three-month reassessment. Of the 49 participants that returned for three-month reassessment, the results show that 92% of the participants assessed never consumed alcohol, 84% never smoked, 82% scored <10 mmol/L for diabetes and 78% scored <5.2 mmol/L for cholesterol which placed them at lowest risk of developing a stroke. The results show that blood pressure measurements placed 53% of participants in the moderate risk category for stroke, while 45% of participants reported moderate levels of stress, thereby placing them in the moderate risk of stroke category. For high risk of stroke, family history 31% was the biggest contributor.

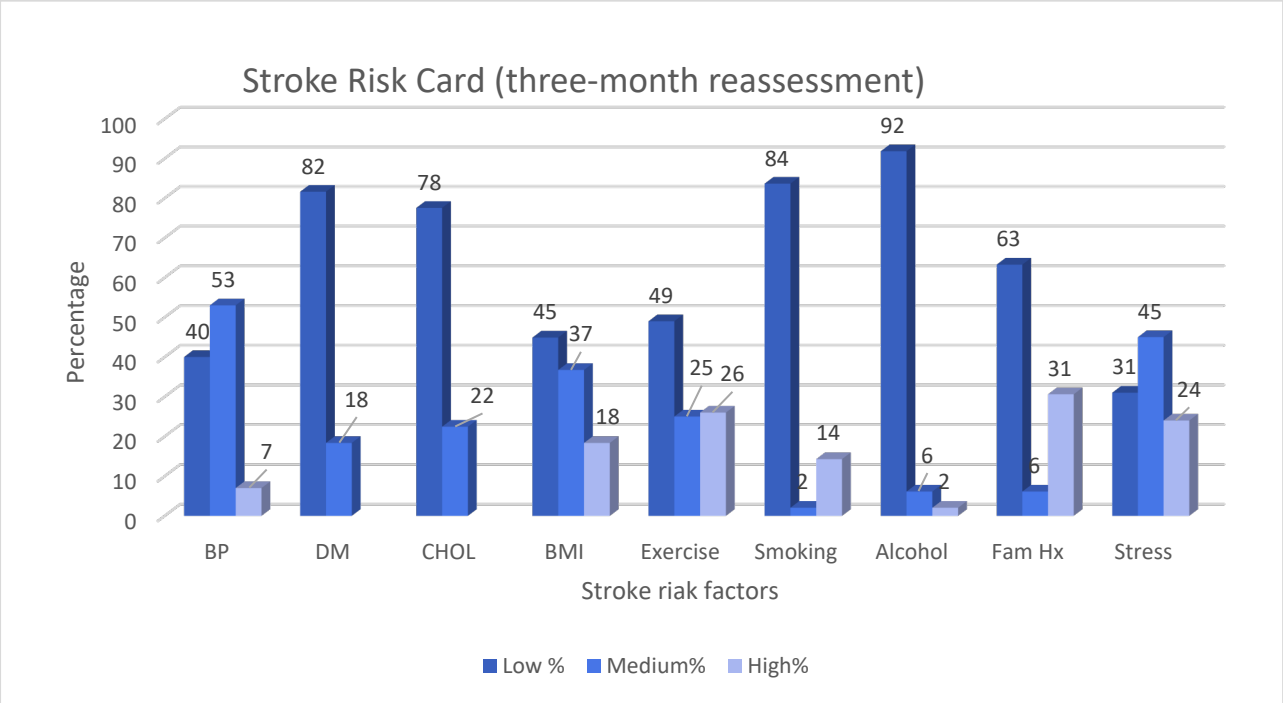


Figure 6: Stroke risk card Bar Chart (three-month reassessment)

Key: DM (Diabetes mellitus) ASTH (Asthma) CHOL (Cholesterol) BMI (Body Mass Index)

4.7 Health Promoting Lifestyle Profile II (HPLPII)

The health promoting lifestyle profile (II) is made up of 52 questions. The lowest possible score is 52 points while the highest possible score is 208 points per participant. Questions were answered using a score range where; never=1, sometimes=2, often=3 and regularly=4. The lowest score recorded was 81 out of 208 and the highest score was 171 out of 208 at baseline assessment. The mean score was 121 (SD= 16.79) at baseline assessment and at the three-month reassessment mean was 118 (SD=16.06) for this questionnaire. The results of the health promoting lifestyles of the respondents in the research are presented. Cronbach's alpha for inter-rater reliability was calculated at baseline and measured as 0.8552.

The table below indicates that majority of the participants reported not checking their pulse when they exercised (77%) and 70% never eat 6-11 servings of bread, cereal, rice and pasta daily. Fifty-two percent (52%) of participants reported eating breakfast regularly.

Table 4: Health promoting lifestyle profile II scores (baseline)

HPLPII Question **(participants n=156)**	Never f(%)	Sometimes f(%)	Often f(%)	Regularly f(%)
Discuss problems and concerns with loved ones?	39 (25%)	51 (33%)	43 (27%)	23 (15%)
Chose diet low in fat, saturated fat and cholesterol?	29 (19%)	64 (41%)	51 (33%)	12 (7%)
Report unusual signs and symptoms to health care professional?	20 (13%)	69 (44%)	47 (30%)	20 (13%)
Follow a planned exercise program?	46 (29%)	49 (32%)	33 (21%)	28 (18%)
Get enough sleep?	17 (11%)	48 (31%)	38 (24%)	53 (34%)
Feel I am growing in positive ways?	34 (22%)	56 (36%)	55 (35%)	11 (7%)
Easily praise others for their achievements?	11 (7%)	28 (18%)	79 (51%)	38 (24%)
Limit consumption of sugar e.g. (sweets)?	45 (29%)	56 (36%)	36 (23%)	19 (12%)
Read or watch content about improving health?	39 (25%)	55 (35%)	48 (31%)	14 (9%)
Exercise vigorously for 20 minutes or more at least three times a week e.g. brisk walking/ aerobic exercise?	56 (36%)	55 (35%)	27 (17%)	18 (12%)
Take time for relaxation daily?	21 (13%)	47 (30%)	65 (41%)	23 (15%)
Believe that my life has purpose?	28 (18%)	51 (33%)	61 (39%)	16 (10%)
Maintain meaningful relationships with others?	13 (8%)	35 (22%)	54 (35%)	54 (35%)
Eat 6-11 servings of bread, cereal, rice	109 (70%)	29 (19%)	17	1 (1%)

HPLPII Question **(participants n=156)**	Never f(%)	Sometimes f(%)	Often f(%)	Regularly f(%)
and pasta daily?			(10%)	
Question health professionals in order to understand their instructions?	25 (16%)	50 (32%)	55 (35%)	26 (17%)
Do light to moderate physical activity e.g. sustained walking for 30- 40 minutes 5 or more times a week?	56 (36%)	58 (37%)	24 (15%)	18 (12%)
Accept thing in my life that I cannot change?	28 (18%)	52 (33%)	58 (37%)	18 (12%)
Look forward to the future?	29 (19%)	53 (34%)	55 (35%)	19 (12%)
Spend time with close friends?	36 (23%)	41 (26%)	52 (34%)	27 (17%)
Eat 2-4 servings of fruit each day?	25 (25%)	61 (39%)	50 (32%)	20 (13%)
Get a second opinion when I question my health care provider's advice?	40 (26%)	60 (38%)	45 (29%)	11 (7%)
Take part in leisure activities that are physical e.g. swimming, dancing, cycling?	79 (51%)	43 (28%)	23 (14%)	11 (7%)
Concentrate on pleasant thoughts at bedtime?	40 (26%)	52 (33%)	51 (32%)	13 (9%)
Feel content and at peace with myself?	29 (19%)	56 (36%)	58 (37%)	13 (8%)
Find it easy to show concern and love to others?	17 (11%)	52 (33%)	53 (34%)	34 (22%)
Eat 3-5 servings of vegetables each day?	27 (18%)	54 (35%)	49 (31%)	26 (17%)
Discuss my health concerns with health professionals?	22 (14%)	55 (35%)	51 (33%)	28 (18%)

HPLPII Question **(participants n=156)**	Never f(%)	Sometimes f(%)	Often f(%)	Regularly f(%)
Do stretching exercises at least three times a week?	49 (31%)	47 (30%)	35 (23%)	25 (16%)
Use specific methods to control my stress?	43 (28%)	48 (31%)	46 (29%)	19 (12%)
Work towards long-term goals in my life?	30 (19%)	52 (33%)	58 (37%)	16 (11%)
Touch and am touched by people in my life I care about?	38 (24%)	59 (38%)	39 (25%)	20 (13%)
Eat 2-3 servings of milk, yogurt or cheese each day?	32 (21%)	74 (47%)	38 (24%)	12 (8%)
Inspect my body at least monthly for physical changes and danger signs?	28 (18%)	30 (19%)	58 (37%)	40 (26%)
Get exercise during daily activities e.g. walking during lunch, using stairs and parking far away from entrances?	38 (24%)	48 (31%)	56 (36%)	14 (9%)
Balance time between work and play?	43 (28%)	56 (36%)	40 (25%)	17 (11%)
Find each day challenging and interesting?	41 (26%)	60 (38%)	36 (24%)	19 (12%)
Find ways to meet my needs for intimacy?	65 (42%)	37 (24%)	34 (22%)	20 (12%)
Eat only 2-3 servings from the meat, fish, beans, nuts and poultry food sections each day?	22 (14%)	63 (41%)	58 (37%)	13 (8%)
Ask health care professionals for information to better take care of myself?	35 (22%)	57 (37%)	50 (32%)	14 (9%)
Check my pulse when exercising?	120 (77%)	28 (18%)	7 (4%)	1 (1%)
Practice meditation 15-20 minutes daily?	47 (30%)	58 (37%)	43 (28%)	8 (5%)

HPLPII Question **(participants n=156)**	Never f(%)	Sometimes f(%)	Often f(%)	Regularly f(%)
Am aware of what is important to me in my life?	14 (9%)	45 (29%)	76 (49%)	21 (13%)
Have support from a network of caring people?	21 (13%)	30 (19%)	49 (32%)	56 (36%)
Read nutritional information on food packaging?	84 (54%)	33 (21%)	33 (21%)	6 (4%)
Attend educational programs on personal health care?	45 (29%)	64 (41%)	33 (21%)	14 (9%)
Reach my target heart rate when exercising?	69 (44%)	43 (28%)	30 (19%)	14 (9%)
Pace myself to prevent tiredness?	56 (36%)	44 (28%)	33 (21%)	23 (15%)
Feel connected with a force greater than myself?	21 (13%)	38 (24%)	51 (33%)	47 (30%)
Settle conflicts with others through discussions and compromise?	28 (18%)	40 (26%)	44 (28%)	44 (28%)
Eat breakfast?	9 (6%)	40 (26%)	26 (16%)	81 (52%)
Seek guidance and counselling when necessary?	30 (19%)	46 (29%)	63 (41%)	17 (11%)
Expose myself to new experiences and challenges?	51 (33%)	40 (26%)	50 (32%)	15 (9%)

Table 5 indicates scores for HPLPII at the three-month reassessment and shows that majority (78%) of participants reported that they found each day challenging. None of the participants reported getting a second opinion when they questioned their healthcare providers advice, while no participants found their day challenging and none of them checked their pulse while exercising.

Table 5: Health promoting lifestyle profile II (three-month reassessment)

HPLPII Question Participants (n=49)	Never f(%)	Sometimes f(%)	Often f(%)	Regularly f(%)
Discuss problems and concerns with loved ones?	10(20%)	15 (31%)	18 (37%)	6 (12%)
Chose diet low in fat, saturated fat and cholesterol?	8 (16%)	27 (55%)	11 (23%)	3 (6%)
Report unusual signs and symptoms to health care professional?	3 (12%)	12 (43%)	13 (27%)	9 (18%)
Follow a planned exercise program?	14 (29%)	20 (41%)	8 (16%)	7 (14%)
Get enough sleep?	6 (12%)	22 (45%)	8 (16%)	13 (27%)
Feel I am growing in positive ways?	10 (20%)	23 (47%)	16 (33%)	0 (0%)
Easily praise others for their achievements?	2 (4%)	6 (12%)	26 (53%)	15 (31%)
Limit consumption of sugar e.g. (sweets)?	16 (33%)	21 (43%)	7 (14%)	5 (10%)
Read or watch content about improving health?	12 (24%)	17(35%)	16 (33%)	4 (8%)
Exercise vigorously for 20 minutes or more at least three times a week e.g. brisk walking/ aerobic exercise?	18 (37%)	17 (25%)	11 (32%)	3(6%)
Take time for relaxation daily?	10 (21%)	9 (18%)	24 (49%)	6 (12%)

HPLPII Question Participants (n=49)	Never f(%)	Sometimes f(%)	Often f(%)	Regularly f(%)
Believe that my life has purpose?	6 (12%)	21 (43%)	21 (43%)	1 (2%)
Maintain meaningful relationships with others?	5 (10%)	8 (16%)	15 (41%)	21 (33%)
Eat 6-11 servings of bread, cereal, rice and pasta daily?	24 (49%)	15 (31%)	9 (18%)	1 (2%)
Question health professionals in order to understand Question health professionals in order to understand their instructions?	7 (14%)	15 (31%)	15 (32%)	12 (24%)
Do light to moderate physical activity e.g. sustained walking for 30- 40 minutes 5 or more times a week?	21 (43%)	18 (37%)	5 (10%)	5 (10%)
Accept thing in my life that I cannot change?	8 (16%)	14 (29%)	20 (41%)	7 (14%)
Look forward to the future?	11 (22%)	15 (31%)	17 (35%)	6 (12%)
Spend time with close friends?	15 (31%)	12 (24%)	14 (29%)	8 (16%)
Eat 2-4 servings of fruit each day?	8 (16%)	25 (51%)	14 (29%)	2 (4%)
Get a second opinion when I question my health care provider's advice?	30 (61%)	13 (27%)	6 (12%)	0
Take part in leisure activities that are physical e.g. swimming, dancing, cycling?	20 (41%)	20 (41%)	6 (12%)	3(6%)
Concentrate on pleasant thoughts at bedtime?	14 (29%)	18 (37%)	12 (24%)	5 (10%)
Feel content and at peace with myself?	5 (10%)	17 (35%)	17 (35%)	10 (20%)
Find it easy to show concern and love to	5 (10%)	21 (43%)	22	1 (2%)

HPLPII Question Participants (n=49)	Never f(%)	Sometimes f(%)	Often f(%)	Regularly f(%)
others?			(45%)	
Eat 3-5 servings of vegetables each day?	11 (22%)	20 (41%)	16 (33%)	2 (4%)
Discuss my health concerns with health professionals?	13 (27%)	23 (47%)	7 (14%)	6 (12%)
Do stretching exercises at least three times a week?	12 (25%)	18 (57%)	8 (16%)	1 (2%)
Use specific methods to control my stress?	9 (18%)	11 (23%)	21 (43%)	8 (16%)
Work towards long-term goals in my life?	17 (35%)	19 (39%)	10 (20%)	3 (6%)
Touch and am touched by people in my life I care about?	14 (28%)	16 (33%)	17 (35%)	2 (4%)
Eat 2-3 servings of milk, yogurt or cheese each day?	11 (22%)	25 (51%)	12 (25%)	1 (2%)
Inspect my body at least monthly for physical changes and danger signs?	16 (33%)	16 (33%)	14 (28%)	3 (6%)
Get exercise during daily activities e.g. walking during lunch, using stairs and parking far away from entrances?	8 (16%)	21 (43%)	15 (31%)	5 (10%)
Balance time between work and play?	23 (46%)	11 (21%)	11 (21%)	6 (12%)
Find each day challenging and interesting?	38 (78%)	7 (14%)	4 (8%)	0
Find ways to meet my needs for intimacy?	20 (41%)	18 (37%)	10 (20%)	1 (2%)
Eat only 2-3 servings from the meat, fish, beans, nuts and poultry food sections each day?	5 (10%)	5 (10%)	21 (43%)	18 (37%)
Ask health care professionals for	4 (8%)	14 (29%)	27	4 (8%)

HPLPII Question Participants (n=49)	Never f(%)	Sometimes f(%)	Often f(%)	Regularly f(%)
information to better take care of myself?			(55%)	
Check my pulse when exercising?	30 (61%)	12 (25%)	7 (14%)	0
Practice meditation 15-20 minutes daily?	15 (31%)	23 (47%)	7 (14%)	4 (8%)
Am aware of what is important to me in my life?	29 (59%)	12 (25%)	6 (12%)	2 (4%)
Have support from a network of caring people?	20 (41%)	13 (27%)	8 (16%)	8 (16%)
Read nutritional information on food packaging?	3 (6%)	8 (16%)	20 (41%)	18 (37%)
Attend educational programs on personal health care?	6 (12%)	9 (18%)	17 (35%)	17 (35%)
Reach my target heart rate when exercising?	2 (4%)	11 (23%)	10 (20%)	26 (53%)
Pace myself to prevent tiredness?	9 (18%)	16 (33%)	18 (37%)	6 (12%)
Feel connected with a force greater than myself?	21 (43%)	13 (27%)	10 (20%)	5 (10%)
Settle conflicts with others through discussions and compromise?	16 (33%)	20 (41%)	7 (14%)	6 (12%)
Eat breakfast?	12 (24%)	12 (24%)	18 (36%)	7 (14%)
Seek guidance and counselling when necessary?	9 (18%)	13 (27%)	17 (35%)	10 (20%)
Expose myself to new experiences and challenges?	6 (12%)	22 (45%)	15 (31%)	6 (12%)

Figure 7 below is a bar graph which illustrates categorised results measured for the HPLPII at baseline. The figure shows the number of participants in each percentage category for the HPLPII.

Figure 7 below shows that at baseline 0% of the 156 participants scored between 0-51 on this questionnaire. Majority of the participants (82%) scored between 105-156 in this questionnaire classifying them as having good health promoting lifestyle behaviours. None of the participants had excellent health promoting lifestyle behaviours.

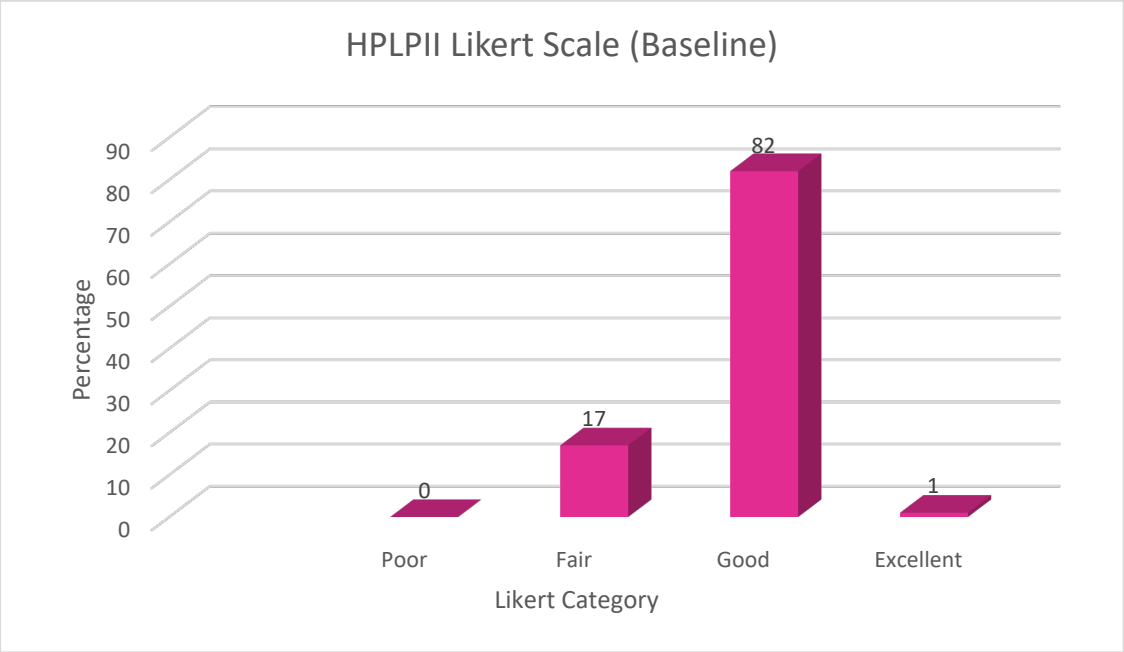


Figure 7: Scoring Bar graph of HPLPII (Baseline)

Figure 8 shows that at the three-month follow up 78% of the 49 participants scored between 105-156 on the questionnaire placing them in the good health promoting lifestyles, category. Only 2% of returning participants were classified as having excellent health promoting lifestyles at the three-month reassessment. All returning participants maintained not having a poor health promoting lifestyle behaviour.

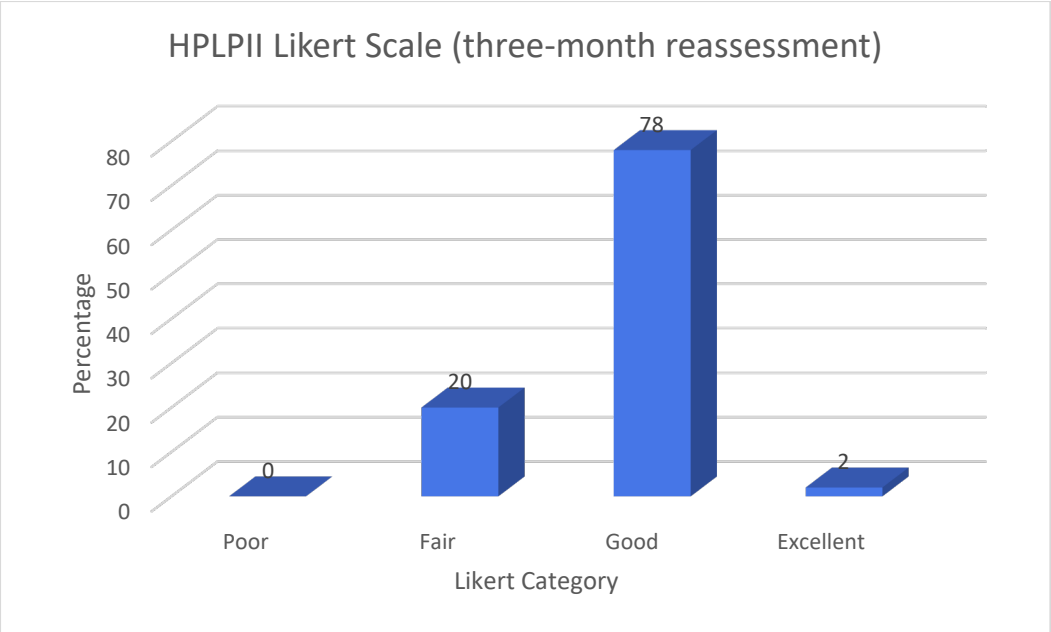


Figure 8: Scoring Bar graph of HPLPII (three-month reassessment)

4.8 Stroke Knowledge

The highest possible score for this questionnaire is 37 and the least possible score is 0 out of 37. The highest score assessed was 35 out of 37 (94%) and the lowest score measured was 6 out of 37 (16%).

The results for stroke risk factor knowledge at baseline assessment showed a median value of 26 (IQR: 29-24). At the three-month reassessment the median value was 25 (IQR: 29-23).

The table below illustrates the questions asked and the number of participants who answered yes or no for that specific question during the initial assessment (n=156). The correct answer for questions 1-31 is (Yes) and the correct answers for questions 32-37 is (No). The table shows that at baseline assessment most of the participants answered questions (1-30) incorrectly. However, most participants answered questions 32-37 correctly. Cronbach's alpha for inter-rater reliability was calculated for the questionnaire at baseline and was measured as 0.7382.

Table 6: Stroke risk factors and knowledge questionnaire (baseline)

CVA Knowledge question	YES f (%)	NO f (%)
Meaning of stroke and TIA		
Q1: Is TIA sign of temporary obstruction of blood supply?	44 (28%)	112 (72%)
Q2: Are TIA symptoms long or short duration, minutes or hours?	42 (27%)	114 (73%)
Q3: Is TIA a warning sign of stroke?	47 (30%)	109 (70%)
Q4: Stroke causes neurological deficit that lasts longer than 24 hours?	41 (26%)	115 (74%)
Q5: Stroke is caused by occlusion or rupture of brain cells?	47 (30%)	109 (70%)
Stroke risk factors		
Q6: Hypertension	18 (12%)	138 (88%)
Q7: Dyslipidaemia	67 (43%)	89 (57%)
Q8: Aging	40 (26%)	116 (74%)
Q9: Diabetes	29 (19%)	127 (81%)
Q10: Heart Disease	28 (18%)	128 (82%)
Stroke warning signs		
Q11: Sudden unilateral weakness of face, arm or leg?	18 (12%)	138 (88%)
Q12: Sudden unilateral numbness of face, arm or leg?	21 (13%)	135 (87%)
Q13: Sudden trouble walking, loss of balance or dizziness?	27 (17%)	129 (83%)
Q14: Sudden trouble speaking?	44 (28%)	112 (72%)

CVA Knowledge question	YES f (%)	NO f (%)
Q15: Sudden severe headache with no known causes?	56 (36%)	100 (64%)
Q16: Sudden trouble seeing in one or both eyes?	35 (22%)	121 (78%)
Q17: Sudden communication problem?	83 (53%)	73 (47%)
Signs and symptoms of stroke		
Q18: Sudden unilateral weakness is a symptom of stroke?	27 (17%)	129 (83%)
Q19: Sudden blurred vision is a symptom of stroke?	14 (9%)	142 (91%)
Q20: Sudden difficulty speaking or understanding language is a symptom of stroke?	31 (20%)	125 (80%)
Q21: Sudden facial weakness is a symptom of stroke?	29 (19%)	127 (81%)
Q22: Sudden decrease in consciousness is a symptom of stroke?	16 (10%)	140 (90%)
Treatment of stroke		
Q23: Thrombolytic drug can be used to treat ischemic stroke?	23 (15%)	133 (85%)
Q24: Treatment would be most efficient if given in 3 hours after onset of stroke?	69 (44%)	87 (56%)
Q25: Haemorrhagic stroke can be treated with surgery?	35 (22%)	121 (78%)
Q26: Stroke can lead to permanent disability that cannot be treated?	65 (42%)	91 (58%)
Prevention of stroke		
Q27: Exercise can prevent stroke?	24 (15%)	132 (85%)
Q28: Relaxation can prevent stroke?	23 (14%)	133 (86%)

CVA Knowledge question	**YES** **f (%)**	**NO** **f (%)**
Q29: Eating low fat diet can prevent stroke?	28 (18%)	128 (82%)
Q30: Controlling risk factors e.g. DM, HPT, Dyslipidaemia can prevent stroke?	23 (14%)	133 (86%)
If you think you are having a stroke, what would you do?		
Q31: Call emergency services?	21 (13%)	135 (87%)
Q32: Rest for 4-5 hours and observe?	47 (30%)	109 (70%)
Q33: Go for a massage?	98 (63%)	58 (66%)
Q34: Buy over the counter drugs?	53 (34%)	103 (66%)
Q35: Find an alternative treatment such as herbal therapy?	46 (29%)	110 (71%)
Q36: Go to see the Dr at the clinic?	53 (34%)	103 (66%)
Q37: Call relatives to come and help?	56 (36%)	100 (64%)

Figure 9 is a Likert scale categorising the results for stroke risk factor knowledge at baseline assessment. The scale shows that majority (67%) of respondents had good knowledge of stroke risk factors and only (1%) scored in the poor stroke risk factor knowledge category while (29%) of the participants displayed excellent knowledge regarding stroke risk factors.

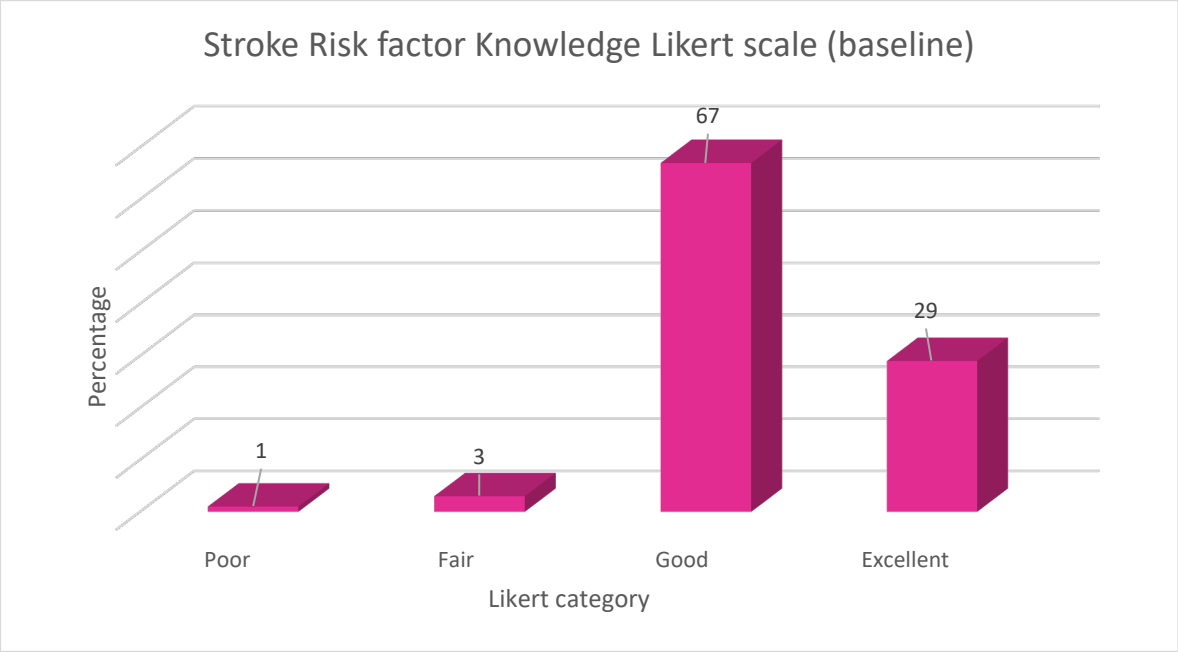


Figure 9: Stroke Risk factor knowledge Likert Scale (baseline)

Table 7 illustrates results measured for the stroke risk factors and knowledge measured at the three-month reassessment with (n=49). The table shows the number of participants who answered yes or no for each specific question. This table shows that at the three-month reassessment most participants answered questions 1-33 correctly. Additionally, most correct answerers were recorded for questions 32-37 at the three-month reassessment. Cronbach's alpha for inter-rater reliability was calculated for the questionnaire at the three-month reassessment and was measured as 0.7923.

Table 7: Stroke risk factors and knowledge questionnaire (three-month reassessment)

CVA Knowledge question	**YES** **f (%)**	**NO** **f (%)**
Meaning of stroke and TIA		
Q1: Is TIA sign of temporary obstruction of blood supply?	34 (69%)	15 (31%)
Q2: Are TIA symptoms long or short duration, minutes or hours?	32 (65%)	17 (35%)
Q3: Is TIA a warning sign of stroke?	37 (76%)	12 (24%)
Q4: Stroke causes neurological deficit that lasts longer than 24 hours?	37 (76%)	13 (24%)
Q5: Stroke is caused by occlusion or rupture of brain cells?	31 (63%)	18 (37%)
Stroke risk factors		
Q6: Hypertension	43 (88%)	6 (12%)
Q7: Dyslipidaemia	30 (61%)	19 (39%)
Q8: Aging	34 (69%)	15 (31%)
Q9: Diabetes	43 (88%)	6 (12%)
Q10: Heart Disease	39 (80%)	10 (20%)
Stroke warning signs		
Q11: Sudden unilateral weakness of face, arm or leg?	47 (96%)	2 (4%)

CVA Knowledge question	YES f (%)	NO f (%)
Q12: Sudden unilateral numbness of face, arm or leg?	46 (94%)	3 (6%)
Q13: Sudden trouble walking, loss of balance or dizziness?	42 (86%)	7 (14%)
Q14: Sudden trouble speaking?	39 (80%)	10 (20%)
Q15: Sudden severe headache with no known causes?	33 (67%)	16 (33%)
Q16: Sudden trouble seeing in one or both eyes?	38 (78%)	11 (22%)
Q17: Sudden communication problem?	47 (96%)	2 (4%)
Signs and symptoms of stroke		
Q18: Sudden unilateral weakness is a symptom of stroke?	47 (96%)	2 (4%)
Q19: Sudden blurred vision is a symptom of stroke?	38 (78%)	11 (22%)
Q20: Sudden difficulty speaking or understanding language is a symptom of stroke?	38 (78%)	11 (22%)
Q21: Sudden facial weakness is a symptom of stroke?	41 (84%)	8 (16%)
Q22: Sudden decrease in consciousness is a symptom of stroke?	44 (90%)	5 (10%)
Treatment of stroke		

CVA Knowledge question	YES f (%)	NO f (%)
Q23: Thrombolytic drug can be used to treat ischemic stroke?	24 (49%)	25 (51%)
Q24: Treatment would be most efficient if given in 3 hours after onset of stroke?	35 (71%)	14 (29%)
Q25: Haemorrhagic stroke can be treated with surgery?	27 (55%)	22 (45%)
Q26: Stroke can lead to permanent disability that cannot be treated?	37 (76%)	12 (24%)
Prevention of stroke		
Q27: Exercise can prevent stroke?	43 (88%)	6 (12%)
Q28: Relaxation can prevent stroke?	36 (80%)	13 (20%)
Q29: Eating low fat diet can prevent stroke?	37 (80%)	12 (20%)
Q30: Controlling risk factors e.g. DM, HPT, Dyslipidaemia can prevent stroke?	42 (86%)	7 (14%)
If you think you are having a stroke, what would you do?		
Q31: Call emergency services?	42 (86%)	7 (14%)
Q32: Rest for 4-5 hours and observe?	16 (33%)	33 (67%)
Q33: Go for a massage?	8 (16%)	41 (84%)
Q34: Buy over the counter drugs?	17 (35%)	32 (65%)

CVA Knowledge question	YES f (%)	NO f (%)
Q35: Find an alternative treatment such as herbal therapy?	10 (20%)	39 (80%)
Q36: Go to see the Dr at the clinic?	16 (33%)	33 (67%)
Q37: Call relatives to come and help?	16 (33%)	33 (67%)

Figure 10 is a Likert scale categorising the results for stroke risk factor knowledge at three-month assessment. The scale shows that majority (53%) of respondents had good knowledge of stroke risk factors and only (2%) scored in the poor and fair stroke risk factor knowledge respectively.

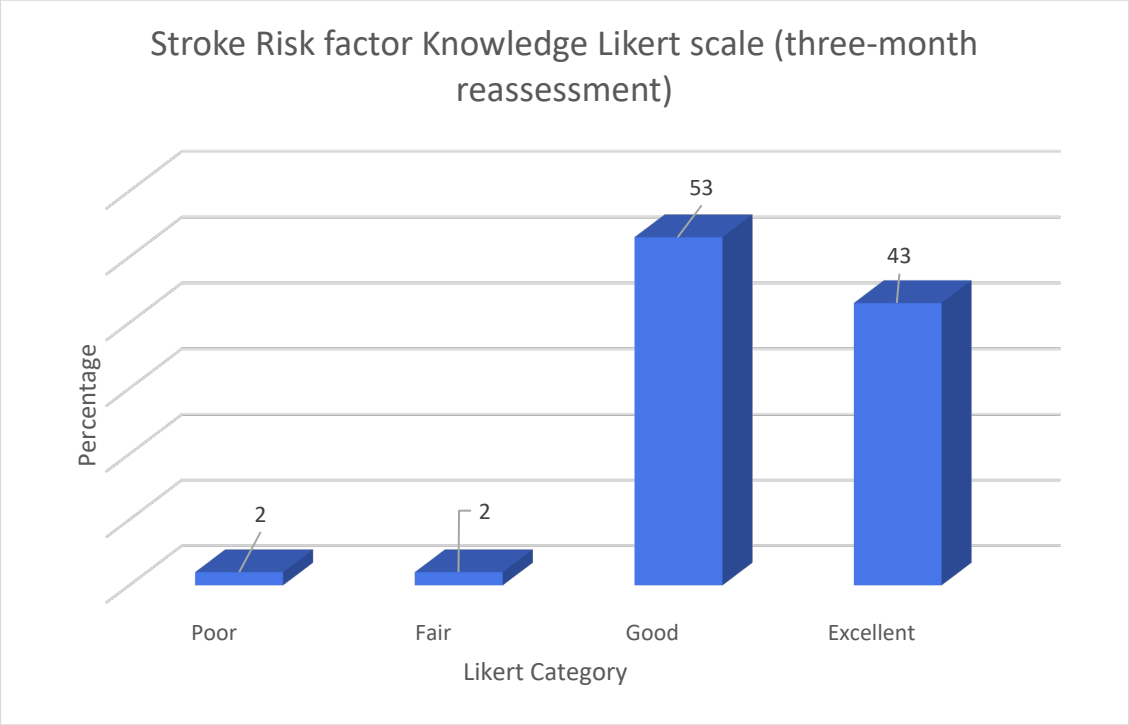


Figure 10: Likert Scale (three-month reassessment)

4.9 EuroQol five-dimension scale (EQ-5D)

The EQ-5D was used to assess health-related quality of life. The EQ-5D assesses five categories to determine the overall health-related quality of life. The categories are mobility, self-care, usual activities, pain/discomfort and depression/anxiety. The total possible score for this questionnaire is 15.

The quality of life is assessed by looking at the score measured for each participant, higher scores in this questionnaire indicate that a participant has higher quality of life than those who scored less in this questionnaire. Quality of life is assessed in five categories namely: mobility, self-care, usual activities, pain/discomfort and depression/anxiety.

Table 8 illustrates the overall frequency and percentage scores for QOL categories measured at the baseline assessment. As outlined in table 8 most of the participants in the study were partially independent for mobility (65%), self-care (50%) and usual activities (45%). Most of the participants experienced moderate levels of pain/discomfort (51%) and no depression/anxiety (50%) during baseline assessment.

Table 8: EQ-5D (baseline)

EQ-5D Category	F (%)
Mobility	
Fully independent	48 (31%)
Partially independent	101 (65%)
Completely dependent	7 (4%)
Self-care	
Fully independent	69 (44%)
Partially independent	78 (50%)
Completely dependent	9 (6%)
Usual activities	
Fully independent	44 (28%)
Partially independent	70 (45%)
Completely dependent	42 (27%)
Pain/Discomfort	
No pain/discomfort	64 (41%)
Moderate pain/discomfort	79 (51%)
Severe pain/discomfort	13 (8%)
Depression/Anxiety	
No anxiety/depression	78 (50%)
Moderate anxiety/depression	57 (37%)
Severe anxiety/depression	21 (13%)

Table 9 indicates that most of the participants in the study were partially independent for mobility (73%), self-care (49%) and usual activities (47%) and most of them experienced moderate levels of pain/discomfort (57%) and no depression/anxiety (47%) at the three-month reassessment.

Table 9: EQ-5D (three-month reassessment)

EQ-5D Category	**F (%)**
Mobility	
Fully independent	13 (27%)
Partially independent	36 (73%)
Completely dependent	0 (0%)
Self-care	
Fully independent	23 (47%)
Partially independent	24 (49%)
Completely dependent	2 (4%)
Usual activities	
Fully independent	14 (29%)
Partially independent	23 (47%)
Completely dependent	12 (24%)
Pain/Discomfort	
No pain/discomfort	17 (35%)
Moderate pain/discomfort	28 (57%)
Severe pain/discomfort	4 (8%)
Depression/Anxiety	
No depression/anxiety	23 (47%)
Moderate depression/anxiety	16 (33%)
Severe depression/anxiety	10 (20%)

4.10 Visual Analogue Scale (VAS)

The Visual Analogue Scale (VAS) attached to the EQ-5D was used to measure how the respondents rate their overall health. The scale is measured from 0 to 100. The lowest score measured from the participants was 0 and the highest was 100. The results measured at baseline assessment had a median value of 70 (IQR: 50-80).

Figure 11 below indicates the categorical ranges that participants could score their VAS score from 0 to 100. The figure below shows that majority of participants (21%) reported a VAS score of 50 out of 100, 2% of participants reported VAS of 0, 10 and 100 at baseline. Of the 156 participants 6% reported a VAS score of 100 out of 100 at the baseline assessment.

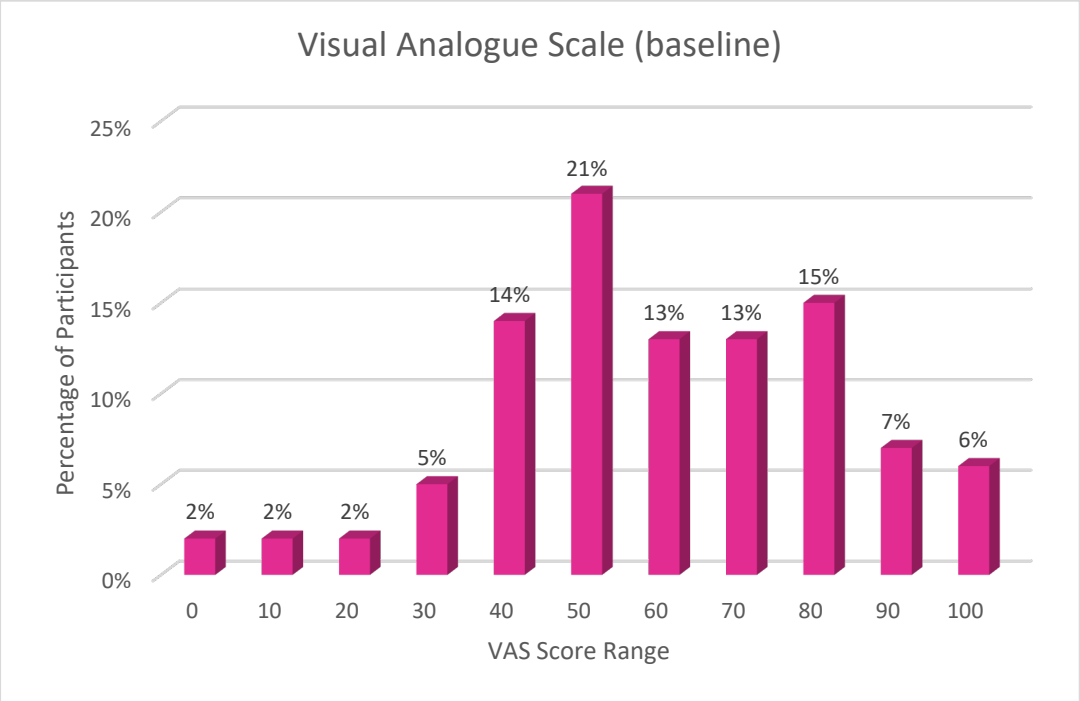


Figure 11: Visual Analogue Scale bar graph (baseline)

Figure 12 shows that majority participants (21%) reported a VAS score of 70 out of 100, none of the participants reported VAS scores of 10 and 20. Of the 49 returning participants 2% reported having a VAS of 0% while 6% reported the maximum VAS score of 100. The median value measured at the three-month reassessment was 70 (IQR: 80-50).

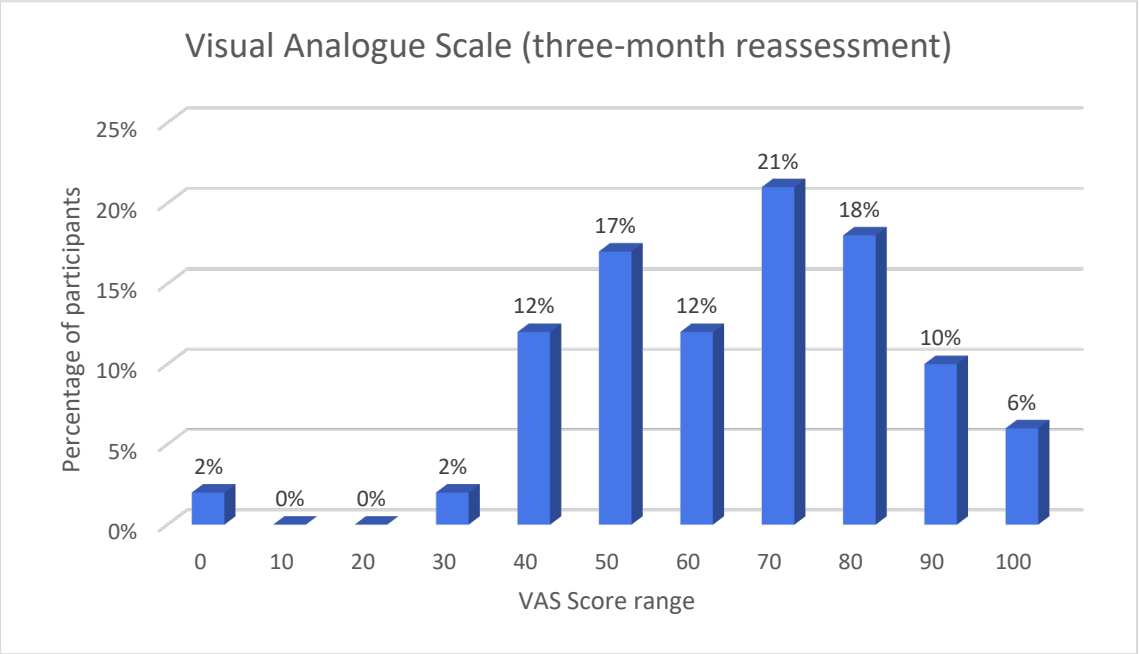


Figure 12: Visual Analogue scale bar graph (three-month reassessment)

CHAPTER 5

5 Discussion

5.1 Introduction

This chapter discusses the results obtained in answer to the objectives of this study. The objectives of this study were to determine the demographics, health promoting lifestyle knowledge, stroke risk factors and quality of life of stroke Survivors in the Chiawelo, Mofolo and Stretford communities of Gauteng. In this chapter the assessed results of the initial and three-months follow up will be described and compared to existing literature.

5.2 Demographics and clinical Factors

The participants in this study were stroke survivors who lived in the Chiawelo, Mofolo and Stretford communities of Gauteng who were receiving physiotherapy and other rehabilitation services in their respective community health centres during the research period.

The main difference in demographics when comparing baseline assessment and the three-month reassessment can be seen in high rate of attrition between baseline and three-month reassessment (69%) with more males returning for the three-month reassessment than females. Additionally, low return rates were observed amongst married participants at the three-month reassessment and there was a complete loss to follow up at the three-month reassessment of participants who had a university degree.

5.2.1 Attrition and loss to follow up

In this study the rate of attrition between the baseline and three-month reassessment was 69%. This falls within the reported ranges of attrition rates for longitudinal studies which is 30%-70% (Gustavson et al., 2012).

The attrition percentage in this study was not expected as all the participants in this study lived within the catchment areas of the Community Health Centres in which the research was conducted. Furthermore, efforts were made by the researchers to contact the participants to remind them of their follow up appointments. Transport fare of ZAR 50 was also given to participants who attended the re-assessment appointments in order to facilitate attendance. The high attrition rate seen in this study could indicate that there may be poor therapeutic compliance amongst stroke survivors in these communities and this could be attributed to the poor socioeconomic circumstances that stroke survivors in these communities live in. Further research can be conducted in these communities to ascertain the specific factors that contribute to attrition amongst stroke survivors in these communities.

A study conducted by Badenhorst et al., (2018) which was based in the Northern Cape province of South Africa investigated the causes of loss to follow up in orthopaedic patients who sustained ankle fractures. In their study, demographic information including travel distance, socioeconomic situation and comorbidities was captured. Their findings indicated that of the 268 participants that were recruited 20.9% did not attend any follow-up visits at all and only 3.3% attended all the scheduled follow-up appointments as compared to this study where the attrition rate between the baseline and three-month reassessment was 69%. The findings of their study attributed attrition to travel distance to the health care facility, increased BMI- which was a unique finding in their study- and HIV status.

Badenhorst et al., (2018) paid the participants in their study ZAR100 at every follow up visit for their time and expenses and in this study, while in this study participants were paid ZAR50 to assist with transportation costs. The difference in compensation rates between the two studies may have contributed to the high attrition rate seen in this study as the increased cost of transportation in South Africa may not been sufficiently covered by this amount.

In this research travel distance to the health care facility was not collected as a data point in the demographic information of the participants. This information could have been used to assess whether travel distance was a contributing factor for attrition in this study.

Additionally, it is important to note the socioeconomic factors that could have contributed to high rate of attrition in this study.

All the communities in which data collection was conducted in are considered as disadvantaged with most of the participants living in informal settlements. Therefore, factors such as access to reliable low-cost transportation that accommodates hemiplegic participants and wheelchair users, access to health-care facilities and service delivery protests that were sporadic and ongoing during the data collection phase of this study could have contributed to participants' inability to attend the three-month reassessment.

It is important to note that there is limited research available on longitudinal long-term prognostic data after stroke based on large cohorts, therefore more research needs to be conducted to ascertain the causes of attrition in longitudinal studies conducted on stroke survivors. Sennfält et al., (2019) conducted a longitudinal study where stroke survivors completed a survey at three and twelve months after initial stroke. Furthermore, additional surveys were conducted for stroke survivors who had survived their stroke in 2011 and 2013 at the three- and five-year intervals post-stroke. The findings in their study showed an attrition rate of 12.9%- 21.2% which is less than that of this study which is 69%. The difference in results between the two studies can be attributed to different sample sizes where Sennfält et al., (2019) had 22929 participants whereas this study only had 156.

It is interesting to note that in this study there was complete loss to follow up of participants who had a university degree 1.9% at baseline assessment and 0% at the three-month reassessment) as compared to all other educational levels. This finding is unique to this study and is contrary to the results found by Reinwand et al., (2015). In their research data from seven randomized controlled trials of web-based computer-tailored interventions were used to evaluate the dropout rates among participants with different educational levels. The findings showed that attrition rates were higher among participants with a lower or middle educational level compared with highly educated participants. The difference in results between the two studies can be related to different research designs as the study conducted by Reinwand et al., (2015) was an appraisal of seven randomised controlled trials whereas this study was observational in its nature.

Furthermore, data collection in their study was conducted by pooling data from the seven studies and using logistic regression analysis to assess attrition between participants with higher educational levels as compared to those with lower educational levels.

In this study hypertension, diabetes and HIV were the most prevalent comorbidities which placed stroke survivors in this study at increased risk of recurrent stroke and the findings from the results will be discussed in this section.

5.2.2 Hypertension

Hypertension was the most prevalent comorbidity amongst stoke survivors in this study, which is consistent with the findings of (Oftedal et al., 2018). In this Norwegian based study, the researchers assessed the prevalence of hypertension in young ischemic stroke survivors. In the study they found that uncontrolled hypertension which they defined as 24-hours ambulatory BP of 130/80mmHg was highly prevalent in ischemic stroke survivors who were <60 years old. Furthermore, hypertension was present in 67% of their study population of 320 participants (Oftedal et al., 2018).

A systematic review conducted by Behrouz and Powers (2015) assessed the prevalence of classic risk factors of stroke such as hypertension, diabetes, ischemic heart disease and dyslipidaemia amongst stroke survivors in the Middle East. Their findings showed that hypertension was a common classic risk factor found among stroke survivors in the Middle East with a prevalence of 62.1%. These results are comparable to those shown in this study where prevalence of hypertension was recorded as 65% at baseline assessment. Additionally, the prevalence of hypertension amongst stroke survivors in this study was higher than the national prevalence of hypertension which according to the 2012 South African National Health and Nutritional and Health Examination Survey (SANHANES) was approximately 26.0% and the 2016 Demographic Health Survey estimated the prevalence to be 46.0% and 44.0% for women and men, respectively (Wandai et al., 2020) .

The similarity in results can be attributed to the fact that both studies were conducted in developing countries where the incidence of stroke has approximately doubled (Behrouz and

Powers, 2015). The Middle East is made up of several different countries such as Bahrain, Cyprus, Egypt, Iran, Iraq and Israel and these countries can be classified as middle to low-income countries (Behrouz and Powers, 2015). South Africa is classified as a developing country and has also been shown to have a rapid increase of stroke incidence (Smythe et al., 2022). Furthermore, research conducted by Rahbar et al., (2022) found that the prevalence of stroke is higher in low to middle oncome countries as compared to high income countries. Their research attributes this increase to higher rates of hypertension, diabetes mellitus and dyslipidaemia in low to middle income countries as compared to high income countries where the prevalence of stroke has decreased (Rahbar et al., 2022).

The finding of high rates of hypertension in stroke survivors in this study are consistent with findings from other literature and can be used to create awareness of the importance of maintaining well controlled blood pressure in stroke survivors to reduce risk of stroke. The high prevalence rate of hypertension this study can be used to create health promotion campaigns that are specifically tailored to educate stroke survivors on how to achieve well controlled blood pressure levels by complying with medical treatment, getting regular blood pressure measurements, making healthy lifestyle changes such as increasing physical activity and incorporating more fresh fruit and vegetables in their diets.

5.2.3 Diabetes Mellitus

The incidence of diabetes amongst stroke survivors in this study was consistent with the findings of Lau et al., (2019) where they conducted a meta-analysis of research sourced from Ovid MEDLINE and EMBASE databases that assessed the prevalence of diabetes in stroke survivors. Their findings showed an estimated 28% of stroke survivors in their study were diabetic and that diabetes was prevalent in one third of all stroke survivors. Furthermore, their study found a 28% prevalence rate of diabetes in ischemic stroke survivors and 26% in haemorrhagic stroke survivors. The similarity of findings relating to prevalence of diabetes in stroke survivors between the two studies can possibly be attributed to the established prevalence of diabetes as a comorbidity in one third of all stroke survivors as shown by Lau et al., (2019).

In South Africa a systematic review conducted by Pheiffer et al., (2021) where the researchers identified, collated, and synthesised all studies reporting the prevalence of total and newly diagnosed type 2 diabetes, impaired glucose tolerance, and impaired fasting glucose in South Africa found that the prevalence of diabetes in individuals that were 25 years and older was 15.25%. The difference in results of prevalence of diabetes in these two studies can be attributed to different inclusion criteria of research participants. In this study the prevalence of diabetes was only assessed in stroke survivors whereas in the research conducted by Pheiffer et al., (2021) the prevalence of diabetes was not limited to a specific population group but was assessed using all new diagnoses of diabetes that were found in patients in South Africa.

Research conducted by Tribelhorn et al., (2021) assessed the prevalence of stroke risk factors amongst patients in an Academic Hospital in South Africa. Diabetes was found to be the second most common modifiable risk factor (14%) amongst patients who were presumed to have a stroke diagnosis. This further indicates the risk that diabetes poses for stroke. The findings from their research however, differ from the findings in this study and this can be attributed to different methodological approaches as this study used physical participants to gather data and -had limited access to medical records. Tribelhorn et al., (2021) used patient files to collect their data and had access to patient records in their research.

Diabetes is a well-documented comorbidity amongst stroke survivors which is associated with poorer outcomes in ischemic haemorrhagic stroke. Therefore, the knowledge gained from this research can be used to aid in the creation of health awareness campaigns that emphasise the importance of maintaining healthy blood glucose levels in stroke survivors to reduce risk of stroke.

5.2.4 Human Immunodeficiency Virus (HIV)

The prevalence of HIV amongst stroke survivors in this study was similar between baseline and the three-month reassessment with more HIV positive participants returning for the three-month reassessment. The reason for the high rates of HIV amongst stroke survivors in this

study can be attributed to increased rates of HIV infection in urban informal settlements (Gibbs et al., 2020) where data collection was conducted for this study.

The results in this study are comparable to research conducted by Kim et al., (2021) where demographic data acquired from the South African Demographic and Health Survey (SADHS) showed that Gauteng had the highest density of people living with HIV (PLHIV) for both genders 26.01% for women and 28.87% for men in Gauteng, South Africa (Kim et al., 2021). Furthermore, HIV is thought to increase the risk of stroke through HIV related risk factors such as immunosuppression and detectable viremia (Bogorodskaya et al., 2018). Therefore, the findings of increased HIV prevalence in this study are comparable to the current research as they reflect the incidence of HIV in stroke survivors who participated in this study.

HIV has been shown to contribute to the increased risk of stroke -especially in the younger population- through numerous pathophysiological mechanisms such as increasing HIV-related stroke risk factors such as immunosuppression and viremia. The increase in viral load and subsequent decrease of CD4 cells result in increased incidence of stroke and other cardiovascular incidents in HIV positive patients (Bogorodskaya, Chow and Triant, 2019). People living with HIV are also at a higher risk of developing stroke from traditional factors, including large artery atherosclerosis and small vessel disease which are the most common for PLWHIV to suffer from stroke.

These findings can assist to develop new or strengthen existing HIV awareness campaigns and encourage compliance with HAART treatment amongst stroke survivors to prevent HIV related complications.

5.3 Economic Situation

The prevalence of disability in South Africa -as reported by Statistics South Africa using information from the 2011 census- shows that 2 870 130 (7.5%) of South Africans are living with disabilities with higher rates of disability reported in females 8.3% as compared to males 6.5%. This finding differs from the findings of this study as most of the participants in this study reported having varying forms of disability as a result of stroke. Therefore, the prevalence

of disability found in this study is significantly higher than the national average as the findings from Statistics South Africa (STATS SA) collected disability data from a much larger sample size than this study. Furthermore, this study only focussed on stroke survivors which is a distinct demographic as compared to the report filed by STATS SA.

As of March 2021, the number of people receiving a disability grant in South Africa was 1.1 million where 86% are permanent disability grants and 14% are temporary grants. These figures show that most persons living with disabilities in South Africa are still not receiving financial support from the state as there are only 1.1 million grant recipients yet there are 2 870 130 persons living with disabilities in South Africa. Hanass-Hancock and McKenzie (2017) conducted research where they assessed the economic vulnerability of households and individuals living with disabilities in South Africa.

They conducted the research by analysing data from the 2011 General Household Survey and their findings showed that individuals and households living with disabilities have fewer employment opportunities and lower educational attainment. Furthermore, their research shows that social grants offered to people living with disabilities counteract economic vulnerabilities to an extent but do not provide sustainable financial relief for the high out of pocket costs of living with a disability (Hanass-Hancock and McKenzie ,2017).

There is limited research on the effects of stroke and employment status especially in the South African context. However, a study in India conducted by Sreedharan et al., (2013) recruited 150 stroke survivors and their primary caregivers. The pre- and post-stroke employment status of the stroke survivor was assessed and subsequently followed up at two intervals, three-months and two years post stroke. Their findings showed that out of the 62.7% of stroke survivors who were employed before their stroke only 20.7% were employed post-stroke with over half of the participants reporting that they had to change their job. Additionally, their study showed that loss of employment in stroke survivors had a statistically significant association with male gender, presence of limb weakness and severity of functional disability (Sreedharan et al., 2013). It is important to note that “current employment status and self-employment” were not assessed in this study. Therefore, factors that could contribute to the rate of return-to work were not assessed in this study.

The degree to which stroke survivors as persons living with permanent or temporary disability can actively participate in economic activities in South Africa is limited. This is as a result of decreased inclusion of persons living with disabilities in development of socioeconomic policies (Thakur et al., 2020). Research conducted by Thakur et al., (2020), assessed how stigma related to disability contributed to depression, unemployment/exclusion from labour markets and low self-esteem in persons living with disabilities. The research was conducted in Soweto, a township south of Johannesburg, South Africa. The researchers conducted a random sample disability case control of households in Soweto and found that unemployment, low education, low self-esteem, and depression were common in people living with disabilities. In order to resolve these challenges, awareness campaigns need to be conducted to the stigma associated with disability. Additionally, access to education and skills development needs to be made more accessible to persons living with disabilities in order to facilitate their participation in the economy.

Further research needs to be conducted to determine which factors contribute to the high rates of unemployment/ decreased return-to work rates amongst stroke survivors in South Africa. Research can also be conducted to ascertain whether stroke survivors participate in other forms of economic activities such as self-employment post stroke. Furthermore, the role of skills development shortages and poor access to appropriate education needs to be investigated to determine its contribution on high unemployment rates in persons living with disabilities.

5.4 Stroke Risk Card

This study used the stroke risk card to assess the modifiable risk factors for stroke in our cohort. Our study found that majority of participants were at low risk of stroke for diabetes, cholesterol, smoking, alcohol consumption and family history of stroke. However, most participants were at a medium risk of stroke for hypertension and stress at the initial assessment. The findings from the three-month reassessment are similar to those from the initial assessment in that the risk factors all remained in the same category for stroke risk.

5.4.1 Stroke risk card: Hypertension

In this study hypertension was found to be a moderate risk factor for stroke at baseline and three-month reassessment.

The results from this study differ from research conducted by (Alloubani, Saleh and Abdelhafiz, 2018) where the researchers conducted a systematic review of published clinical trials of stroke risk factors in order to determine predictive risk factors of stroke. The researchers reviewed studies from EMBASE and MEDLINE databases and found that hypertension was a significant risk factor for stroke. In their research hypertension was identified as a significant risk factor for stroke and when correctly managed can drastically reduce stroke risk. In this study, hypertension was found only to be a moderate risk factor for stroke. The differences in results can be attributed to the different study designs and data collection methods.

In this study data was collected from a sample of participants using questionnaires, whereas in the research conducted by (Alloubani, Saleh and Abdelhafiz, 2018) a systematic review was conducted. For this reason, the number of published studies reviewed would consequently affect the overall prevalence of hypertension found in their research.

The results for risk of hypertension in our research are comparable to those of Masilela et al., (2020) where their findings showed uncontrolled hypertension was prevalent in 13.3% - 75.5% of the population. The variation in percentage ranges between the two studies can be due to different sample sizes where theirs was significantly larger having 329 participants. Furthermore, the use of different blood pressure measurement tools can also contribute to the difference in percentage ranges where they used an automated digital blood pressure monitor (Macrolife BP A 100 Plus model) whereas a sphygmomanometer was used in this study.

These findings can be used to interrogate why stroke survivors in these areas are unable to maintain well controlled blood pressure levels as high blood pressure is consistently regarded as a significant modifiable risk factor for stroke across the literature. More research needs to be conducted in these communities to assess how socioeconomic, interpersonal, cultural and environmental factors affect the ability of stroke survivors in these communities to maintain

ideal blood pressure levels. Furthermore, the interventions designed to control hypertension in these communities need to take all the above-mentioned factors into consideration in order to effectively reduce the prevalence of hypertension amongst stroke survivors in the Chiawelo, Mofolo and Stretford communities of Gauteng.

5.4.2 Stroke Risk Card: Diabetes

In this study diabetes was found to be a moderate contributing factor to the risk of stroke at baseline and three-month reassessments.

The results of this study differ from the findings of Pheiffer et al., 2018 in a systematic review to determine the prevalence of diabetes in South Africa, which indicated a 9% prevalence. However, this does not translate to the prevalence of diabetes in stroke survivors in South Africa.

The prevalence of diabetes in stroke survivors was investigated by Lau et al., 2019 and through their research they found that the prevalence of diabetes in stroke survivors was 28%. Furthermore, their findings indicated that 33% of diabetic stroke survivors had ischemic strokes and 26% had a haemorrhagic stroke. In their research Lau et al., 2019 differentiated between stroke types. This could not be done in this study as the data collection tool (stroke risk card) does not account for this information. Furthermore, access to patient hospital files which contain computerized tomography (CT) scans which confirm stroke type and diagnosis were unavailable and not included in the data collection for this study.

The difference in results between this research and that of Pheiffer et al., (2018) can be attributed to different research methods where this study was a descriptive quantitative study, while the study by Pheiffer et al., (2018) was a systemic review of studies conducted between 1997 and 2018. The systematic review conducted by Pheiffer et al., (2018) included studies that had varying sample sizes, data collection methods and data analysis methods. The different methodological approaches in the studies that were included in the systematic review conducted by Pheiffer et al., (2018) contributed to the differing results found in this study as compared to theirs.

Diabetes has been identified across the literature as a risk factor for vascular events and therefore the epidemiology of diabetes in stroke survivors needs to be further interrogated in the South African context.

5.4.3 Stroke risk card: Smoking

Stroke survivors in this study were found to be at low risk of stroke for smoking with 83% of participants at baseline assessment being non-smokers and 84% non-smokers at three-month reassessment.

A population-based study conducted by Zhang et al., (2013) assessed the socio-economic and psychological determinants of smoking in older adults in five provinces in China. The researchers conducted interviews of random samples of 6071 adults aged 60 years or less and found that 45.6% of men in their research were classified as current smokers.

Furthermore, the determinants of smoking in men in their study included low socio-economic status, pessimistic attitudes/depression, never being married and alcohol consumption. The difference in results between this study and theirs can be attributed to differences in sample sizes where their study had significantly more. The fact that participants in this study had already survived an initial stroke whereas in their study the population included stroke survivors and non-stroke survivors. Additionally, in their study the determinants of smoking were identified using specific psychological diagnoses which was not done in this study.

Epstien et al., (2017) conducted a study to assess whether smoking cessation after an ischemic stroke or transient ischemic attack improves outcomes compared to continued smoking. This was done using a prospective observational cohort study of 3,876 participants. Their findings indicated that at the time of their stroke 28% of stroke survivors were smokers which is a much higher percentage as compared to the 10% in this study. Additionally, they reported that by the time of randomization 42% of the participants in their study had ceased smoking. They also found that the five-year risk of stroke recurrence was increased by 22.6% for participants who continued to smoke.

The discrepancies between the findings of this study and theirs can be attributed to the significant difference in sample size where their sample was twenty-four times larger than this study. They also assessed the number of participants who ceased smoking at the end of randomization in their study; smoking cessation was not assessed in this study. This information can be beneficial to have as it would indicate how many previously active smoking stroke survivors in the Chiawelo, Mofolo and Stretford communities of Gauteng had successfully ceased smoking. Furthermore, this additional information could guide the design and inform the scale to which smoking cessation health promotion campaigns need to be conducted in these communities.

Smoking in stroke survivors can lead to increased risk of stroke (Epstien et al., 2017). Based on the results of this study majority of stroke survivors were non-smokers. Therefore, continued health promotion regarding the dangers of smoking -especially in stroke survivors can be done by health care providers to reinforce the importance and benefits of smoking avoidance in this population to reduce risk of stroke.

5.5 Health promoting lifestyles

In this study Health Promoting Lifestyles (HPLs) were assessed using the HPLP-II. The assessments of HPLs of stroke survivors in the Chiawelo, Mofolo and Stretford communities of Gauteng showed that their HPL scores were mainly in the "good" category (106-154 out of 208) at the initial and three-month follow up assessments.

There is limited research on the health promoting lifestyle profiles of stroke patients in communities like Chiawelo, Mofolo and Stretford. However, Li et al., (2018) assessed the correlation between health promoting lifestyles and health related quality of life among a population of 530 elderly people with hypertension living in Hengyang, China. Although our study designs and objectives were different from theirs, findings similar to ours were reported in their study. They found that HPLs in their study population was mainly at the "good" category. Additionally, their study compared the results obtained between the subscales of the HPLPII and found that nutrition had the highest score (2.73±0.42) followed by stress management, spiritual growth, interpersonal relationships, physical activity, while health

responsibility had the lowest score (1.99±0.56). The comparison between the subscales of the HPLPII in their study indicated which domains of health promoting lifestyles were most practiced by the participants in their study and which ones were not. This form of comparative analysis between the subscales of the HPLPII was not done in our study and could be beneficial as it would indicate the domains of HPL's which have the lowest score in our study population. Having this information could assist in creating targeted health promotion campaigns that address the subscales with the lowest scores in order to address those issues with the aim of reducing the risk of recurrent stroke in stroke survivors in the Chiawelo, Mofolo and Stretford communities of Gauteng.

A search of the literature yielded limited research assessing the HPL's of stroke survivors using the HPLPII and in order to ascertain the extent of applicability of this tool in stroke survivors, more research needs to be conducted using this tool in stroke survivors in the Chiawelo, Mofolo and Stretford communities of Gauteng.

Poor health promoting lifestyles can result in increased risk of stroke (Boehme et al., 2017). Stroke survivors need to be educated on how their lifestyle choices can affect their risk of stroke. They need to be empowered with the knowledge that certain practices such as not smoking, eating a balanced diet and taking care of their mental health can reduce their risk of stroke. Therefore, the knowledge gained from this study can be used to inform the design of health promotion campaigns aimed specifically at stroke survivors to reduce the risk of stroke.

5.6 Stroke Risk Factor knowledge

The results in this study show that majority of stroke survivors had good knowledge of stroke risk factors 67% with only a 14% decrease at the three-month reassessment. The slight difference in results between the two assessment periods can be attributed to decrease in the number of stroke survivors that attended the three-month follow up.

It is, however, interesting to note that more participants answered questions 31-37 correctly at the three-month reassessment where stroke survivors were asked "what they would do if they thought they were having a stroke". At the three-month reassessment majority of participants

responded that they would call emergency services and not attempt to manage the situation by seeking over the counter medication, using herbal remedies or rest for four to five hours and observe their symptoms.

In this study participants had good knowledge of stroke warning signs at baseline and three-month reassessment. The findings of this study differ from research conducted by Saengsuwan, Suangpho and Tiamkao (2017) where they found that stroke survivors or patients suffering from recurrent TIA's had unsatisfactory knowledge of stroke risk factors. The difference in results can be attributed to the research being conducted in different settings. The study by Saengsuwan, Suangpho and Tiamkao (2017) was conducted in a hospital setting where health promotion campaigns may not be conducted regularly. It is possible that participants in this study scored higher in stroke knowledge because they had access to stroke risk factor knowledge information.

The participants in this study attend their physiotherapy (individual and group) appointments at Community Health Centres (CHC's) where there are health promotion posters placed in the facility and health education campaigns are run by health professionals in the facilities which aim to educate all patients about health-related conditions, one of which is stroke. Furthermore, the South African National Department of Health adopted The National Health Promotion Policy and Strategy 2015 - 2019 where health professionals are encouraged to educate their patients about their condition as much as possible.

Therefore, if participants in this study received health education from their physiotherapists during their individual or group therapy appointments then that would be seen in their increased knowledge regarding stroke risk factors.

The difference in results between the two studies can also be attributed to different data collection tools being used. In this study only –close-ended questions were used to collect data. However, in the study conducted by Saengsuwan, Suangpho and Tiamkao (2017), open-ended and close-ended questionnaires were used to assess stroke risk knowledge. The researchers found that participants in their study scored higher points when stroke risk factor knowledge was assessed using the closed ended questionnaire.

It is important to note that although the overall results in stroke knowledge between the two studies differ, there are some similarities in how participants scored when assessed using only the closed ended questionnaire. In this study hypertension 88%, dyslipidaemia 61% and ageing 69% were the most identified risk factors for stroke at the three-month reassessment. Additionally, sudden unilateral weakness 96% and loss of balance and dizziness 86% were the most identified stroke warning signs at the three-month reassessment in this study. These findings are comparable to those found by Saengsuwan, Suangpho and Tiamkao (2017) when stroke risk factors and knowledge was assessed using the close ended questionnaire.

Stroke risk factor knowledge can influence health promoting lifestyle choices which can subsequently impact the risk of stroke. When stroke survivors have poor knowledge of predisposing factors to stroke, stroke warning signs and symptoms their risk of stroke is increased.

Furthermore, if stroke survivors do not know what to do in the event of experiencing a second stroke or any other form of neurological fallout, they may delay seeking treatment which can negatively affect the prognosis of the stroke. The insight gained from this study can be used to strengthen health promotion policies such as the National Health Insurance bill which prioritizes health promotion as a key aspect to improving health in South Africa. The knowledge gained from this study could be used to guide health promotion policy makers to focus on specific vulnerable groups such as stroke survivors when creating health promotion campaigns and not solely focussing on generalised health promotion strategies.

5.7 Quality of life (EQ-5D)

In this study the EQ-5D was used to assess the quality of life of stroke survivors in the Chiawelo, Mofolo and Stretford communities of Gauteng. The EQ-5D assessed five main categories that affect the quality of life of participants namely: mobility, self-care, usual activities, pain/discomfort and depression/anxiety. The results from this study show that most of the participants report having “fair” quality of life for mobility, usual activities and pain and discomfort at baseline and the three-month reassessment periods.

It is important to assess the overall quality of life of stroke survivors as the subsequent disability can affect the stroke survivor and their families (Ramos-Lima et al., 2018). Research conducted by Ramos-Lima et al (2018) showed an inversely proportional relationship between the severity of stroke, quality of life and disability amongst stroke survivors in Brazil. Furthermore, the literature shows that loss of functional independence and post-stroke depression are the most affected aspects of QoL amongst stroke survivors. Research conducted by Bártlová et al (2022) also found that stroke survivors in their study reported lower QoL scores especially in categories related to functional independence and post-stroke depression.

5.7.1 Mobility and Quality of Life

In this study majority of stroke survivors were partially independent for mobility and were community ambulators. It is noteworthy that none of the participants who were fully dependent for their mobility needs (and not community ambulators) were able to return for the three-month reassessment. The possible reason for this difference in return rates (for participants who were fully dependent in mobility), can be as a result of non-availability of a carer or companion to assist them to return to their reassessment and public transport being largely inaccessible for wheelchair users in South Africa (Duri and Luke, 2022). This challenge could have been mitigated by researchers conducting home visits for participants who were unable to return for follow-up visits. However, home visits were not conducted as most participants were not reached when contacted to schedule home visits for the three-month reassessment.

This study did not assess the type of transport that participants used when needing to access health facilities.

However, research conducted by Smythe et al., (2022) found that stroke survivors in the Eastern and Western Cape provinces of South Africa reported that limited transport options and decreased mobility following a stroke were substantial barriers to their access to healthcare. Furthermore, the difficulties for non- community ambulating stroke survivors to access the clinic facility were further exacerbated by sporadic protests that occurred in the communities

during the three-month reassessment period. Moreover, non-community ambulating stroke survivors may face more financial strain as compared to their community ambulating counterparts as a result of increased home care required which they may need to pay for personally.

The findings in this study related to fully independent and partially dependent stroke survivors differ to a study conducted by Joseph, Rhoda and Conradsson, 2020 where the physical activity of stroke survivors living in low-income communities in Cape Town was assessed. Their study found that the community ambulation group in their study displayed the most physical activity in the morning with a gradual decline in physical activity throughout the day.

However, the amount of physical activity that the community ambulation group participated in was less than the daily recommended amount for persons with disabilities to obtain cardiovascular health benefits (Joseph, Rhoda and Conradsson, 2020).

The differences in findings compared to Joseph et al., (2020) can be attributed to different study designs and data collection tools used. In this study mobility (functional physical activity) was a self-reported measure which was assessed using the three levels of description provided in the EQ-5D. Moreover, in this study the frequency of mobility and physical activity throughout the day was not assessed. However, in the study conducted by Joseph et al., 2020 physical activity was measured at 30 Hz using triaxial accelerometers (Actigraph GT3X) in free living conditions. The measures used in their study were objective as compared to ours which only reported on the participants perceived degree of independent mobility with no additional objective measure to quantify their perception.

It is important to note that the functional recovery of independent mobility following a stroke can be affected by factors such as balance control, gait pattern and gait speed (Joseph, Rhoda and Conradsson, 2020).

Additionally, limited ambulatory capacity in stroke survivors can affect their ability to participate in exercise and subsequently impede favourable aerobic adaptations obtained by participating in endurance training which has positive effects on cardiovascular health (Lamberti et al., 2017). The degree to which community ambulating stroke survivors in low-

income countries can participate in physical activity is also affected by high crime rates, poverty and lack of resources of community-based rehabilitation facilities in low-income communities (Joseph, Rhoda and Conradsson, 2020).

The consequences resulting from stroke survivors' struggling to access health care facilities due to their decreased mobility, can lead to poor continuous monitoring of their co-morbidities e.g., monthly hypertension and diabetes screenings as well as decreased compliance to rehabilitation programmes such as physiotherapy. Missed physiotherapy and other rehabilitation appointments can lead to regression of rehabilitation outcomes as continuous assessment and intervention is impeded when stroke survivors cannot attend their appointments. Furthermore, the inaccessibility to appropriate transport could have been a large contributing barrier for stroke survivors who were classified as completely dependent for mobility attending their three-month reassessment. In order to mitigate these challenges that stroke survivors in this study face with regards to mobility and access to health care facilities; community-based rehabilitation approaches such as home visits for individual physiotherapy sessions or provision of rehabilitation by community-based rehabilitation health care workers need to be strengthened.

Furthermore, access to rehabilitation services can be improved by identifying appropriate and easily accessible community based public spaces for example multipurpose community halls, public parks or school sporting grounds to be used for the provision of group physiotherapy for stroke survivors living in close proximity to these facilities.

5.7.2 Usual Activities and Quality of life

Majority of stroke survivors in this study were partially independent in their usual activities at both assessments. The findings of this study are comparable to those of Wondergem et al., (2016) where they conducted a systematic literature review which examined the decline of activities of daily living. Their findings showed that there were small but significant improvements in ADL's 3-12 months post-stroke. Additionally, they observed that there was no significant change in ADL status 1-3 years post- stroke which is important to note as the

majority of stroke survivors in this study had survived their stroke within one to three years of baseline and three-month reassessment.

In this research, data analysis of ADL status did not include analyses of the relationship between time since onset of stroke and current functional status. This comparative element in data analysis can assist in determining whether participants are at risk of functional decline over time following the onset on stroke. This study experienced the same ADL decline as reported by Wondergem et al., (2016). The availability of this information could assist in identifying stroke survivors who are at risk of ADL decline and therapy can be modified for them to facilitate and maintain maximal functional independence.

5.7.3 Depression and Quality of life

In this study majority of stroke survivors reported moderate to severe feelings of depression at baseline and three-month reassessment periods. These findings could be related to the fact that most stroke survivors in this study did not practice health promoting lifestyles that supported good mental health. In this study, 25% of participants reported that they never discuss their concerns with loved ones, 18% reported never feeling that their life has purpose and 36% reported never participating in light to moderate physical exercise five times a week. Additionally, these findings could be attributed to the fact that mental health literacy in South Africa is still poor while stigma regarding issues of mental health remains high (Grant et al., (2022).

Grant et al., (2022) conducted research to evaluate the accuracy of a Community Mental Health Education and Detection (CMED) tool in Newcastle sub-district of the Amajuba District of KwaZulu-Natal province of South Africa. In their study mental health issues were classified into five categories namely: depression, severe mental illness, alcohol abuse, drug abuse and trauma related anxiety. Community health workers administered the questionnaire to 198 participants during routine visits and their findings showed that 55.2% of participants in their study were identified as having mental health issues with depression being the most prevalent. The findings from our study are comparable to the study conducted by Grant et al., (2022) as our study had comparable rates of depression and this could be attributed to the research being

conducted in communities of similar profiles. Both studies were conducted in peri-urban and rural areas which are both serviced by primary healthcare facilities. Furthermore, both studies used similar data collection methods where the prevalence of mental health issues was assessed by using a questionnaire-based outcome measure where the EQ-5D was used in this study and the Community Mental Health Education and Detection (CMED).

Research conducted by Ezema et al., (2018) assessed the influence of post stroke depression on functional independence in activities of daily living. Their findings indicated that over 80% of the participants in their study had depression, with over 50% of those cases documented as being severely depressed (Ezema et al., 2018). These findings are comparable to our study as it has been documented that 100% of participants reported depression with varying degrees. The study conducted by Ezema et al., (2018) does however report higher rates of severe depression as compared to this study. The differences in findings can be attributed to different data collection tools being used in each study. Ezema et al., (2018) assessed post-stroke depression using the Hamilton Depression Rating Scale (HAM-D) which is a 21 item questionnaire measuring the frequency and intensity of depressive symptoms in persons with major depressive disorder (Ezema et al., 2018). Inhis study depression, was assessed using the EQ-5D which doesn't assess depressive symptoms but only assesses whether a participant feels depressed or not and only provides three subjective grades to describe the severity of their depression as no depression, moderate or severe depression.

Another study conducted by Sarfo et al., (2017) assessed post-stroke depression in the Ghanaian patients at the Neurology Clinic of Komfo Anokye Teaching Hospital. Data was collected using the 20-item Centre for Epidemiologic Studies Depression Scale to measure depression. It was found that 9% of participants were severely depressed. These results are comparable to our study as we found that 13% of participants reported experiencing severe depression at the initial assessment.

This similarity in results can be attributed to the increased prevalence of Post-Stroke Depression (PSD) amongst stroke survivors as seen in recent literature. PSD has been a neglected entity in stroke research; however, this is gradually changing, and recent research suggests that a third of stroke survivors suffer from depression (Sarfo et al., 2017).

The research conducted on post-stroke depression in low and middle-income countries is limited (Sarfo et al., 2017) and this is attributed to stroke research and treatment being largely focussed on the physical sequalae of stroke as compared to the cognitive and emotional consequences of stroke (Sarkar et al., 2021). Future research must focus on determining the physiological causes and socioeconomic contributing factors that lead to post stroke depression in the African and South African contexts.

Depression can impede the rehabilitation process as stroke survivors with depression can experience decreased compliance with home programmes leading to delayed functional recovery. Stroke survivors can receive regular mental health screening in order to facilitate early detection of mental illness and treatment to ensure good rehabilitation outcomes.

There is limited research on the prevalence, causes and consequences of PSD in the African context as most research on PSD has been conducted in the Western world (Sarfo et al., (2017). Therefore, in order to understand the determinants that contribute to increased rates of PSD amongst stroke survivors more research needs to be conducted to determine the prevalence and cause of PSD in communities of similar profiles.

Subsequently, the knowledge gained from this research can then guide researchers and policy makers in creating and implementing interventions that can address PSD amongst stroke survivors in the African context.

The knowledge gained from this study can be used in the creation of health promotion campaigns that raise awareness on mental health literacy and mental health challenges that stroke survivors might experience post-stroke. These kinds of campaigns could assist in reducing mental health stigma in these communities and inform stroke survivors that there is access to mental health care at their local primary health care facilities. Furthermore, the findings in this study can facilitate research into interventions that can be utilised to address PSD and other mental health challenges that stroke survivors' experience.

5.7.4 Pain and Quality of life

In this study majority of stroke survivors reported moderate levels of pain at baseline and three-month reassessment. The results of our research are comparable to research conducted by Gandolfi et al., (2021) where they assessed the Health-Related Quality of Life (HRQoL) and psychological features in post-stroke patients with chronic pain and found that chronic pain is highly prevalent amongst stroke survivors and also causes increased disability. Additionally, their study found that chronic pain in stroke survivors can affect rehabilitation outcomes which can negatively affect the rehabilitation process of patients.

However, their study assessed HRQoL using the Stroke Impact Scale (SIS) and pain using the Brief Pain Inventory (BPI).

The results from the study conducted by Gandolfi et al., (2021) showed that patients with chronic pain reported significantly higher disability and lower HRQoL ($p<0.001$) than patients who did not have chronic pain (Gandolfi et al., 2021). Furthermore, the results from the BPI indicated that stroke survivors with chronic pain reported longer duration and higher intensity of pain and these results were moderately and strongly correlated with length of care (Gandolfi et al., 2021). The study conducted by Gandolfi et al., (2021) was more in depth with regards to assessing the correlation between pain and quality of life while also assessing how psychological features of stroke survivors affects chronic pain and HRQoL, whereas in our study pain/ discomfort was assessed using the EQ-D5 which does not explicitly assess the correlation between pain/discomfort and quality of life. In this study the assessment of pain/discomfort was subjective and observational and data analysis did not include correlation data analysis between post-stroke pain and quality of life.

Chronic pain in stroke survivors can lead to poor rehabilitation outcomes as the severity and frequency of the pain can limit the stroke survivors' ability and desire to participate in the rehabilitation process (Gandolfi et al., 2021). It is therefore important to screen stroke survivors for pain/ pain related syndromes and provide the appropriate non-pharmacological or pharmacological pain management in order to facilitate their physical rehabilitation process. Non-pharmacological pain management can also be used in the clinical setting to manage pain in stroke survivors during therapy. A systematic review and meta-analysis conducted by Kannan, Bello and Winser (2022) showed that transcutaneous electrical nerve stimulation

(TENS), mirror therapy and acupuncture significantly reduced pain severity amongst stroke survivors. Physical rehabilitation protocols could include patient specific training on how to safely administer non-pharmacological pain management such as therapeutic massage at home. Research conducted by Cabanas-Valdés, R. et al. (2021) shows that therapeutic massage reduces spasticity and pain in stroke survivors.

The overall quality of life of stroke survivors in this study was found to be "moderate" and this is shown at baseline and three-month reassessments using the Visual Analogue Scale where participants reported on their perception of their overall health status at the time of assessment. The findings of this study however, differ from those found by Joundi et al (2022). Their research assessed the quality of life of community dwelling stroke survivors in Canada, and their findings suggest that the Health Related Quality of Life of stroke survivors diminishes over time as patients enter the chronic phase of stroke. Interestingly, their study indicated that stroke survivors between the ages of 60-74 reported the lowest QOL scores for pain, cognition and mobility (Joundi et al., 2022). The difference in results can be attributed to different methodological approaches between the two studies where in this study quality of life was assessed only in stroke survivors, whereas Joundi et al., (2022) assessed the health related quality of life of stroke survivors and compared the results with persons who had never had a stroke.

5.8 Summary of Discussion

This chapter discussed the results of this study in line with the research objectives and made inferences by comparing findings from other studies.

The findings from this study showed high rates of attrition which is found to be consistent with literature assessing attrition rates in longitudinal research. In this study attrition could largely be attributed to unfavourable socioeconomic factors such as low income and educational levels found in stroke survivors in this study.

In this study comorbidities such as hypertension, diabetes mellitus and HIV were found to increase the risk of stroke in participants, which is consistent with current research that

identifies these modifiable risk factors and how they contribute to increased risk of stroke in stroke survivors.

Disability grants was a common way of contributing to family income and low rates of employment were found amongst stroke survivors in this study.

Stroke survivors in this study were found to have "good" health promoting lifestyles. Furthermore, stroke survivors were found to have "good" knowledge of stroke risk factors and warning signs.

The overall quality of life of stroke survivors in this study was "fair" with partial independent mobility, partial independence in usual activities, chronic pain and depression being found to have the most impact on the overall quality of life of stroke survivors.

In order to fully understand how demographics and clinical factors, stroke risk, health promoting lifestyles, stroke risk factor knowledge and quality of life of stroke survivors in peri-urban, urban and semi-rural areas of South Africa more research related to the causative aspect of these factors needs to be conducted on stroke survivors living in these communities. Subsequently, the knowledge gained from the research conducted can guide researchers to create interventions that can assist to mitigate the causative factors related to increased risk of stroke. Intervention-based research where researchers implement health education programmes, community-based exercise clinics and health screenings for stroke survivors can be conducted to assess the stroke risk reduction efficacy of these strategies amongst stroke survivors in the Chiawelo, Mofolo and Stretford communities of Gauteng.

The conclusions, recommendations, implications on health promotion and clinical implications will be presented in the next chapter.

CHAPTER 6

6 Conclusion

6.1 Conclusions of the study

In conclusion the findings from this research study suggest that stroke survivors in the Chiawelo, Mofolo and Stretford communities of Gauteng are at increased risk of stroke due to clinical factors such as hypertension, diabetes and HIV. There were no demographic findings in this study that indicated that participants are at increased risk of stroke. Stroke survivors in this study were shown to be at decreased risk of stroke for health promoting lifestyles as majority of stroke survivors in this study were shown to have good health promoting lifestyles and good stroke risk factor and warning signs knowledge. Stroke survivors in this study were shown to have "moderate" levels of quality of life.

This study has uncovered these factors in this specific demographic. The knowledge gained from this research can be used to inform intervention-based research that aims to reduce the risk of stroke in this cohort. Furthermore, the knowledge gained from this research can strengthen existing health education and health promotion programmes to reduce the risk of stroke.

6.2 Limitations of study

- Methodology: In this study data on health promoting lifestyles was collected using questionnaires administered during an interview. Interview based data collection methods may not always be fully accurate as participants may provide researchers with incomplete or untrue information regarding their lifestyles. This could be as a result of fear or embarrassment that the participants may have about their chosen lifestyles.
- Inability of researchers to contact participants for follow up assessment as some participants did not have mobile devices of their own, others relied on family members and neighbours to relay their messages as the family member or neighbour would be

the person of contact. Other participants could not be reached as their phone numbers were no longer in service. Therefore, these challenges resulted in high rates of attrition in this study.

- Sporadic service delivery protests occurring during data collection resulting in some participants being unable to travel to health care facilities due to road closures and safety concerns during unrest.

6.3 Recommendations for research

- Intervention based research can be conducted to mitigate the demographic and clinical factors which increase the risk of stroke amongst stroke survivors in these communities. Intervention studies can include exercise clinics in community centres or sports grounds for stroke survivors to participate in. Furthermore, intervention-based research could include intersectoral collaborations where infrastructure such as park gyms that are accessible to people living with disabilities are built in order to make exercise equipment and facilities more accessible. Additionally, interventions such as regular health screenings of blood pressure, blood glucose levels and cholesterol can be intensified in this population to facilitate continuous monitoring of the aforementioned clinical factors that can increase risk of stroke.
- Research assessing the availability and efficacy of skills development programmes amongst stroke survivors in these communities can also be done to ascertain the barriers stroke survivors face with regards to economic participation. Research interventions can include creating skills and entrepreneur workshops to empower stroke survivors with marketable skills that can assist them in finding appropriate employment or starting their own businesses.
- Further research needs to be conducted to evaluate stroke survivors' access to knowledge regarding health promoting lifestyles and stroke risk factor knowledge. This could include assessing how health promoting lifestyle knowledge is presented to stroke survivors in the clinical setting. This can be done by assessing whether they

receive verbal or written health education during individual or group rehabilitation sessions.

- Intervention studies should focus on improving post stroke pain in stroke survivors and this could be done by educating stroke survivors on self-administered pain management techniques e.g. using heat therapy to manage post stroke pain. Interventions to improve anxiety and depression could include creating stroke survivors support groups that are facilitated by a counsellor where mental health issues are addressed.

6.4 Recommendations for clinical practice

- Health professionals should provide continued health education when managing stroke survivors, educating them about the benefits of practicing health promoting lifestyles and the risk factors of stroke and how to reduce them. Additionally, Community Healthcare Workers (CHW's) should also provide health education to non-community ambulating stroke survivors when conducting home visits.
- Continuous monitoring of stroke survivors, blood pressure, cholesterol and blood glucose levels can be done by stationing a staff nurse in the rehabilitation department to measure these signs before individual or group therapy. Furthermore, stroke survivors and their care givers can be empowered and trained to perform continuous monitoring of their blood pressure, glucose and cholesterol levels. They should then be provided with electronic blood pressure cuffs, glucometers and cholesterol measuring devices to keep at home in order to perform regular monitoring at home.

- More health promotion and stroke awareness campaigns need to be conducted on a larger scale to educate stroke survivors about risk factors that can increase the risk of stroke. This could be achieved by having regular health education talks on clinic days when hypertensive patients are being seen. Health promotion activities can also include community-based campaigns where health professionals go out into the community facilities such as community halls and conduct home visits where they would provide health education regarding health promoting lifestyles.

- Health promotion activities for stroke survivors can also be done by having Stroke Sporting days at local stadiums or sporting grounds, where stroke survivors participate in adapted sporting activities which aims to promote appropriately adapted physical activities for stroke survivors to participate in. These sports day-like campaigns could be run bi-annually in order to promote and facilitate physical activities for stroke survivors in these communities.
- More rigorous screening for stroke risk factors needs to be done at health facilities to provide close monitoring of changing risk factors in order for interventions to be implemented before patients suffer a stroke.
- Health promotion campaigns aimed specifically at stroke survivors need to be created to improve knowledge of stroke risk factors and how to reduce stroke risk and benefits of health promoting lifestyles.

6.5 Recommendations for public health policies

- Public health policies need to ensure that non-ambulating stroke survivors also have access to health education. This can be done by strengthening policies that preside over health promotion activities by allocating resources and providing training for CHWs and health promoters who provide health education to stroke survivors during home visits and community-based health education programmes.
- Public policies need to also address the challenges that stroke survivors face when accessing healthcare. This can be done by providing reliable and consistent patient transport to stroke survivors so that they can attend all their health-related appointments or a universal cash subsidy can be offered to them (through the disability grants they receive from government) to use as transport money for health purposes.
- Public policies need to facilitate stroke survivors' ability to participate in economic activities and subsequently reduce unemployment rates amongst stroke survivors. This can be done by ensuring that stroke survivors' are referred to skills training centres

where they will be empowered with marketable skills so they can be gainfully employed.

- The inclusion of persons with disabilities needs to be driven by policy where companies are encouraged to accommodate persons with disabilities as part of their staff compliment. This can be facilitated by providing quota for companies to meet where they include PWD's in their staff compliment.

References

Alloubani, A., Saleh, A. and Abdelhafiz, I. (2018) 'Hypertension and diabetes mellitus as a predictive risk factor for stroke', *Diabetes and Metabolic Syndrome: Clinical Research and Reviews*, 12(4), pp. 577–584. doi:10.1016/j.dsx.2018.03.009.

Ashburn, A. (1997). Physical Recovery Following Stroke. *Physiotherapy*, 83(9), pp.480–490.

Ashley, K. D., Lee, L. T. and Heaton, K. (2019) 'Return to Work Among Stroke Survivors', *Workplace Health and Safety*, 67(2), pp. 87–94. doi: 10.1177/2165079918812483.

Ashley, K. D., Lee, L. T., & Heaton, K. (2019). Return to Work Among Stroke Survivors. In *Workplace Health and Safety* (Vol. 67, Issue 2, pp. 87–94). SAGE Publications Inc. https://doi.org/10.1177/2165079918812483

Barclay, S., Todd, C., Finlay, I., Grande, G., and Wyatt, P., 2002. Not another questionnaire! Maximizing the response rate, predicting non-response and assessing non-response bias in postal questionnaire studies of GPs. *Family Practice*, 19(1), pp.105-111.

Bártlová S, Šedová L, Havierniková L, Hudáčková A, Dolák F, Sadílek P. Quality of Life of Post-stroke Patients. Zdr Varst. 2022 Mar 21;61(2):101-108. doi: 10.2478/sjph-2022-0014. PMID: 35432611; PMCID: PMC8937589.

Behrouz, R., & Powers, C. J. (2016). Epidemiology of classical risk factors in stroke patients in the Middle East. In *European Journal of Neurology* (Vol. 23, Issue 2, pp. 262–269). Blackwell Publishing Ltd. https://doi.org/10.1111/ene.12742

Boehme, A. K., Esenwa, C. and Elkind, M. S. V. (2017) 'Stroke Risk Factors, Genetics, and Prevention', *Circulation Research*, 120(3), pp. 472–495. doi: 10.1161/CIRCRESAHA.116.308398.

Burns, M., 2014. How to establish interrater reliability. Nursing, 44(10), pp.56-58.

Chowles, T. (2017). *Incidence and Prevalence of Stroke a Growing Concern*. [online] eHealth News ZA. Available at: https://ehealthnews.co.za/stroke-growing-concern/ [Accessed 21 May 2020].

Cieza, A., Brockow, T., Ewert, T., Amman, E., Kollerits, B., Chatterji, S., ÜstÜn, T.B. and Stucki, G. (2002). Linking Health-Status Measurements to the International Classification of Functioning, Disability and Health. *Journal of Rehabilitation Medicine*, 34(5), pp.205–210.

Connor, M., 2007. Stroke in patients with human immunodeficiency virus infection. *Journal of Neurology, Neurosurgery & Psychiatry*, 78(12), pp.1291-1291.

Connor, MD., Thorogood, M., Casserly, B., Dobson, C., Warlow, MD., 2004. Prevalence of stroke survivors in rural South Africa: Results from the Southern Africa stroke prevention initiative (SASPI) Agincourt field site. Stroke 35: 627 – 632.

Daniel, W., 1999. Biostatistics: A Foundation for Analysis in The Health Sciences. 7th ed. New York: John Wiley and Sons, pp.141-142.

Dar N Z, Khan S A, Ahmad A, et al. (May 28, 2019) Awareness of Stroke and Health-seeking Practices among Hypertensive Patients in a Tertiary Care Hospital: A Cross-sectional Survey. Cureus 11(5): e4774. DOI 10.7759/cureus.4774.

Eales, C.J. and Stewart, A.V. (2001). Health and responsibility self-efficacy, self-care and self-responsibility. *South African Journal of Physiotherapy*, 57(1), pp.20–25.

Edwards, J. D. et al. (2018) 'Return to work after young stroke: A systematic review', *International Journal of Stroke*, 13(3), pp. 243–256. doi: 10.1177/1747493017743059.

Flach, C., Muruet, W., Wolfe, C. D. A., Bhalla, A., & Douiri, A. (2020). Risk and Secondary Prevention of Stroke Recurrence: A Population-Base Cohort Study. *Stroke*, *51*(8), 2435–2444. https://doi.org/10.1161/STROKEAHA.120.028992

Fukuda, S. et al. (2019) 'Impact of Upper Limb Function and Employment Status on Return to Work of Blue-Collar Workers after Stroke', *Journal of Stroke and Cerebrovascular Diseases*, 28(8), pp. 2187–2192. doi: 10.1016/j.jstrokecerebrovasdis.2019.04.036.

Gallo, W.T., Bradley, E.H., Falba, T.A., Dubin, J.A., Cramer, L.D., Bogardus, S.T. and Kasl, S.V. (2004). Involuntary job loss as a risk factor for subsequent myocardial infarction and stroke: Findings from The Health and Retirement Survey. *American Journal of Industrial*

Medicine, [online] 45(5), pp.408–416. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1351254/ [Accessed 21 Jan. 2020].

Gibbs, A. et al. (2020) 'HIV-Prevalence in South Africa by settlement type: A repeat population-based cross-sectional analysis of men and women', *PLoS ONE*, 15(3), pp. 1–20. doi:10.1371/journal.pone.0230105.

Giles, T.D. (2006). Assessment of Global Risk: A Foundation for a New, Better Definition of Hypertension. *The Journal of Clinical Hypertension*, 8(8), pp.5–14.

Gustavson, K. et al. (2012) 'Attrition and generalizability in longitudinal studies: Findings from a 15-year population-based study and a Monte Carlo simulation study', *BMC Public Health*, 12(1). doi:10.1186/1471-2458-12-918.

Gutierrez, J. and Esenwa, C., 2015. Secondary stroke prevention: challenges and solutions. Vascular Health and Risk Management, p.437.

Hanass-Hancock J, McKenzie TC. People with disabilities and income-related social protection measures in South Africa: Where is the gap? Afr J Disabil. 2017 Sep 26;6:300. doi: 10.4102/ajod.v6i0.300. PMID: 29062759; PMCID: PMC5645570.

Hernandez, G., Garin, O., Dima, A., Pont, A., Martí Pastor, M., Alonso, J., Van Ganse, E., Laforest, L., de Bruin, M., Mayoral, K., Serra-Sutton, V. and Ferrer, M., 2019. EuroQol (EQ-5D-5L) Validity in Assessing the Quality of Life in Adults with Asthma: Cross-Sectional Study. *Journal of Medical Internet Research*, 21(1), p.e10178.

Jarrett, J., Stewart, T. and Rogers, L. (1981). Diabetes mellitus. III: Complications and organising long-term management. *BMJ*, 283(6294), pp.763–765.

Jarvis, H. L. et al. (2019) 'Return to Employment After Stroke in Young Adults: How Important Is the Speed and Energy Cost of Walking?', *Stroke*, 50(11), pp. 3198–3204. doi: 10.1161/STROKEAHA.119.025614.

Joundi, R. A., Patten, S. B., Lukmanji, A., Williams, J. V. A., & Smith, E. E. (2022). Impairment in Health-Related Quality of Life among Community-Dwelling Stroke Survivors.

Canadian Journal of Neurological Sciences, *49*(3), 373–380. https://doi.org/10.1017/cjn.2021.119

Kannan, P., Bello, U.M. and Winser, S.J. (2022) 'Physiotherapy interventions may relieve pain in individuals with central neuropathic pain: a systematic review and meta-analysis of randomised controlled trials', *Therapeutic Advances in Chronic Disease*, 13. doi:10.1177/20406223221078672.

Kobylańska, M. et al. (2019) 'The role of biopsychosocial factors in the rehabilitation process of individuals with a stroke', *Work*, 61(4), pp. 523–535. doi: 10.3233/WOR-162823.

Kolmos, M., Christoffersen, L., & Kruuse, C. (2021). Recurrent Ischemic Stroke – A Systematic Review and Meta-Analysis. In *Journal of Stroke and Cerebrovascular Diseases* (Vol. 30, Issue 8). W.B. Saunders. https://doi.org/10.1016/j.jstrokecerebrovasdis.2021.105935

Kronish, I. M., Goldfinger, J. Z., Negron, R., Fei, K., Tuhrim, S., Arniella, G., & Horowitz, C. R. (2014). Effect of peer education on stroke prevention: The prevent recurrence of all inner-city strokes through education randomized controlled trial. *Stroke*, *45*(11), 3330–3336. https://doi.org/10.1161/STROKEAHA.114.006623

Lancet Neurology, 2019. Global, regional, and national burden of stroke, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. 18, pp.439-458.

Lennon, S. and Hastings, M., 1996. Key Physiotherapy Indicators for Quality of Stroke Care. Physiotherapy, 82(12), pp.655-664.

Luengo-Fernandez, R. et al. (2020) 'Economic burden of stroke across Europe: A population-based cost analysis', *European Stroke Journal*, 5(1), pp. 17–25. doi: 10.1177/2396987319883160.

Makheta, M., 2018. Referral Policy. Johannesburg: Gauteng department of health.

Maredza, M., Bertram, M. and Tollman, S., 2015. Disease burden of stroke in rural South Africa: an estimate of incidence, mortality and disability adjusted life years. BMC Neurology, 15(1).

Martins, S., Norrving, B., Salinas, J., Sprinkhuizen, S., and Schwamm, L., 2015. Defining an international standard set of patient-centered outcome measures after stroke. *Journal of the Neurological Sciences*, 357, p.e394.

Masilela, C. et al. (2020) 'Cross-sectional study of prevalence and determinants of uncontrolled hypertension among South African adult residents of Mkhondo municipality', *BMC Public Health*, 20(1), pp. 1–10. doi: 10.1186/s12889-020-09174-7.

Namaganda, P., Nakibuuka, J., Kaddumukasa, M., & Katabira, E. (2022). Stroke in young adults, stroke types and risk factors: a case control study. *BMC Neurology*, *22*(1). https://doi.org/10.1186/s12883-022-02853-5

Nedeltchev, K., de maur, T., Georgiadis, D., Arnold, M., Caso, V., Mattle, H., Schroth, G., Remonda, L., Sturzenegger, M., Fischer, U. and Baumgartner, R., 2005. Ischaemic stroke in young adults: predictors of outcome and recurrence. *Journal of Neurology, Neurosurgery & Psychiatry*, 76(2), pp.191-195.

Odgaard-Jensen, J., Vist, G., Timmer, A., Kunz, R., Akl, E., Schunemann, H., Briel, M., Nordmann, A., Pregno, S. and Oxman, A. (2011). Randomisation to protect against selection bias in healthcare trials. *Cochrane Database Syst Rev*, 4.

Oftedal, Å. et al. (2018) 'Prevalence and covariates of uncontrolled hypertension in ischemic stroke survivors: the Norwegian stroke in the young study', *Blood Pressure*, 27(3), pp. 173–180. doi:10.1080/08037051.2018.1425827.

Om Manda, S., Musekiwa, A., Matsena Zingoni, Z., Ncayiyana, J. R., & Louisa Ugwu, C. J. (2021). *REVIEWED BY Spatial disparities of HIV prevalence in South Africa. Do sociodemographic, behavioral, and biological factors explain this spatial variability?*

Owens Johnson, C., Nguyen, M., Roth, G.A., Nicholas, E., Alam, T., Abate, D. and Abd-Allah, F. (2019). Global, regional, and national burden of stroke, 1990–2016: a systematic analysis

for the Global Burden of Disease Study 2016. *Lancet Neurology*, Accessed 18 Apr. 2020 18, pp.439–58.

Oza, R., Rundell, K. and Garcellano, M. (2017) 'Recurrent Ischemic Stroke: Strategies for Prevention', *American family physician*, 96(7), pp. 436–440.

Palstam, A. et al. (2019) 'Work-related predictors for return to work after stroke', *Acta Neurologica Scandinavica*, 139(4), pp. 382–388. doi: 10.1111/ane.13067.

Pheiffer, C. et al. (2018) 'The prevalence of type 2 diabetes in South Africa: A systematic review protocol', *BMJ Open*, 8(7), pp. 2–5. doi: 10.1136/bmjopen-2017-021029.

Preamble to the Constitution of WHO as adopted by the International Health Conference, New York, 19 June - 22 July 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of WHO, no. 2, p. 100) and entered into force on 7 April 1948.

Qualtrics XM // The Leading Experience Management Software. (2021, April 23). Qualtrics. https://www.qualtrics.com/

Rahbar, M. H., Medrano, M., Diaz-Garelli, F., Gonzalez Villaman, C., Saroukhani, S., Kim, S., Tahanan, A., Franco, Y., Castro-Tejada, G., Diaz, S. A., Hessabi, M., & Savitz, S. I. (2022). Younger age of stroke in low-middle income countries is related to healthcare access and quality. In *Annals of Clinical and Translational Neurology* (Vol. 9, Issue 3, pp. 415–427). John Wiley and Sons Inc. https://doi.org/10.1002/acn3.51507

Reddy, P. et al. (2015) 'Prevalence of tobacco use among adults in South Africa: Results from the first South African national health and Nutrition Examination Survey', *South African Medical Journal*, 105(8), pp. 648–655. doi: 10.7196/SAMJnew.7932.

Sacco, R.L., Kasner, S.E., Broderick, J.P., Caplan, L.R., Connors, J.J., Culebras, A., Elkind, M.S., George,M.G., Hamdan, A.D., Higashida, R.T. and Hoh, B.L., 2013. An updated definition of stroke for the 21st century: a statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke, 44(7), pp.2064-2089.

Saengsuwan, J., Suangpho, P. and Tiamkao, S., 2017. Knowledge of Stroke Risk Factors and Warning Signs in Patients with Recurrent Stroke or Recurrent Transient Ischaemic Attack in Thailand. *Neurology Research International*, 2017, pp.1-7.

Samodien, E., Abrahams, Y., Muller, C., Louw, J., & Chellan, N. (2021). Non-communicable diseases - A catastrophe for South Africa. *South African Journal of Science*, *117*(5). https://doi.org/10.17159/SAJS.2021/8638

Sarfo, F.S., Gebregziabher, M., Ovbiagele, B., Akinyemi, R., Owolabi, L., Obiako, R., Armstrong, K., Arulogun, O., Akpalu, A., Melikam, S., Saulson, R., Jenkins, C. and Owolabi, M. (2016). Validation of the 8-item questionnaire for verifying stroke free status with and without pictograms in three West African languages. *eNeurologicalSci*, 3(3), pp.75–79.

Sarikaya, H., Ferro, J. and Arnold, M. (2015) 'Stroke prevention - Medical and lifestyle measures', *European Neurology*, 73(3–4), pp. 150–157. doi: 10.1159/000367652.

Smajlović, D. (2015) 'Strokes in young adults: Epidemiology and prevention', *Vascular Health and Risk Management*, 11, pp. 157–164. doi: 10.2147/VHRM.S53203.

Smythe, T., Inglis-Jassiem, G., Conradie, T., Kamalakannan, S., Fernandes, S., van-Niekerk, S., English, R., Webster, J., Hameed, S., & Louw, Q. (2022). Access to health care for people with stroke in South Africa: a qualitative study of community perspectives. *BMC Health Services Research*, *22*(1). https://doi.org/10.1186/s12913-022-07903-9

Stroke, 2004. Prevalence of Stroke Survivors in Rural South Africa. 35(3), pp.627-632.

Strokecenter.org. 2011. Stroke Statistics | Internet Stroke Centre. [online] Available at: <http://www.strokecenter.org/patients/about-stroke/stroke-statistics/> [Accessed 23 August 2011].

Swanson, D., 2004. Advancing Methodological Knowledge Within State and Local Demography: A Case Study. Population Research and Policy Review, 23(4), pp.379-398.

Thakur, V. et al. (2020) 'Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . The

COVID-19 resource centre is hosted on Elsevier Connect , the company ' s public news and information ', (January), pp. 2020–2021.

The World Health Report. Reducing Risk, Promoting Healthy lifestyle. [online] World Health Organization. Available at: <https://www.who.int/whr/2002/en/> [Accessed 27 March 2020].

Thorogood, M., Connor, M., Tollman, S., Lewando Hundt, G., Fowkes, G., and Marsh, J., 2007. A cross-sectional study of vascular risk factors in a rural South African population: data from the Southern African Stroke Prevention Initiative (SASPI). *BMC Public Health*, 7(1).

Vestling M, Tufvesson B, Iwarsson S 2003 Indicators for return to work after stroke and the importance of work for subjective well-being and life satisfaction. *Journal of Rehabilitation Medicine* 35:127 – 131.

Wan L, Zhao J, Zhang X, Deng S, Li L, He S, Ruan H 2014 Stroke prevention knowledge and prestrike health behaviours among hypertensive stroke patients in Mainland China. *Journal of cardiovascular Nursing* 29 (2): E1-E9. Doi10.1097/JCN.0b013e31827f0ab5

Wandai, M.E. et al. (2020) 'Geographical influence on the distribution of the prevalence of hypertension in South Africa: A multilevel analysis', *Cardiovascular Journal of Africa*, 31(1), pp. 47–53. doi:10.5830/cvja-2019-047.

Wang, Y. C., Kapellusch, J. and Garg, A. (2014) 'Important factors influencing the return to work after stroke', *Work*, 47(4), pp. 553–559. doi: 10.3233/WOR-131627.

Westerlind, E. et al. (2020) 'Return to work after stroke: A Swedish nationwide registry-based study', *Acta Neurologica Scandinavica*, 141(1), pp. 56–64. doi: 10.1111/ane.13180.

Western Cape Provincial Government, 2017. Incidence and Prevalence of Stroke A Growing Concern. Western Cape: Western Cape Provincial Newsletter.

World Health Organisation MONICA Project 1988 Monitoring trends and determinants in cardiovascular disease: a major international collaboration. *Journal of Clinical Epidemiology* 41: 105 – 114.

World Health Organization. Regional Office for Europe. (1999). Healthy living: what is a healthy lifestyle. Copenhagen: WHO Regional Office for Europe, 1999. Healthy Living: What Ravens-Sieberer, U., Wille, N., Badia, X., Bonsel, G., Burström, K., Cavrini, G., Devlin, N., Egmar, A.-C., Gusi, N., Herdman, M., Jelsma, J., Kind, P., Olivares, P.R., Scalone, L. and Greiner, W. (2010). Feasibility, reliability, and validity of the EQ-5D-Y: results from a multinational study. *Quality of Life Research*, 19(6), pp.887–897 [Accessed 29 April 2020].

Zanoni, B. C., Archary, M., Buchan, S., Katz, I. T., & Haberer, J. E. (2016). South Africa: the Cresting Wave. *BMJ Global Health*, *1*, 1. https://doi.org/10.1136/bmjgh-2015

APPENDICIES

Appendix A: Stroke Risk Card

STROKE RISK SCORE CARD

Instructions: Tick the answer that describes you best. Total your score at the bottom of each column and compare with the stroke risk levels

RISK FACTOR	LOW RISK		MEDIUM RISK		HIGH RISK	
1. BLOOD PRESSURE	☐	< 120/80mm/Hg	☐	*120-139/80-89mm/Hg	☐	** > 140/90mm/Hg
2. TOTAL CHOLESTEROL	☐	< 200mg/dL	☐	* 200-239mg/dL	☐	** > 240 mg/dL or unknown
3. DIABETES (Blood glucose)	☐	<10mmol/L	☐	* 10-11.1mmol/L	☐	** >11.1mmol/L
4. BMI	☐	18.5-24.9 kg/m²	☐	25-26.9 kg/m²	☐	> 27 kg/m²
5. EXERCISE	☐	4-5x/week, 30min/day	☐	2-3x/week, 30min/day	☐	<2x/week, 30min/day
6. SMOKING	☐	No	☐	Trying to quit	☐	Smoker
7. ALCOHOL USE	☐	≤1 Drink/ given day	☐	2 Drinks/ given day	☐	> 2 Drinks/ given day
8. STROKE IN FAMILY	☐	No	☐	Not sure	☐	Yes
9. STRESS	☐	I don't stress at all	☐	I stress a normal amount	☐	I am stressed all the time
TOTAL						

RESULTS

7 - 9 = LOW RISK	Any one of * = MEDIUM RISK	Any one of ** = HIGH RISK
	≥ 3 ticks of any other = MEDUIM RISK	≥ 3 ticks of any other = HIGH RISK
You are doing well controlling stroke risk.	Good start. Work on controlling risk.	Ask about stroke prevention right away!

Appendix B: Demographic Questionnaire

1 Age :

For the following, please tick the relevant block

2. Gender

□ Male □ Female

3. Marital status

□ Single □ Divorcee □ Live-in Partner □ Widow □ Married

4. Highest educational level completed/achieved

□ University degree

□ Grade 12 + 3 years of further education after metric.

□ Grade 12 or equivalent

□ Up to grade 11

□ Up to grade 7

SECTION B: Stroke

5.1 When did you have the stroke? _____

5.2 Which side of the body is the weakness on?

□ Left □ Right

5.3 Do you have any speech problems?

□ No □ Yes

5.4 If yes to question 5.3, tick appropriate speech problem.

(NB! Patients with global aphasia and receptive aphasia are excluded in this study)

□ Dysphasic (expressive) □ Aphasic (expressive)

□ Dysarthria

6. What other illnesses do you have besides stroke?

□ Diabetes

□ Epilepsy

□ Asthma

□ Arthritis

□ Hypertension

□ HIV related illnesses

□ High Cholesterol

□ Cardiac disease

Other: (please specify):_____

SECTION C: Economic situation

7. What financial role did you play in the family before the stroke?

□Breadwinner

□Dependent

□Contributing to the family income

□Not contributing to the family income

Appendix C: Health Promoting Lifestyle Profile II

LIFESTYLE PROFILE II

DIRECTIONS: This questionnaire contains statements about your *present* way of life or personal habits. Please respond to each item as accurately as possible, and try not to skip any item. Indicate the frequency with which you engage in each behavior by circling:

N for never, **S** for sometimes, **O** for often, or **R** for routinely

		NEVER	SOMETIMES	OFTEN	ROUTINELY
1.	Discuss my problems and concerns with people close to me.	N	S	O	R
2.	Choose a diet low in fat, saturated fat, and cholesterol.	N	S	O	R
3.	Report any unusual signs or symptoms to a physician or other health professional.	N	S	O	R
4.	Follow a planned exercise program.	N	S	O	R
5.	Get enough sleep.	N	S	O	R
6.	Feel I am growing and changing in positive ways.	**N**	S	O	R
7.	Praise other people easily for their achievements.	N	S	O	R
8.	Limit use of sugars and food containing sugar (sweets).	N	S	O	R
9.	Read or watch TV programs about improving health.	N	S	O	R
10.	Exercise vigorously for 20 or more minutes at least three times a week (such as brisk walking, bicycling, aerobic dancing, using a stair climber).	N	S	O	R
11.	Take some time for relaxation each day.	N	S	O	R
12.	Believe that my life has purpose.	N	S	O	R
13.	Maintain meaningful and fulfilling relationships with others.	N	S	O	R
14.	Eat 6-11 servings of bread, cereal, rice and pasta each day.	N	S	O	R
15.	Question health professionals in order to understand their instructions.	N	S	O	R
16.	Take part in light to moderate physical activity (such as sustained walking 30-40 minutes 5 or more times a week).	N	S	O	R
17.	Accept those things in my life which I can not change.	N	S	O	R
18.	Look forward to the future.	N	S	O	R
19.	Spend time with close friends.	N	S	O	R
20.	Eat 2-4 servings of fruit each day.	N	S	O	R
21.	Get a second opinion when I question my health care provider's advice.	N	S	O	R
22.	Take part in leisure-time (recreational) physical activities (such as swimming, dancing, bicycling).	N	S	O	R
23.	Concentrate on pleasant thoughts at bedtime.	N	S	O	R
24.	Feel content and at peace with myself.	N	S	O	R
25.	Find it easy to show concern, love and warmth to others.	N	S	O	R

	NEVER	SOMETIMES	OFTEN	ROUTINELY
26. Eat 3-5 servings of vegetables each day.	N	S	O	R
27. Discuss my health concerns with health professionals.	N	S	O	R
28. Do stretching exercises at least 3 times per week.	N	S	O	R
29. Use specific methods to control my stress.	N	S	O	R
30. Work toward long-term goals in my life.	N	S	O	R
31. Touch and am touched by people I care about.	N	S	O	R
32. Eat 2-3 servings of milk, yogurt or cheese each day.	N	S	O	R
33. Inspect my body at least monthly for physical changes/danger signs.	N	S	O	R
34. Get exercise during usual daily activities (such as walking during lunch, using stairs instead of elevators, parking car away from destination and walking).	N	S	O	R
35. Balance time between work and play.	N	S	O	R
36. Find each day interesting and challenging.	N	S	O	R
37. Find ways to meet my needs for intimacy.	N	S	O	R
38. Eat only 2-3 servings from the meat, poultry, fish, dried beans, eggs, and nuts group each day.	N	S	O	R
39. Ask for information from health professionals about how to take good care of myself.	N	S	O	R
40. Check my pulse rate when exercising.	N	S	O	R
41. Practice relaxation or meditation for 15-20 minutes daily.	N	S	O	R
42. Am aware of what is important to me in life.	N	S	O	R
43. Get support from a network of caring people.	N	S	O	R
44. Read labels to identify nutrients, fats, and sodium content in packaged food.	N	S	O	R
45. Attend educational programs on personal health care.	N	S	O	R
46. Reach my target heart rate when exercising.	N	S	O	R
47. Pace myself to prevent tiredness.	N	S	O	R
48. Feel connected with some force greater than myself.	N	S	O	R
49. Settle conflicts with others through discussion and compromise.	N	S	O	R
50. Eat breakfast.	N	S	O	R
51. Seek guidance or counseling when necessary.	N	S	O	R
52. Expose myself to new experiences and challenges.	N	S	O	R

Appendix D: EuroQol Five-Dimension Scale (EQ-5D)

Participant code: ☐

New user: ☐ Existing User: ☐

By placing a tick in one box in each group below, please indicate which statements best describe your own health state today.

Mobility

I have no problems in walking about ☐

I have some problems in walking about ☐

I am confined to bed ☐

Self-Care

I have no problems with self-care ☐

I have some problems with washing or dressing myself ☐

I am unable to wash or dress myself ☐

Usual Activities (*e.g. work, study, housework, family or leisure activities*)

I have no problems with performing my usual activities ☐

I have some problems with performing my usual activities ☐

I am unable to perform my usual activities ☐

Pain / Discomfort

I have no pain or discomfort ☐

I have moderate pain or discomfort ☐

I have extreme pain or discomfort ☐

Anxiety / Depression

I am not anxious or depressed ☐

I am moderately anxious or depressed ☐

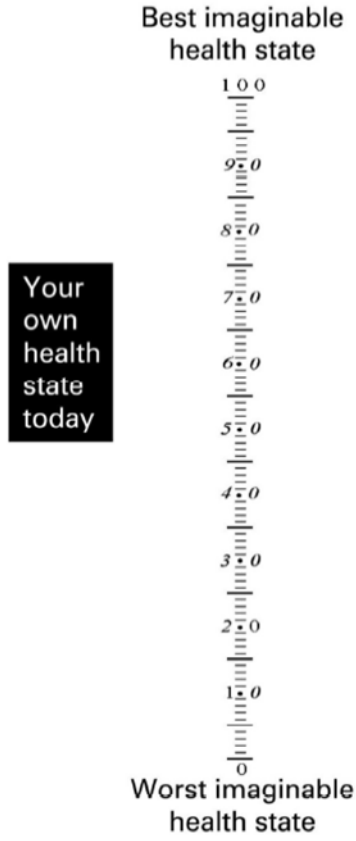
I am extremely anxious or depressed ☐

Visual Analogue Scale

Please indicate on this scale how good or bad your own health state is today.

The best health state you can imagine is marked 100 and the worst health state you can imagine is marked 0.

Please draw a line from the box to the point on the scale that indicates how good or bad your health state is today.



Now, please write the number you marked on the scale in the box below.

YOUR HEALTH TODAY = ☐

Appendix E: Knowledge of stroke risk factors and warning signs questionnaire

Meaning of stroke and TIA (5 scores)

TIA is a temporary obstruction of blood supply to the brain (Y)

TIA symptoms usually of short duration, in minutes or a few hours (Y)

TIA is a warning sign of stroke (Y)

Stroke causes a neurological deficit that lasts longer than 24 hours (Y)

Stroke is caused by the occlusion or rupture of brain vessels (Y)

Stroke risk factors (5 scores)

Hypertension (Y)

Dyslipidaemia (Y)

Aging (Y)

Diabetes (Y)

Heart disease (Y)

Stroke warning signs (7 scores)

Sudden unilateral weakness of face, arm or leg (Y)

Sudden unilateral numbness of face, arm or leg (Y)

Sudden trouble walking, loss of balance or dizziness (Y)

Sudden trouble speaking (Y)

Sudden severe headache with no known causes (Y)

Sudden trouble seeing in one or both eyes (Y)

Sudden communication problem (Y)

Signs and symptoms of stroke (5 scores)

Sudden unilateral weakness is a symptom of stroke (Y)

Sudden blurred vision is a symptom of stroke (Y)

Sudden difficulty speaking or understanding language is a symptom of stroke(Y)

Sudden facial weakness is a symptom of stroke (Y)

Sudden decrease in consciousness is a symptom of stroke (Y)

Treatment of stroke (4 scores)

Thrombolytic drug can be used to treat ischaemic stroke (Y)

Treatment would be most efficient if given in 3 hours after onset (Y)

Haemorrhagic stroke can be treated with surgery (Y)

Stroke can lead to permanent disability that cannot be treated (Y)

Prevention of stroke (4 scores)

Exercise can prevent stroke (Y)

Relaxation can prevent stroke (Y)

Eating low fat diet can prevent stroke (Y)

Controlling of risk factors such as diabetes, hypertension, dyslipidaemia can prevent stroke (Y)

If you think you have stroke, what will you do? (7 scores)

Call emergency service (10177) (Y)

Rest for 4-5 hours and observe (N)

Go to have a massage (N)

Buy some over the counter drugs (N)

Find an alternative treatment such as herbal therapy (N)

Go to see the doctor at the clinic (N)

Call relatives to come (N)

Appendix F: Data collection tools and type of data

Objective	Outcome measure	Type of data	Statistical test/ Analysis	Scoring method	Data presentation
Define demographic factors of stroke survivors in the Mofolo, Chiawelo and Stretford communities	Demographic and clinical information questionnaire.	Quantitative Categorical data	Frequency and percentage	This three-section questionnaire is scored categorically to determine the demographic and clinical data of the participant	Frequency tables (demographic and clinical information) Bar graphs (co-morbidities and economic situation)
To determine stroke risk factors in stroke survivors within the Mofolo, Chiawelo and Stretford communities	Stroke Risk card	Quantitative ordinal Categorical data	Frequencies and percentages	Is a value determined, risk-based scoring scale (low, medium and high). The patient is scored according to their level of risk which is determined by the assigned values in each category. A score of 7-9 ticks in the low-risk block= low risk of stroke.	Bar graphs

				Score of ≥3 ticks in medium category= Medium risk of stroke. Score of ≥3 ticks in high-risk category= High risk of stroke.	
Determine health promoting lifestyles of stroke survivors in the participants at Mofolo, Chiawelo and Stretford communities (initial assessment and 3 months later).	Health promoting lifestyle profile (ii)	Quantitative Continuous data	Frequencies, percentages and mean (SD)	A score for overall health-promoting lifestyle is obtained by calculating a mean of the individual's responses to all 52 items; six subscale scores are obtained by calculating a mean of the responses to subscale items.	Frequency tables and bar graphs
Assessment of knowledge of stroke risk factors and warning signs of stroke survivors	Knowledge of stroke risk factors and warning signs questionnaire	Quantitative Discrete data	Frequencies and percentages. Median and Inter Quartile ranges (IQR)	This is a categorised questionnaire with 5 sections. One mark is given for the correct answer from questions 1-31. And then one mark is	Frequency tables and bar graphs.

				given by answering 2 from question 31-37.	
To establish the quality of life of survivors of stroke survivors in the Mofolo/ Chiawelo and Stretford communities	EuroQol-5Dimension (EQ-5D)	Quantitative Continuous data	Frequencies and percentages Median and Inter Quartile Ranges (IQR).	This scale is numbered from zero to one hundred. One hundred indicates the highest possible level of health and zero, the worst. Each item is scored from one to five on its respective level to calculate the final score.	Frequency tables, bar graphs and histograms with box and whisker plots.

Appendix G: Budget

Item	Description	Unit cost	Number of Units	Total cost
Office supplies, printing & reproduction	Printing and photocopying of questionnaires	R1/page	1661	R1661
Travel to sites	Travelling to clinic and community of campaign and for follow-up sessions at initial assessment and 3-months after	3.55/km	1015kms	R3603.25
Participant /patient transport	Travelling to the clinic for initial assessment and 3 months follow up	R50 per visit	1 visit for 151 patients	R7550.00
Research assistantship	Research assistants	R200/hour	10 visits doing about 4 hours per visit (40 hours)	R8000.00
				R 20814.25

Appendix H: Research Information Sheet

Faculty of Health Sciences, Postgraduate Office
Phillip V Tobias Building, 2nd Floor
Cnr York & Princess of Wales Terrace, Parktown 2193
Tel: (011) 717 2745 | Fax: (011) 717 2119
Email: Mathoto.senamela@wits.ac.za

Title

The assessment of health promoting lifestyle knowledge, stroke related risk factors and quality of life of stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng, South Africa.

Good day Sir/Madam

I, Tshepang Chriseldah Sebulele am a student at the University of the Witwatersrand doing my Master of Physiotherapy Post Graduate research. I am conducting research on the health promoting lifestyles and knowledge of stroke survivors in the Chiawelo, Mofolo and Stretford communities. The goal of research is to discover new information, and through this research I aim to uncover how well the stroke survivors in the Chiawelo Mofolo and Stretford communities understand health promoting lifestyles. Health promoting lifestyles are behaviors that promote good health e.g. exercising eating a healthy diet and getting regular medical checkups.

I'm inviting you to take part in this study. The study is going to involve answering five questionnaires that will be researcher and self-administered. These questionnaires aim to gather information about your current health status and the amount of knowledge that you have regarding how your lifestyle can affect your health. Additionally, a medical assessment conducted by a nurse will be done to obtain the following information about you as part of the research project e.g. (blood pressure, blood sugar levels and body mass index). We are assessing the demographics and depth of knowledge of health promoting lifestyles of stroke survivors in the Chiawelo, Mofolo and Stretford communities. The entire process- interviews

and health screening- could take approximately 35 to 40 minutes to complete and requires 151 participants. The questionnaires are made up of the following:

1. Demographic and clinical information questionnaire: Define demographic factors of stroke survivors in the Mofolo, Chiawelo and Stretford communities.
2. Prevalence of stroke risk factors using Stroke Risk card: To determine knowledge of stroke risk factors in stroke survivors within the Chiawelo, Mofolo and Stretford communities.
3. Health promoting lifestyle profile (ii): Determine health promoting lifestyles of stroke survivors in the Chiawelo, Mofolo and Stretford study participants at (initial assessment and 3 months later).
4. EQ-5D: To establish the quality of life of survivors of stroke survivors in the Chiawelo, Mofolo and Stretford communities.
5. Assessment of knowledge of stroke risk factors and warning signs of stroke survivors: Knowledge of stroke risk factors and warning signs questionnaire.

Participants will only be asked to answer questions and have a basic health screening, they will not be at risk of harm. There are no direct benefits of being a part of this study.

Participation is voluntary and the participant has the right to refuse to participate in the study or withdraw from participating in the study at any time. There is no penalty for refusal to participate or withdrawal from the study.

Transport costs will be covered for the 3-month follow up when participants need to return to the clinic.

Participants' personal will be kept confidential that records cannot be linked to any individual participating in the study. Data collected (surveys/questionnaires) will be stored off site in a secure container by the researcher. Only the researcher and the research assistant will have access to information related to the study and its participants. When the information is presented at the end of the study, participants will remain anonymous to protect their identity and personal information.

Thank you

Researcher: Tshepang Chriseldah Sebulele

Contact details of researcher: Cell (081-415-3086) email (tsebulele@gmail.com).

Research Supervisor: Mr Kganetso Sekome

Contact details: email: Kganetso.sekome@wits.ac.za

Phone: 011-717-3705

This study has been approved by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg ("Committee"). A principal function of this Committee is to safeguard the rights and dignity of all human subjects who agree to participate in a research project and the integrity of the research.

If you have any concern over the way the study is being conducted, please contact the Chairperson of this Committee who is Dr Clement Penny, who may be contacted on telephone number 011 717 2301, or by e-mail on Clement.Penny@wits.ac.za. The telephone numbers for the Committee secretariat are 011 717 2700/1234 and the e-mail addresses are Zanele.Ndlovu@wits.ac.za and Rhulani.Mukansi@wits.ac.za

Thank you for reading this Study Information Sheet.

Faculty of Health Sciences, Postgraduate Office
Phillip V Tobias Building, 2nd Floor
Cnr York & Princess of Wales Terrace, Parktown 2193
Tel: (011) 717 2745 | Fax: (011) 717 2119
Email: Mathoto.senamela@wits.ac.za

Appendix I: Plagiarism Declaration

PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY

I Tshepang Chriseldah Sebulele (Student number: 761079) am a student

registered for the degree of Masters by dissertation in Physiotherapy (Neurology) in the academic year 2022.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission

and/or without acknowledging the original source) is wrong.

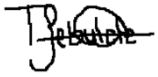
- I confirm that the work submitted for assessment for the above degree is my own unaided

work except where I have explicitly indicated otherwise.

- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against

me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.

- I have included as an appendix a report from “Turnitin” (or other approved plagiarism detection) software indicating the level of plagiarism in my research document.

Signature:  Date: 22 November 2022

Appendix J: Informed Consent Sheet

Faculty of Health Sciences, Postgraduate Office
Phillip V Tobias Building, 2nd Floor
Cnr York & Princess of Wales Terrace, Parktown 2193
Tel: (011) 717 2745 | Fax: (011) 717 2119
Email: Mathoto.senamela@wits.ac.za

I (full name and surname) _____ give permission to Tshepang C Sebulele /fellow researchers and research assistants to include me in their study to assess the health promoting lifestyle knowledge, stroke related risk factors and quality of life of stroke survivors in the Mofolo, Chiawelo and Stretford communities of Gauteng, South Africa.

I understand why this research is done and know that:

• I can leave the research project any time when I want to

• Information that I will give will be treated with confidentiality

• I will be allocated a code, which will be used in place of my name

• I will not be paid for taking part in this research but will be compensated for travel expenditure

Name & Signature: _____ Date: _____

Participant

Name & Signature: _____ Date:

Researcher/Research assistant

Appendix K: Permission letter to use close-ended stroke risk knowledge and warning signs questionnaire

Jittima Saengsuwan
Department of Rehabilitation Medicine
Faculty of Medicine, Srinagarind hospital
Khon Kaen University, Khon Kaen
Thailand 40002

Khon Kaen,
30.06.2020

I hereby certify that I have given 'Ms. Tshepang Sebulele' permission to use the close-ended questionnaire to determine knowledge of patients with recurrent stroke or recurrent TIA.

จิตติมา แสงสุวรรณ

Jittima Saengsuwan, MD PhD

Appendix L: Ethics declaration form

University of the Witwatersrand Student Ethics Declaration Form

(To be completed during the protocol assessor meeting)

Background

All Research conducted by a University of the Witwatersrand student, with human subjects or animals, requires approval by the Wits Human Research Ethics Committee or Animal Research Ethics Committee, respectively.

If research has been undertaken without the necessary ethics approvals, this is considered an ethics violation. This will be reported to the relevant structures, the data will have to be discarded, and in the case of students, they cannot use the data towards their degree.

To prevent any ethics violations, the ethics requirements for the proposed project will be discussed with you at the protocol assessment.

Declaration

Based on the current protocol assessment (and any proposed changes suggested by the assessor committee), we, the undersigned, understand that the proposed research requires:

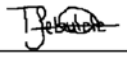
1. Human Research Ethics clearance certificate	No
a. Covered under existing supervisor ethics	Yes
b. Requires a new HREC application	No
2. Animal Research Ethics clearance certificate	No
3. No Human or Animal Ethics Clearance	No

4. Unclear, will seek appropriate guidance from the HREC/AREC committees (whichever relevant)

Signatures

Supervisor/s: 

Haffejee

Student: 

Date: 25 June 2020

11 March 2019/MP

Appendix M: Ethics Clearance Certificate

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R49 Ms TC Sebulele

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M201024

NAME: (Principal Investigator)	Ms TC Sebulele
DEPARTMENT:	School of Therapeutic Sciences Department of Physiotherapy Medical School University
PROJECT TITLE:	*The assessment of health promoting lifestyle knowledge, stroke related risk factors and quality of life of stroke survivers in the Mofolo, Chiawelo and Stretford communities of Gauteng, South Africa* **Change of study title noted on 2021/09/10**
DATE CONSIDERED:	2020/10/30
DECISION:	Approved unconditionally
CONDITIONS:	
NOTE:	If contact information regarding student study participants is required, please contact the Registrar's office - <Nicoleen.Potgieter@wits.ac.za>
SUPERVISOR:	Mr K Sekome; Msdms D Thupae and S Haffejee
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2021/02/12

This Clearance Certificate is valid for 5 years from the date of approval. An extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office secretariat on the 3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to submit details to the Committee. **I agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **October** and therefore reports and re-certification will be due in the month of **October** each year. Unreported changes to the study may invalidate the clearance given by the HREC (Medical).

Signature of Principal Investigator _____ Date _____

Appendix N: Revised approved ETD form

File: T4gen

S2017/688

(Replacing A2006/ 269, *A2007/26*, *A2009/39* *and A2012/32*)

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FINAL SUBMISSION OF THESIS, DISSERTATION OR RESEARCH REPORT/PROJECT
(Unbound and Electronic Copies)

Faculty of Health Sciences

School of Therapeutic Sciences

Submission of M Dissertation (*Note: This form should only be completed at final submission of dissertation or research/project or thesis)*

PLEASE WRITE CLEARLY IN BLOCK LETTERS *(If completing form by hand)*

1. Name (in full): Tshepang Chriseldah Sebulele
2. Person Number: 761079
3. Present mailing address: 28 Lelie Street Bergsig, Heidelberg 1441

Postal code: 1441 Fax: N/A

E-mail: 761079@students.wits.ac.za Cell: 081-415-3086 Home tel: N/A Work tel: N/A

4. If you are likely to move in the next 6 – 12 months please provide the mailing address and effective date of a change in address: **N/A**

Effective date: **N/A**

Contact telephone numbers: **081-415-3086**

5. I hereby submit my Master f Physiotherapy by Dissertation

5.1 If this is research for a Masters by Dissertation or PhD thesis, please provide your **ORCID number 0000-0003-2990-4065**

(Open Researcher and Contributor ID, ORCID, is an alphanumeric code to uniquely identify academic authors and contributors, it's highly recommended that you register and provide this ID, to register or read more see http://orcid.org)

6. Number of unbound copies: 2

(Ensure that you have signed and dated all copies)

"Number of CDs: 1(**Please note:** an electronic version must be supported by a copy on CD for submission onto the Electronic Theses and Dissertation System (ETD): http://www.wits.ac.za/library/electronic-theses-and-dissertations-etd/5/electronic_theses_and_dissertations_etd.html. A payment of **R180** must be made at the Cashiers Office into the account code: 001.408.4221103.8115201 PROJECT: ETDW000, alternatively payment can be made at First National Bank, Braamfontein branch, account number 51360056499, branch code 251905, swift code: firnzajja950. A copy of the payment receipt must be submitted to the faculty with the thesis/dissertation " (*Note:*

1. *Only abstracts of awards with 50% or more as a research component must be submitted for uploading onto the ETD system. Please check with your Faculty Office if this applies to your submission*
2. *All submissions will be uploaded onto the ETD system immediately upon the payment of the R180)*

(CD should be clearly labelled with your name, person number, title of thesis and software package. The ETD system supports PDF only - please enquire at the University Library (Education and Training Division): (011) 717 1954 (tel) or (011) 717 1909 (fax) for assistance in converting your dissertation or research/project report or thesis if necessary)

7. I declare that:

7.1 I have checked all copies of my dissertation or research/ project report or thesis and no pages are missing or poorly reproduced;

7.2 All revisions have been completed in accordance with the recommendations of the examiners;

7.3 The electronic copy is identical to the printed copy approved by the faculty;

7.4 The dissertation or research/project report or thesis complies with the rules relating to abstract and style, copies and formal declaration, duly signed by me, as shown in the General Rules of the University;

7.5 Where any document of which I am not the owner is included in my work, I have obtained and attach hereto the written consent of the holder of the intellectual property rights in such a document allowing distribution as specified in 7.7 below;

7.5.1 In the event of copyright permission not being obtainable for visual images or other works, I will not include the full work(s) in my online thesis/dissertation/research report on the ETD system, but undertake to point only to the source (by URL or other means) for such work(s);

7.6 I have properly acknowledged all sources; and

7.7 I have noted the rules relating to intellectual property and acknowledgement of the award of the programme as shown in the General Rules of the University and the University's Intellectual Property Policy. Insofar as I hold intellectual property rights in my dissertation or research/project report or thesis, and to that extent only, I agree that the University and its agents may archive and make accessible to the public, upon such conditions as the University may determine, my dissertation or research/project report or thesis in its entirety in all forms of media, now or hereafter known.

8. Title of submitted dissertation/research report/thesis:

The assessment of health promoting lifestyle knowledge, stroke related risk factors and quality of life of stroke survivors in the Mofolo, Chiawelo, and Stretford communities of Gauteng, South Africa.

(Please Note: If, due to unforeseen circumstances, the above title has changed from your previously approved title, no further action can be taken by the Faculty Office until the amendment has been approved by the Faculty.)

8.1 Keywords:

stroke, health promotion, stroke prevention, health promoting lifestyles, stroke risk knowledge, quality of life

9. I acknowledge that:

9.1 My dissertation or research/project report or thesis may be placed in the archive of electronic theses and dissertations. I acknowledge that it may be made electronically available in its entirety on the ETD system from four months after the date of submission unless permission for further embargo has been approved by the relevant Supervisor and communicated in writing by myself to the University Research Office, Library and Central Records Office *(see General Rule G19 which outlines embargo conditions);*

The following files are on this CD *(please specify format)*:

_____

_____

9.2 The following parts of the work may be released immediately for electronic access worldwide:
(Only if an official embargo has been agreed to in terms of General Rule G19 will your abstract not be made available for the agreed period)

Abstract and key bibliographic data *(i.e. from submission form)*

9.3 I acknowledge that I am not entitled to the return of the copies of the dissertation or research/project report or thesis or other work I have submitted for the programme.

10. Did your research involve animal experimentation or the use of human subjects, human tissue or other material, or patient records?

☐ Yes

No

[x]

If yes, please certify that clearance was obtained from the relevant, approved, University ethics committee:

Clearance number(s): N/A

11. I understand that I will not graduate unless my university fees have been paid in full.

12. I understand that if I am in material breach of any of the rules, terms and conditions governing the submission of a dissertation or research/project report or thesis at the University I may not graduate, or it may result in the revocation of the awarded award.

13. The University is not responsible for the safekeeping of the information constituting a dissertation or research/project report or thesis. Should a student use the University's ETD system for the keeping of a dissertation or research/project report or thesis in progress responsibility for the maintenance, security and back-up of such work lies with the student. The student absolves the University of any liability whatsoever for any loss/damage to a dissertation or research/project report or thesis and/or information contained in them howsoever it occurs. The student indemnifies and hold the University harmless against any claims or liability whatsoever for any loss or damage to a dissertation or research/project report or thesis and information gathered for that purpose or contained in any dissertation or research/project report or theses howsoever it occurs.

14. Name of supervisor: Mr. Kganetso Sekome

Discipline: Physiotherapy

School Therapeutic Sciences

Signature: KSEKOME

Name of second supervisor (if more than one) Ms.

Dineo Thupae

Discipline: Occupational Therapy

School: Therapeutic Sciences

Signature: 

Name of third supervisor (if more than one) Mrs.

Sameera Haffejee

Discipline: Physiotherapy

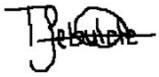
School: Therapeutic Sciences Signature

SHaffejee:

14.1. The candidate must attach an original "Certificate To Accompany Higher Programmes Research Report" from his/her supervisor(s).

14.2. Is this dissertation or thesis supported by funding from (please tick):

- DST-NRF (e.g. CoE's; SARChI Chairs; Innovation; African Origins Platform; Knowledge, Interchange and Collaboration; etc.) [Please underline the programme that applies]
- DST-CSIR (e.g. NEPTTP e-Research; etc.)
- Other: **Medical Research Council Of South** Africa [Please list the full name of the funder]



15. Signature of candidate:

Date: 14 December 2022

FOR FACULTY OFFICE USE

☐

Retain one unbound copy

☐ Field of study and biographical information confirmed

☐ Two unbound final, corrected copies, as well as final, corrected copy in electronic format, of dissertation or research/project report or thesis submitted and forwarded to Central Records Office (refer to section 6)

☐ An electronic copy of the abstract of the dissertation or research report or thesis and receipt for the ETD payment submitted and forwarded to Central Records Office (refer to section 6)

Note: 1. *Only abstracts of awards with 50% or more as a research component must be submitted for uploading onto the ETD system*
4. Please tick the appropriate box below to indicate the percentage of the research component of the award:

1. *50% or more research*

2. Less than 50% research

Signed formal declaration submitted (refer to section 7.4) and included as part of dissertation

3. or research/project report or theses

Written consent of holder of intellectual property rights included in the work attached - *if applicable* (refer to section 7.5)

Embargo notification attached – *if applicable* (refer to section 9)

Ethics Committee clearance number indicated - *if applicable* (refer to section 10)

4. Original certificate of completion for dissertation or research/project report or thesis from the candidate's supervisor(s) and Head of School attached (see section 14)

Copy of this submission form and attachments included with copies sent to Central Records Office – for forwarding to Library. **Originals placed on student file.**

5.

☐

☐

☐

Faculty Officer:_____ Date:

FOR CENTRAL RECORDS OFFICE USE

☐ One unbound final, corrected hard copy of dissertation or research/project report or thesis forwarded to Library

☐ Final corrected copy in electronic format and receipt for ETD payment forwarded to Library

☐ Copy of this submission form included with dissertation or research/project report or thesis forwarded to Library

Central Records Office:_____ Date:

FOR LIBRARY USE

☐ Electronic version of dissertation or research/project report or thesis abstract activated on ETD

Library ETD Administrator:_____ Date:

Appendix O: Turn it in Report

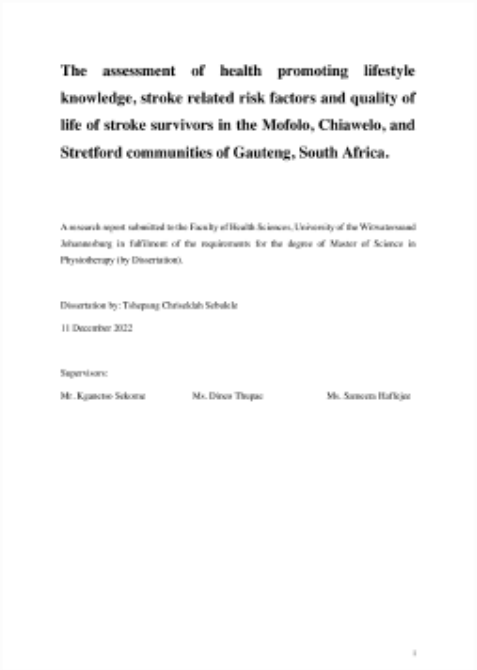
turnitin

Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

Submission author:	Tshepang Sebulele
Assignment title:	Draft submission (all, regardless of course/programme)
Submission title:	MSc FINAL 27 December.docx
File name:	MSc_FINAL_27_December.docx
File size:	4.26M
Page count:	157
Word count:	33,024
Character count:	182,295
Submission date:	27-Dec-2022 02:45PM (UTC+0200)
Submission ID:	1986902046



The assessment of health promoting lifestyle knowledge, stroke related risk factors and quality of life of stroke survivors in the Mofolo, Chiawelo, and Stretford communities of Gauteng, South Africa.

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand Johannesburg in fulfilment of the requirements for the degree of Master of Science in Physiotherapy (by Dissertation).

Dissertation by: Tshepang Chiseklah Sebulele

11 December 2022

Supervisors:

Mr. Kganeso Sekome Ms. Dineo Thupae Ms. Sameera Hafkjee

Appendix P: Certificate of Submission for Examination- signed by Student

CERTIFICATE OF SUBMISSION FOR EXAMINATION OF MASTERS RESEARCH REPORT / DISSERTATION OR PHD THESIS SIGNED BY HIGHER DEGREES CANDIDATES

Full name	Tshepang Chriseldah Sebulele		
Student number	761079		
Title of submitted Research Project: **The assessment of health promoting lifestyle knowledge, stroke related risk factors and quality of life of stroke survivors in the Mofolo, Chiawelo, and Stretford communities of Gauteng, South Africa.** *NB: If this title is different to your previously approved title, no further action can be taken by the Faculty Office until a change of title has been approved.*			
Contact no	081-415-3086	E-mail	761079@students.wits.ac.za

1. If you are likely to move in the next 6-12 months, please give the anticipated date of move:
N/A

5. I hereby submit my **Masters (dissertation) for examination**

6. I have checked all copies of my research report / dissertation / thesis and declare that no pages are missing or poorly reproduced.

7. I have submitted 2 (two) unbound copies and 1 (one) copy on CD

8. **I confirm that I have:**

1. A signed declaration indicating my understanding of the concept of plagiarism and a denial of plagiarism in my research document.
2. A report from "Turnitin" (or other approved plagiarism detection) software indicating the level of

plagiarism in my research document included as an appendix.

9. **I confirm that I have:**

1. Not used either human or animal tissue or records **No**

2. If yes: I have included the ethics waiver letter pertinent to my research as an appendix **Yes/No**

3. Done research using animals **No**

If yes: I have included a copy of the animal ethics committee clearance certificate as an appendix in this document **Yes/No**

4. Done research using human subjects, human tissue or patient records **Yes**

If yes: I have included a copy of the human ethics clearance certificate as an appendix to the research document **Yes**

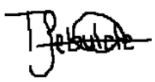
10. I understand that I may not graduate unless my University fees have been paid in full.

11. My Supervisor(s) names, departments, telephone numbers and email addresses are as follows:

Name	Mr Kganetso Sekome		
Department	Physiotherapy (University of the Witwatersrand)		
Telephone	011-717-3705	E-mail	Kganetso.sekome@wits.ac.za
Name	Ms Dineo Thupae		
Department	Occupational Therapy (University of KwaZulu Natal)		
Telephone	031-260-7307	E-mail	thupaed@ukzn.ac.za
Name	Ms Sameera Haffejee		
Department	Physiotherapy (Chris Hani Baragwanath Academic Hospital)		
Telephone	011-933-8309	E-mail	haffejeesameera@gmail.com

List all publications, which you have published in peer-reviewed journals from your postgraduate research report/dissertation/thesis during the course of your studies in the Faculty of Health Sciences (Include authors, year, title of paper, name of journal, volume number and page numbers). This information is mandatory.

Signature of candidate:



Date: 11 December 2022

Appendix Q: Letter from Head of Division