

**INCIDENCE AND COMMON CAUSES OF MAJOR LOWER  
LIMB AMPUTATION AT A HOSPITAL IN A SUB-DISTRICT OF  
THE CITY OF CAPE TOWN MUNICIPALITY.**



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**Date: June 2023**

## DECLARATION

I declare that this work entitled the 'Incidence and Common Causes of Major Lower Limb Amputation in a Hospital in a Sub-district of the City of Cape Town Municipality' is my own work. It has not been submitted for any degree or examination at any other university and all the resources I have used, or quoted, have been indicated and acknowledged by complete references.

**Name:** Timothy Kaylor

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**Signature:**



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## DEDICATION

To my family, Karen, Eldred, Kyran, and Tammy, you have been with me on this journey. Your support has motivated and encouraged me to achieve this goal. You are the reason I am who I am and I am where I am. Thank you.

I dedicate this to all my loved ones who have sacrificed selflessly and helped me to complete this thesis. To Kelly and Dohann, you have helped me through the challenges and motivated me through till the end. I am forever indebted to you.



## ABSTRACT

**Background:** Major lower limb amputation (LLA) is a life-changing event described as the loss of a limb at or proximal to the ankle upwards. The amputation itself is a change in body structure but has a significant influence on many activities, participation in activities and quality of life. Optimal functional outcomes for persons with a major LLA require intensive long-term rehabilitation and costly assistive devices such as prostheses. Due to the high costs associated with it, the increasing number of persons with major LLA places a burden on the resource-limited public health system. In order for the provincial department of health to plan to provide sufficient human and financial resources and procure enough assistive devices such as prostheses, the need for these devices and the incidence of major LLAs should be established. The study aims to determine the incidence and common causes of major LLAs in adults and children who underwent major lower limb amputations at Tygerberg Hospital over one year from 19 December 2019 to 20 December 2020.

**Methods:** A quantitative, retrospective, and descriptive study design was used. The study was set in the Tygerberg Hospital servicing the Tygerberg health catchment area in the City of Cape Town Municipality. A self-developed data collection sheet was used to collect data pertaining to the socio-demographic profile, comorbidities, cause of amputation and associated outcomes, such as in-hospital mortality and length of hospital stay. The medical records were collected from the electronic database enterprise content management (ECM) of Tygerberg Hospital using names and file numbers obtained from the surgical records and surgical register from the surgeries. Data was captured retrospectively from December 2019 to December 2020 in 2020 to 2021. The incidence

of major LLA is reported as a number per 100000 of the at-risk population of 533047 in 2019 (Stats SA, 2019) that access the public health system and reside in the Tygerberg sub-district. Descriptive and inferential statistics were used.

**Ethics:** Ethics approval to conduct this study was granted by the Biomedical Research Ethics Committee of the University of the Western Cape (BM19/6/17). Permission to collect data was obtained from the provincial department of health and the chief medical officer of Tygerberg Hospital prior to the collection of data.

**Results:** There were a total of 106 participants. The incidence of LLA was 19.8 per 100000 between 19 December 2019 and 20 December 2020 at Tygerberg tertiary hospital. Only three of these participants were minors. The mean age of the participants was 56 years. The majority of participants was males (53.7%; n = 57) compared to females (46.3%; n = 49). The primary cause of major LLA was diabetes mellitus (51.9%; n = 56) and peripheral vascular disease (28.3%; n = 30). The mean length of stay was 22.58 days.

**Conclusion:** Diabetes mellitus and peripheral vascular disease were the leading causes of major lower limb amputations. Considering the rapid increase in DMII, especially in Africa, an increase in the incidence of major LLAs is expected. This study is only one of two studies done the first of which was done in 1993 by J A Hendry in the Tygerberg sub-district of the City of Cape Town to provide some data pertaining to the incidence and common causes of LLA, which could assist the provincial department of health in planning and allocating the appropriate resources or preventative strategies.

## KEY WORDS

Aetiology

City of Cape Town Municipality

Comorbidity

Diabetes Mellitus

Hospital

Incidence

Major lower limb amputation

South Africa

Tygerberg Sub-district





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## ABBREVIATIONS

DMII	-	Diabetes Mellitus Type 2
ECM	-	Enterprise Content Management
GATE	-	Global Cooperation on Assistive Health Technology
HPT	-	Hypertension
KZN	-	KwaZulu Natal
IDF	-	International Diabetes Federation
LLA	-	(Major) Lower Limb amputations
PVD	-	Peripheral Vascular Disease
COVID-19	-	Severe Acute Respiratory Syndrome Coronavirus 2019
USD	-	United States Dollar
WHO	-	World Health Organization
ZAR	-	South African Rand



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# CHAPTER ONE

## INTRODUCTION

### 1.1 Background and introduction

The incidence of major lower limb amputation (LLA) refers to the number of people who have had amputations of the lower limb/s above the ankle joint in a specific geographical setting within a determined timeframe. Incidence statistics are used to determine the need for assistive devices such as crutches and prosthetics and assist with the planning and allocation of public health resources and human resources (Bonita et al., 2006).

Major lower limb amputation is the surgical procedure of removing part of or the whole limb through or proximal to the ankle (Al Agha et al., 2017). Having an amputation leads to altered function and body image; this has a significant influence on many activities, participation in activities and quality of life, decreased self-esteem, social isolation, perceived vulnerability, body image problems, and a sense of stigmatisation have also been associated with limb loss (Jo et al., 2021).

The incidence of major LLA varies globally (Moxey et al., 2011) and incidence figures are scarce. It ranges from 8.8 per 100000 in the Netherlands in 2004 (Fortington et al., 2013) to 92.5 per 100000 individuals in Ireland in 2009 (Buckley et al., 2012). There are minimal population-based incidence figures for major LLA in African countries. In South Africa, recent studies from January 2014 to December 2015 (2 years) at the Inkosi Albert Luthuli Central Hospital (IALCH) in KwaZulu Natal (KZN) had an incidence of 234 individuals who

have had lower limb amputations or 17 per 1000 diabetic patients who had LLA for the first time (Mtshali & Mahomed, 2020). At Addington hospital between 2010 and 2014 there were 667 individuals who have had LLA (Manickum et al., 2019). At Greys Hospital in KZN between January 2013 and July 2018 (5 years), 363 patients had LLAs (Khan et al., 2020). To date, there was only one incidence study done on the number of LLAs have been conducted at the Tygerberg Hospital or in the Western Cape Province in 1993 by J A Hendry.

There are several leading causes for major LLAs in the Western world, and these are complications of diabetes mellitus, peripheral vascular disease, trauma such as burns, congenital limb deformities and cancer (Imam et al., 2017). Historically, there used to be marked differences between the causes of LLA between developed and developing countries. The most common cause of major lower limb amputations globally is complications to DMII (Al Agha et al., 2017). Dysvascular causes are the most common cause of LLAs in the developed world, while trauma used to be the most common cause in developing countries (Shaw et al., 2018). The rapid increase in urbanisation of South Africa and the westernisation of lifestyles and diets of South Africans is having a considerable impact on disease profiles in South Africa. Diseases such as diabetes and atherosclerosis, previously thought to be rare among the population of the country, are now becoming more prevalent. These disease processes have multiple systemic effects and may manifest with pathologies involving the lower limbs and may ultimately require a lower limb amputation (Khan et al., 2020).



There is a radical increase in the number of persons diagnosed with DMII in South Africa. According to the IDF 2021, South Africa has the biggest increase in the number of people diagnosed with DMII, from 1.9 million to 4.2 million, which is the largest on the African continent (IDF Diabetes Atlas, 2021). The increase of people suffering from DMII may result in a potential surge in the number of LLAs in South Africa as DMII is the leading cause of LLA globally (Dunbar et al., 2015), however, there are few LLA incidence studies in South Africa.

Major lower limb amputation is associated with significant morbidity, mortality, and disability. An amputation is not only the loss of a limb but can also mean disability, unemployment, high insurance payments and a poor quality of life (Godlwana, 2008). Major LLA carries a high psychological and socio-economic burden on the victim and the community of the amputee, as well as for the health system (Al Agha et al., 2017).

Having a lower limb amputation has substantial implications for the human and financial resources of the public health system. In the United States, acute and post-acute care for major LLAs exceeds USD 4 billion (Dillingham et al., 2005). In 2015/2016, the provincial departments of health and local governments in South Africa spent ZAR1639 per uninsured person on district health services in 2015/16, irrespective of the health condition (Massyn et al., 2015). In KZN, the mean hospital cost per major lower limb amputation in 2015/2016 was USD16718 or approximately ZAR245836,52 and in 2020, USD21441, which is equal to ZAR315287,76 (Mtshali et al., 2022).

Therefore, it may have significant financial implications for the already burdened provincial public health system. There is currently no information on the incidence of LLA in the Tygerberg sub-district of the City of Cape Town Metropole and very little in South Africa in order to describe the need for physical and financial resources, i.e., medical professionals, hospital care, prostheses and walking or assistive devices and the potential impact or strain on the health system.

## **1.2 Problem statement**

The loss of a limb is a potentially devastating event and often results in profound physical, psychological and vocational consequences (Dillingham et al., 2002). In South Africa, there is a rapid increase in the prevalence of DMII, particularly in individuals aged between 20 and 79 years, which has increased twofold from 2000 to 2009 (Pheiffer et al., 2018). South Africa had 4.2 million people with DMII in 2021 (IDF Diabetes Atlas, 2021).

Considering the increase in DMII and the fact that it is the most significant risk factor for lower limb amputation, it is likely that the number of major LLAs will also increase. The public health system in South Africa is under-resourced, and the substantial increase in the number of people with lower limb amputations is adding further strain to the limited resources (Stats SA, 2019).

The potential increase in the number of persons with major limb amputation increases the burden on the financial resources of the public health system and has significant implications for human resources. People who have undergone a lower limb amputation

require intensive acute care and long-term rehabilitation. There are currently very few physiotherapists and occupational therapists employed in government facilities, resulting in a potential lack of manpower to provide quality rehabilitation to persons with major LLAs. A lack of rehabilitation results in decreased functional outcomes for these patients (Ennion & Rhoda, 2016).

Despite the potential impact on the financial and human resources in the government health setting, there are no statistics on the incidence of lower limb amputation in adults and children within the Tygerberg sub-district of the City of Cape Town Municipality. There are also no statistical records regarding LLAs at Tygerberg Hospital.

### **1.3 Research question**

What is the incidence, common causes and demographic profile of adults and children with major lower limb amputation at Tygerberg Hospital in the Tygerberg sub-district of the City of Cape Town Municipality catchment area?

### **1.4 Study aim**

The aim of the study is to determine the incidence, common causes, comorbidities and demographic profile of adults and children with major lower limb amputation at Tygerberg Hospital in the Tygerberg sub-district of the Cape Town Municipality for one year.

### **1.5 Study objectives**

The objectives of the study are to determine the following:

- 1) Incidence of major LLA,
- 2) Common causes of LLA,
- 3) Comorbidities associated with LLA,
- 4) In-hospital mortality of patients with LLA,
- 5) Length of hospital stay of patients with LLA,

at the Tygerberg Hospital in the Tygerberg sub-district of the Cape Town Municipality catchment area (Appendix A).

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

There is a dearth of information regarding the incidence and common causes of major lower limb amputations in South Africa, and none at the Tygerberg Hospital. Major lower limb amputation continues to be a common procedure in South Africa and carries an enormous financial burden not only for the person with the LLA and their families but also for the health care system. Determining the incidence of major lower limb amputations will provide important information to assist in planning for financial and physical resources for the already burdened provincial health department. Identifying the common causes may also give valuable information to prevent or slow the rate of major lower limb amputations and may serve as valuable for pilot studies to prevent major lower limb amputations and common causes.

### **1.7 Operational definitions**

**Major lower limb amputations:** Loss in the transverse anatomical plane at or proximal to the ankle joint (Pran et al., 2021).

**Under-resourced:** Not provided with as much money or as many staff, materials, etc., as needed (Oxford Learners Dictionary, 2023).

**Human resources:** Human resources, when pertaining to health care, can be defined as the different kinds of clinical and non-clinical staff responsible for public and individual health intervention (Kabene et al., 2006).

**Outpatient:** A person who goes to a hospital for treatment but does not stay there (Oxford Learners Dictionary, 2023).

**Readmission:** To be admitted to hospital within 30 days of discharge from hospital (Zasadil & Peele, 2015).

**In-hospital mortality:** Deaths that occur while in hospital (Stewart et al., 2016).

## 1.8 Outline of thesis

### CHAPTER 1

This chapter introduces the reader to the research topic, specifically the incidence and common causes of major lower limb amputations. This chapter highlights the lack of research, specifically incidence studies in South Africa and Africa. The significance of the study was described, and the reader was introduced to the research question, aim and objectives of this study. The theoretical framework used to guide the study and the methodological approach will be described in subsequent chapters.

## CHAPTER 2

This chapter describes the theoretical framework and provides an in-depth synopsis of current and global evidence related to incidence-related studies in different countries and literature on common causes of major lower limb amputations. This chapter also described relevant literature on the cost per amputation, specifically the monetary value cost to the country locally and internationally.

## CHAPTER 3

This chapter describes the methodological design of the study, study setting, study population and sample strategy, data collection procedures, instruments, and ethical clearance.

## CHAPTER 4

The results of this study are reported in line with the research questions and objectives of the study. The main findings are presented in narrative paragraphs and visually illustrated using figures, graphs, and tables.

## CHAPTER 5

This chapter provides a summary of the main findings, an integrated discussion critically analysing the findings of the study and comparing it to local and international literature. The study's clinical implications and the use for further research of incidence studies are also discussed.



## CHAPTER 6

This is the final chapter in which the main findings are summarised. The strengths, limitations and recommendations for further research are highlighted and a conclusion is made from the results.





## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Theoretical framework

In order to be fully integrated back into society after the loss of a limb, the person with an amputation will require access to expensive assistive devices such as crutches, wheelchairs and, ultimately, a prosthesis. The World Health Organization (WHO) estimates that approximately one billion people globally require assistive technology, while only ten per cent of those who require it have access to it (Brouillette, 2017). As a result, the WHO established the Global Cooperation on Assistive Health Technology (GATE) initiative. The GATE initiative formulated the 'Global priority research agenda for improving access to high-quality affordable assistive technology' (Brouillette, 2017), the theoretical background for this study.

This global research priority agenda aims to facilitate improved access to assistive technology (such as prosthetics) through stimulating research into the need for and impact of assistive technology. The agenda has five guiding areas for research, namely:

1. Effects, costs, and economic impact of assistive technology.
2. Assistive technology policies, systems, service provision models and best practices.
3. High-quality and affordable assistive technology.

4. Human resources for the assistive technology sector.

5. Standards and methodologies for the assessment of assistive technology need and unmet need.’ (Brouillette, 2017; p. 2)

Each of the five categories also has more detailed subsections. The proposed study aligns with category five, question 5.1, ‘How can accurate data about the prevalence of impairments/disability be collected and used in a standardised, valid and reliable way, so that governments and service providers can plan and operate effectively?’ (Brouillette, 2017; p. 13). Collecting information on the incidence of lower limb amputation will provide insight into how this information can be collected and assist the government with planning resources. Furthermore, if the number of people who experience lower limb amputation is known, it will provide more insight into the need for prostheses and possibly answer question 3.1 (Brouillette, 2017; p. 11) ‘What types of assistive products are most needed, which ones have demonstrated most beneficial to users?’

## **2.2 Introduction and aetiology**

Major lower limb amputation is a lifesaving procedure (Adams & Lakra, 2023). It is a life-changing operation that results in significant morbidity and mortality worldwide. The adverse social implications and effects on the capacity to work, quality of life, and self-image are devastating (Aljarrah et al., 2019). The global incidence of major lower limb amputation varies widely with geographical location (Pran et al., 2021).

There is little research undertaken in South Africa. The following literature review discusses the incidence and prevalence of LLA in South Africa and internationally, the main causes of lower limb amputation, morbidity and mortality of LLA, and the financial implications for the health department and individuals.

There are no national incidence studies for LLA done in South Africa. International incidence of lower limb amputation ranged from 8.8 per 100000 in the Netherlands in 2004 (Fortington et al., 2013) to 92.5 per 100000 individuals in Ireland in 2009 (Buckley et al., 2012). Over seven years, between 2010 and 2014, the tertiary hospital of Trinidad and Tobago had an average of 28 per 100000 individuals with major lower limb amputations per year (Pran et al., 2021). In Sweden, a national study from 2007 to 2018 recorded a declining trend of LLA with a national average of 22.1 per 100000 (Jarl et al., 2022).

South Africa's population was 60.6 million at the end of June 2022 and has shown positive population growth over the last 20 years and a life expectancy of 62.8 years, which is also on an upward trend (Stats SA, 2022). The Tygerberg sub-district of the City of Cape Town has a population of approximately 533047 (Stats SA, 2019). South Africa is still a developing country (Bakari, 2017) and is still considered a low- to middle-income class country (Mooney et al., 2008).

There are several main causes for major LLA in the Western world, including complications of diabetes mellitus, peripheral vascular disease, trauma such as burns, congenital limb deformities and cancer (Imam et al., 2017).

Trauma used to be the most common cause in Low to middle income countries (Pran et al., 2021). Complication to diabetes mellitus is the leading cause of LLA in the world to date. South Africa is becoming more Westernised and has adopted a more sedentary lifestyle (Sarvestani & Azam, 2013). This has led to a rapid increase in DMII, with the International Diabetes Federation (IDF) reporting 2.3 million new cases of DMII over ten years (IDF Diabetes Atlas, 2021).

Lower limb amputation has significant implications for the human and financial resources of the public health system. In the United States, the total cost care for major lower limb amputations exceeds USD 4.3 billion yearly (Dillingham, Pezzin & Shore, 2005). The provincial departments of health and local governments in South Africa spent ZAR1639 per uninsured person on district health services in 2015/16, irrespective of the health condition (Massyn et al., 2015). The hospital expenses specifically related to LLA is high; in KZN, the mean hospital expense per lower limb amputation caused by diabetes mellitus between 2015 and 2016 was approximately ZAR245836,52, and in 2020, ZAR315287,76 (Mtshali et al., 2022). The average hospital cost per diabetic-related amputation between 2013 and 2017 was ZAR323418 (Thompson et al., 2020), and the annual cost to the KZN department of health is in excess of ZAR398 million per annum which is rising.

Therefore, it might have significant financial implications for the burdened provincial public health system. There is no current information pertaining to the incidence of major LLAs in the Tygerberg sub-district of the City of Cape Town Metropole to describe the need for adequate human and financial resources such as physical rehabilitation, prosthesis, assistive devices, preventative measures as well as the potential impact on the health system as a whole.



## CHAPTER THREE

### METHODOLOGY

#### 3.1 Introduction

This chapter provides a detailed description of the research approach, study design, research setting, population sample size and sampling procedure. It also discusses the data collection and analysis processes, including the ethical considerations. The methods and instruments used to collect data are described.

#### 3.2 Study setting

The study setting is the Tygerberg sub-district of the City of Cape Town Municipality of the Western Cape. Only two hospitals perform major lower limb amputations within the Tygerberg sub-district: Karl Bremer and Tygerberg Hospitals. Due to the COVID-19 pandemic, the national government put restrictions in place from 26 March 2022 till 18 August 2020 which impeded on the accessibility of the two facilities in the Tygerberg sub-district. The restrictions included but were not limited to restricted access to the facilities whereby only staff, patients, medical students and interns enrolled at Karl Bremer and Tygerberg Hospitals were allowed access to the institution. Once access was granted, only a select number of people were allowed to enter the hospital at any time. Karl Bremer, however, extended its restriction period over several months until approximately September to October 2020 and due to time constrictions, it was not possible to collect data from Karl Bremer Hospital. Karl Bremer was, therefore, excluded, and data was only



collected from Tygerberg Hospital. The incidence of major lower limb amputations was determined at Tygerberg Hospital over the period of a year starting from 19 December 2019 to 20 December 2020. Tygerberg tertiary hospital officially opened in 1976 to serve as a tertiary training hospital; prior to this, Karl Bremer Hospital was used for tertiary medical school training, however, this was deemed inadequate. According to the Manual for Interns and Doctors, provided by Tygerberg Hospital, Tygerberg tertiary hospital has approximately 1384 beds and 28 operating theatres. The total number of beds includes carefully situated special ward units. The main operating facilities comprise 28 operating theatres, including six special investigation theatres as well as six recovery areas. Tygerberg Hospital also provides emergency facilities. This unit has three 24-hour emergency theatres and a six-bed acute intensive care unit. Each department at Tygerberg Hospital has an outpatient section for consultation and training.

There are several unique services at Tygerberg tertiary hospital, which include the Carel Du Toit Centre for hearing impaired, centre for mental health, clinical nutrition and vitaminology, clinical retinal laboratory, cochlear implant unit, complex craniofacial surgery unit, complex radiation, and oncology therapy. Also, there is the metabolic unit, in-vitro fertilisation, kidney transplant unit, human genetics unit, neonatal intensive care unit, neuropsychiatric unit, open heart surgery unit, perinatal stress disorder unit, specialised pulmonary function unit, tuberculosis unit, Tygerbear social work unit, day surgery unit, MRI, Oncology, adult burns unit, hyperbaric oxygen facility, PET CT Scanner, Pain services (Tygerberg Hospital, 2022).

### **3.3 Study approach and design**



A quantitative retrospective study approach was utilised to collect data for this study. Ideally, the incidence would be determined prospectively, but due to the COVID-19 pandemic and the restrictions which resulted in a national lockdown, it was not possible to conduct a prospective study as planned due to the limited access to records at the Tygerberg Hospital at the time. Instead, a retrospective descriptive study design was used to determine the incidence of major lower limb amputations at Tygerberg Hospital in the City of Cape Town Metropole. The advantages of retrospective research are:

- There is minimal cost and minimal use of resources as pre-existing data is investigated.
- Increased speed of data collection and analyses due to the fact that the data is available and obtained from clinical databases.
- An association between the variable and the outcome may be derived from cohort studies.

There are, however, disadvantages to retrospective studies, such as retrospective data examining already existing data that was collected or entered into a clinical database previously and not data collected for the research. This does lead to the following:

- The risk of bias from resources;
- There are data set requirements;
- Comparison group limitations; and
- Relevant information lost (Talari & Goyal, 2020)

### 3.4 Study population, sampling Strategy and size

In the Tygerberg sub-district, there were approximately 533047 people in 2019 (Stats SA, 2019).

The population is described according to the objectives of the study per 100000.

Table 1: List of suburbs within the Tygerberg sub-district in the City of Cape Town.

Number	Area	Estimated population sizes
1	Bellville	112507
2	Elsies River	42479
3	Parow	119462
4	Goodwood	50285
5	Belhar	56234
6	Delft	152030
7	Epping Industria	50

A purposive sampling strategy was used for the total consenting population. The study included every individual who underwent their first major lower limb amputation in the specified timeframe and resided within the Tygerberg sub-district of the City of Cape Town Municipality.

### *Inclusion criteria*

Any person who underwent a major lower limb amputation (through or above the subtalar/ankle joint) at Tygerberg Hospital for the first time (re-amputation at another level was not included) and who was referred to Tygerberg via the Western Cape health department referral system were included.

### *Exclusion criteria*

- The participant had previous major lower limb amputation/s.
- Amputation procedure fell outside the timeframe.
- The participant had lower limb amputation below the ankle joint resulting in transmetatarsal amputation.

### **3.5 Instruments of data collection**

A data extraction sheet (Appendix B) was developed based on recommendations made by a systematic review of population-based amputation studies (van Netten et al., 2016) and general information included in similar incidence studies for different conditions (Joseph et al., 2015). The sheet has 12 questions that capture descriptive demographic variables such as gender, date of birth, date of amputation surgery, level of amputation, the primary cause of lower limb amputation, comorbidities, in-hospital mortality and date of discharge (length of hospital stay).

### **3.6 Procedure of data collection**

Prior to data capturing, several hospital employees from both Tygerberg and Karl Bremer Hospitals were interviewed and asked: 'In which wards were lower limb amputations cared for', 'In which theatres were lower limbs amputated', 'Which departments (speciality) looked after lower limb amputations', 'Which doctor/s performed amputations and how could I get hold of them'. These questions helped lead the researcher to the specific wards and theatre departments. The vascular, orthopaedic and theatre departments were contacted, and information on the previous years' surgeries was discussed. Data from the orthopaedic department was collected. The vascular department had no information or statistics from previous years.

Data capturing for December 2019 to December 2020 commenced retrospectively, periodically and on separate occasions due to COVID-19 restrictions set out by the government and facilities of the Tygerberg health sector from August–September 2020, June–August 2021 and October–November 2021 with visits to the facilities, namely Karl Bremer and Tygerberg Hospitals.

Tygerberg tertiary hospital has several operating theatres: Orthopaedic theatre, theatre C1AT, Theatre G and H and trauma theatre. Data was collected and captured from the specific theatres' registries, and information such as patient names, file numbers, date of surgery, and type of amputation performed was obtained first from the orthopaedic department theatre notes and then from the other theatres. The institution was visited on several occasions over 12 months to collect and document data from theatre registries;

Tygerberg G and H theatres were missing the registry for November 2019 to mid-February 2020; however, the theatre admission booklet was used to retrieve some of the missing data. Those theatres and their registries were scrutinised, and the names and file numbers of those who underwent major lower limb amputations were recorded. The information was then used to retrieve the files uploaded to the enterprise content management system of Tygerberg Hospital. Several search strategies were used, starting with looking up the patient's file number. However, the file number recorded/written down was not always correct, so certain numbers were changed during the search, which could have been written down inaccurately, i.e., 5 and 8, 1 and 7, 6 and 8, etc. until the correct cross-referenced match between name and surname, corresponding operation and date were found. The relevant information from the supporting documents in the file was captured, and data was extracted using the self-developed data extraction sheet (Appendix S).

### **3.7 Analysis of data**

Using the data extraction sheet (Appendix S), the data of participants' names, file numbers and surgery procedures were collected from theatre registries and collected manually from the theatres of Tygerberg Hospital. The medical file numbers, names and dates of birth were used to look up patients' medical records. Each participant had a data capturing sheet, and once completed, the sheet was then coded using a TBH code, with numbers starting at 001 to 135. The researcher then removed three duplicates, exclusions of which there were 16 and used an Excel spreadsheet (Appendix E) to document each participant's results according to the self-developed data capturing sheet.

The data was recorded on a self-developed data capturing sheet and then coded and captured on a Microsoft Excel spreadsheet. Once data was checked and cleaned, it was exported and analysed descriptively using SPSS vs 27. Data was presented as frequencies, standard deviations and means.

### **3.8 Scientific rigour**

Scientific rigour in this study was ensured by clear documentation of the methods for replicability of the study. A reliable and valid tool: data extraction sheet (Appendix S) was developed and used based on the work of van Netten et al. (2016) as described above, and the content was validated by the researcher for the instrument meeting the objectives of the study. The extraction sheet was used to collect data and ensure the internal and external validity of the results to answer the research question. Reliability throughout the data collection processes was ensured by going through several processes documented in the process of data collection. The primary student researcher noted missing data from clinical files during data capturing from the clinical files and ECM system. Data was coded, verified and extracted. The sampling method and data analysis procedures are clearly outlined in the methodology. Both methodological and reporting processes (results) are transparently documented to ensure scientific rigour. All results are reported, thus eliminating reporting bias.



### **3.9 Ethical considerations**

Ethical clearance was obtained from the Biomedical Research Ethics Committee of the University of the Western Cape to commence with the study (Ethics clearance number: BM19/6/17). Permission from the Western Cape health department (Tygerberg health district) was granted to begin the research (WC\_201910\_001) (Appendix B), following this permission was acquired from Tygerberg Hospital to conduct research at the facility (Appendix D) that included permission to access the facilities and patient records from the medical managers of the two hospitals on 22 February 2020. Karl Bremer hospital consented and approved access to facilities as well as medical records from the hospitals. All recorded data was coded, and password protected, and the identities of participants were coded and protected to protect their identity, e.g., TBH001. All their personal information was captured and kept private, and only the primary investigator can access the information, which is now locked away and stored. The data will be kept for five years and, after that, deleted from all known devices and physical records shredded in a secure location. Feedback and acknowledgement will be given to Tygerberg Hospital and the Tygerberg health district within six months of the completion of the research.



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# CHAPTER FOUR

## RESULTS

### 4.1 Introduction

In this chapter, the main findings of the study will be presented in accordance with the research objectives. The results will be discussed starting with the incidence of major lower limb amputation, demographic details, common causes, comorbidities, types of surgical procedure, level of amputation, in-hospital mortality, length of hospital stay and re-amputation of participants with major lower limb amputations.

### 4.2 Incidence of major lower limb amputations

Between 19 December 2019 and 20 December 2020, 106 major lower limb amputations were recorded at Tygerberg tertiary hospital, with an incidence rate of 19.8 per 100000 of the population in 2020. There are no other associated incidence or prevalence studies, statistical tools or documented theatre notes to provide insight into the statistics for major lower limb amputations prior to December 2019. This is based on the Tygerberg tertiary hospital inpatient service population of 381535 for 2020 (Tygerberg Hospital, 2022).

### 4.3 Demographics of participants

The records of 106 participants were included in the study. There were three minors and 103 adults over the age of 18 years with a mean age of 56 years (SD+- 14,82; range 12–81). The ages ranged from 12 being the youngest participant, to 81 being the eldest participant, with the majority of participants (54%; n = 57) being male.

The majority (81%; n = 82) of participants had little to no income (Figure 4.1), and most were on a pension (37%; n = 39), while almost a third were unemployed (29%; n = 31).

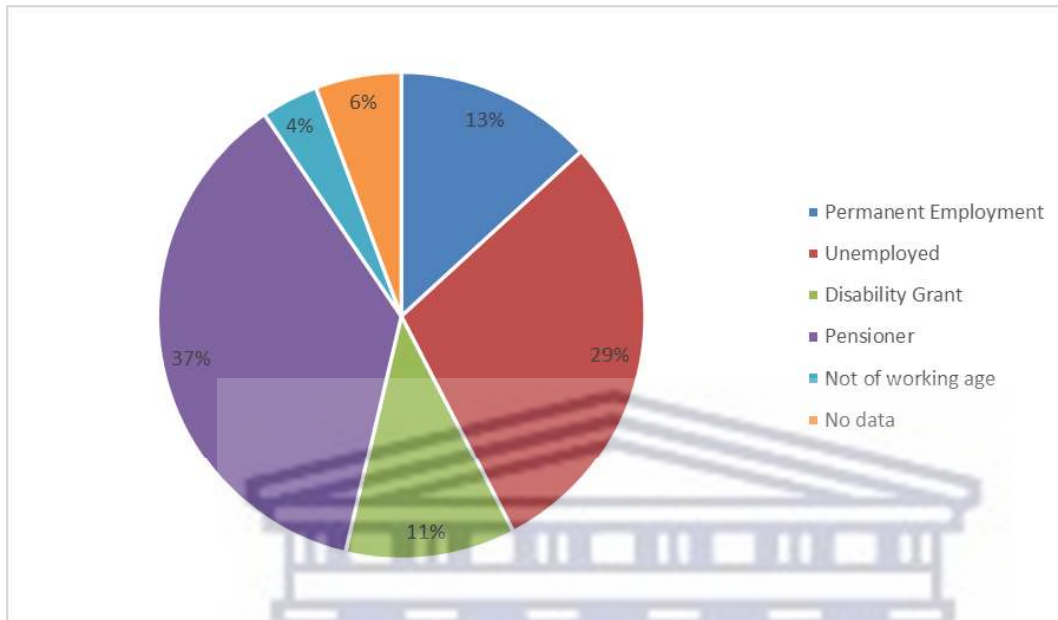


Figure 4.1 Employment status

The majority of participants were either married (41.5%; n = 44) or never married/single (37.7%; n = 40) (Figure 4.2).

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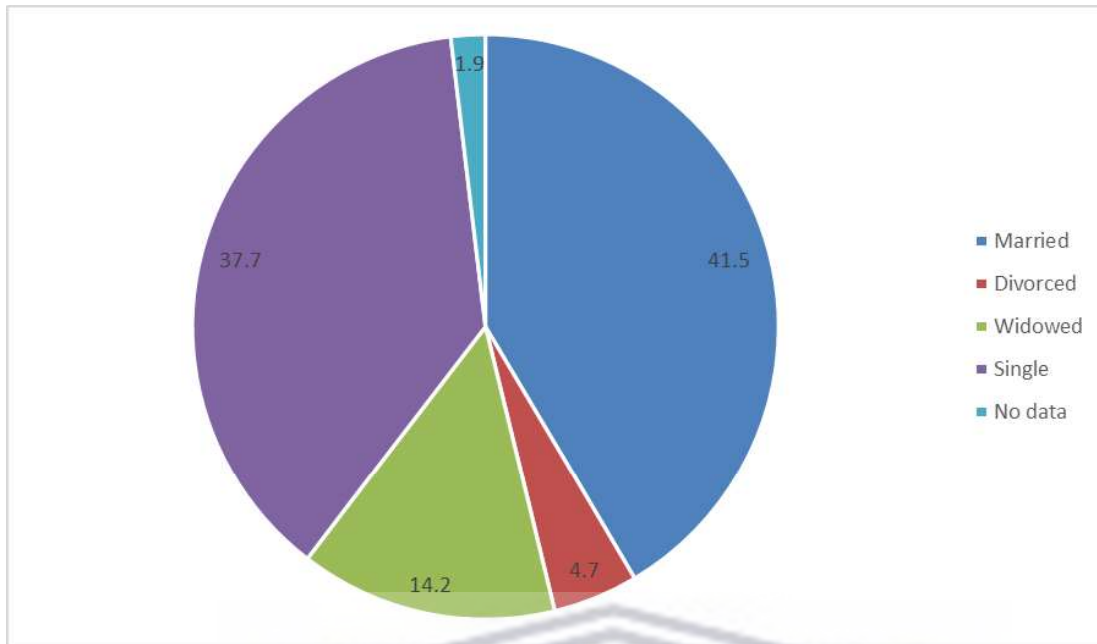
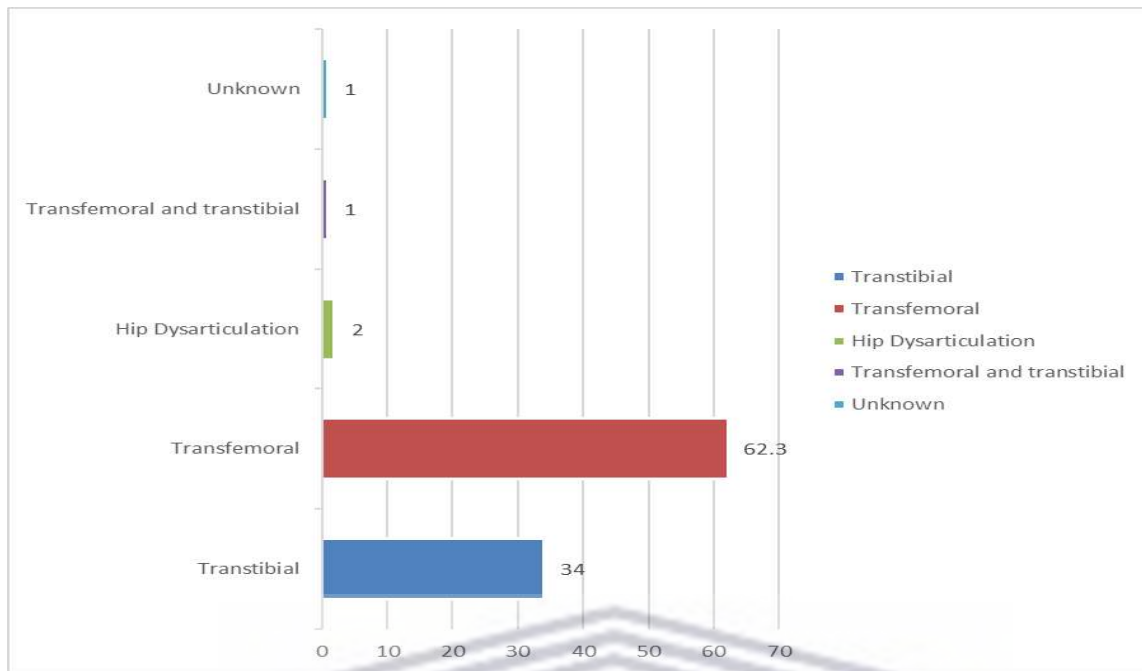


Figure 4.2 Marital status

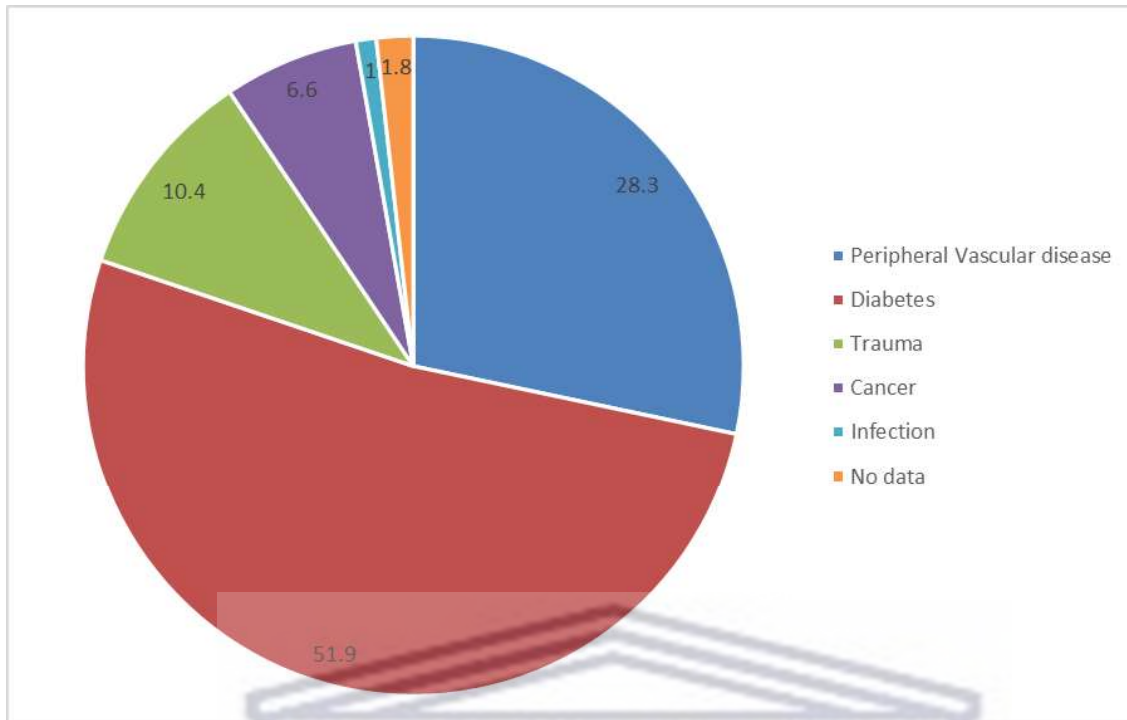
Transfemoral amputation was the most common (62.3%; n = 66) level of amputation in this cohort, followed by trans-tibial amputation (34%; n = 36). Two participants had hip disarticulation (1.9%; n = 2), and one had above and below knee amputation in the same hospital admission (0.9%; n = 1). One of the participants' surgery data was inaccessible (Figure 4.3).



**Figure 4.3 Level of Amputation**

#### **4.4 Common causes of major lower limb amputations**

The most common cause of major lower limb amputation at Tygerberg Hospital was the complications of diabetes mellitus (51.9%; n = 56), followed by peripheral vascular disease (28.3%; n = 30) and trauma (10%; n = 11). These included burns, electric burns, motor vehicle accidents, pedestrian accidents and blunt force trauma (Figure 4.4).



**Figure 4.4 Primary cause of major lower limb amputation**

#### **4.5 Comorbidities associated with major lower limb amputation**

Major lower limb amputations are usually associated with several comorbidities because most are caused by chronic illnesses such as diabetes. Hypertension (66%; n = 70) was the most common comorbidity, followed by diabetes (51.9%; n = 56) and peripheral vascular disease (28.3%; n = 30). A large percentage (27.4%; n = 29) of participants suffered from a combination of diabetes, hypertension, and dyslipidemia, commonly known as metabolic syndrome.



#### 4.6 Type of surgical procedure

The fish mouth incision procedure was the most common type of surgical procedure (69.8%; n = 74), followed by the guillotine approach (1.9%; n = 2), and there was no information available on the type of surgical procedure for 22 participants.

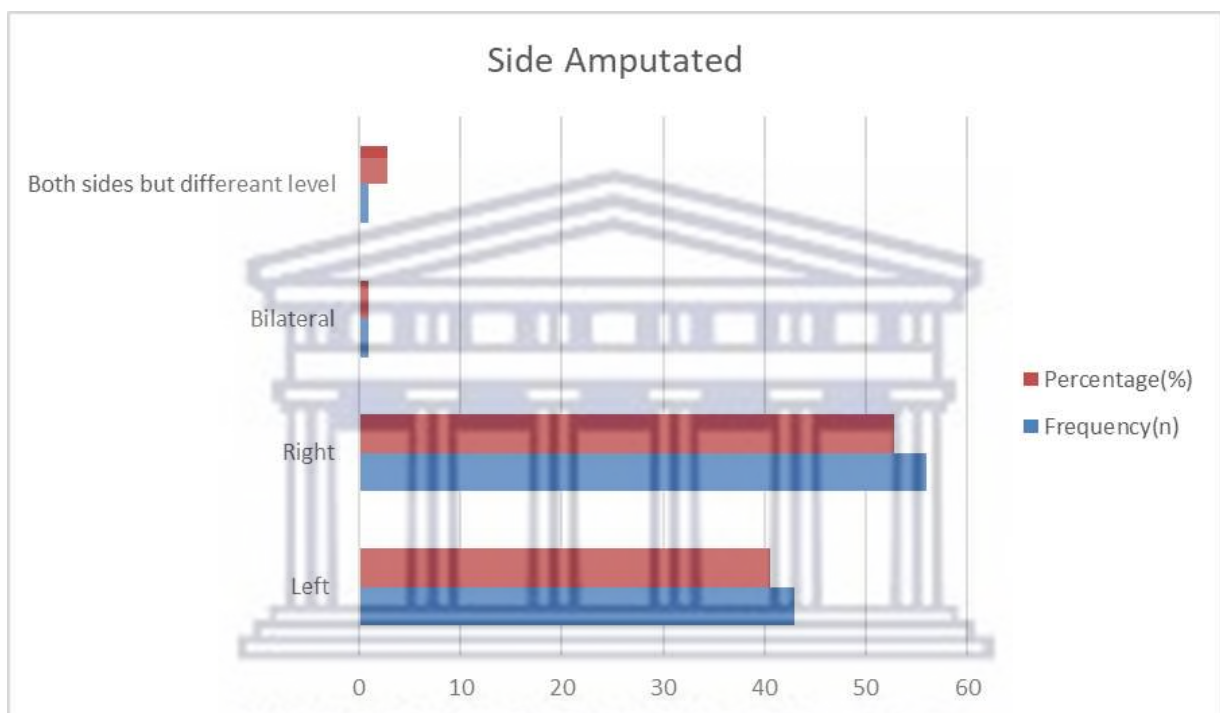


Figure 4.5 Side amputated

#### **4.6 In-hospital mortality rate of major lower limb amputation**

A relatively large percentage (7.5%; n = 8) of the participants did not survive the amputation surgery or died days later in the hospital following major lower limb amputation. Of these eight fatalities, two of those eight participants underwent hip disarticulation, one had a trans-tibial amputation, and the other five participants underwent transfemoral amputations.

#### **4.7 Length of hospital stay**

The mean length of hospital stay was 22.58 days (SD +/- 17.79; range 4–89 days). Most participants spent 18 or less days in hospital (59.4%; n = 63).

#### **4.8 Re-amputation**

There was a total of ten readmissions documented. All ten readmissions had re-amputations. One of the participants had the same leg amputated at a higher level, and (80%; n = 8/10) had the contralateral side amputated.

The logo of the University of the Western Cape, featuring a stylized classical building with columns and a pediment.

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## CHAPTER FIVE

### DISCUSSION

#### 5.1 Introduction

This chapter presents an overview of the main findings, critically analysed, and appraises in relation to the local and global context and evidence. The findings are integrated into the discussion in line with the theoretical framework that applies to this study. The thesis is concluded in Chapter 6.

This study was conducted between 19 December 2019 and 20 December 2020. As of December 2019, South Africa was under lockdown and in a state of disaster during COVID-19. The implementation of strict protocols and limited access to the facilities allowed access to only staff, patients, medical students, and interns enrolled at Karl Bremer and Tygerberg Hospitals. However, Karl Bremer extended its restriction period for several months until October 2020. Due to time constrictions, the data from Karl Bremer Hospital was unobtainable, so it was excluded from this study. Data was only collected from the Tygerberg Hospital. Major lower limb amputations are considered lifesaving procedures and were undertaken during COVID-19 when South Africa was under a state of disaster, and all procedures that were not considered lifesaving were reduced or cancelled. It is unclear if the amount of major lower limb amputations were more or less than in previous years due to the pandemic, but the assumption is that it would be less.

## **5.2 Incidence of Lower Limb amputation**

There were 106 incidences of major lower limb amputations performed at Tygerberg Hospital between December 2019 and December 2020, resulting in an incidence rate of 19.8 per 100000 of the population in 2020. Even though this number might be lower than anticipated due to the COVID-19 pandemic, the incidence was higher than a national study conducted in the Netherlands in 2004 but consistent with data collected at a tertiary care institute in Trinidad and Tobago. At this hospital in Trinidad and Tobago, data was collected over six years between January 2010 and December 2016, and the reported incidence rate of LLA was 28 per 100000 (Pran et al., 2021). Tygerberg tertiary hospital's LLA rate is higher than the eight per 100000 which was reported in the Netherlands (Fortington et al., 2013) and significantly less than that of Ireland in 2009, which recorded an incidence of 95 per 100000 (Buckley et al., 2012). Several factors were similar between Tygerberg Hospital and the research done in Trinidad and Tobago. In Trinidad and Tobago, DMII is prevalent, and this, similar to the current study, is the most common cause of major lower limb amputation. There were also similarities between the comorbidities and risk factors identified in the populations described in both these studies. In the Trinidad and Tobago study, 70 per cent (66% in the current study) of persons with lower limb amputations also presented with hypertension, and 50 per cent (51.9% in current study) of those who suffered limb loss was as a result of DMII (Pran et al., 2021). It should be noted that in Trinidad and Tobago, there was an increase in LLA over the six years.

In developing countries globally, the leading cause of major lower limb amputations is uncontrolled diabetes, trauma and infection. In developed countries, vascular disease is the main cause of major lower limb amputations (Pran et al., 2021). South Africa is becoming more Westernised and has adopted more of a Westernised lifestyle which has shown an increase in the incidence of DMII. The reason for this increase in the prevalence of DMII could be due to a sedentary lifestyle (Sarvestani & Azam, 2013).

Another possible reason for the relatively low incidence of lower limb amputation in this study could be that the study only investigated the incidence of major lower limb amputations performed at Tygerberg tertiary hospital. The information was gathered from Tygerberg's medical records department. Tygerberg has recently manually uploaded all prior medical records onto an electronic system known as ECM (enterprise content management). This has not been completely reliable because some documents and/or missing medical information from the medical records were not retrievable due to loss or human error. In South Africa, it is a medico-legal requisite to record and keep adequate medical records from all healthcare professionals and the retention of medical records by healthcare institutions (HPCSA, 2022). Records are to contain valuable information regarding a patient's condition and management at the healthcare facility (HPCSA, 2022). There is a direct relationship between the quality of note-keeping and the quality of care in healthcare facilities in the Netherlands. Inadequate record keeping or loss of records is a major obstacle in archival research (Wegner, 2013), which could result in an under-reporting of the incidence of lower limb amputations.



### **5.3 Demographics of participants with lower limb amputations**

South Africa is a middle- to lower-income class country (Mooney et al., 2008). Most participants are male (54%; n = 57) compared to females (46%; n = 49) this is similar to the research done in Trinidad and Tobago from 2010 to 2016 which found that 59% of all participants who had amputations were male and only 41% were female (Pran et al., 2021), similarly in Jordan which is a low to middle income country found that participants who had amputations between 2012 and 2017 presented with a rate of 61% being male compared to 39% being female (Aljarrah et al., 2019).

Poverty significantly and negatively affects daily activity participation due to physical and emotional stresses associated with lower limb amputations. Major lower limb amputations have an incalculable financial and socio-economic effect on individuals, society and households. In this study, only (13%; n = 14) of the participants were permanently employed prior to having their lower limb or limbs amputated, with the majority of participants deemed to be under financial strain or dependent on family members, guardians or friends. In KZN, the average hospital cost per diabetic-related amputation between 2013 and 2017 was ZAR323418 (Thompson et al., 2020). When extrapolating this cost per amputation to the number of diabetes-related (51.9%; n = 55) amputations performed at Tygerberg Hospital during the study period, it would approximately amount to ZAR17787990. This unplanned financial burden places tremendous strain on the already under-resourced facility. If policies, strategies and resources are put in place to prevent major lower limb amputations and prevent DMII, the number of major lower limb amputations could be reduced, and the financial burden could be significantly reduced.



Adequate human and physical resources such as prostheses and assistive devices need to be allocated to ensure optimal functional outcomes for persons with lower limb amputations.

#### **5.4 Causes of lower limb amputation**

The leading cause of LLA in this study was diabetes (51.9%; n = 55). Diabetes mellitus type 2 is the leading cause of non-traumatic major lower limb amputations in the world and among the leading ten causes of death worldwide (WHO, 2019).

Diabetes affects 451 million adults worldwide, and the number is projected to rise to 693 million cases by 2030 and 783 million cases by 2045 (IDF Diabetes Atlas, 2021). In 2017, over 15.5 million adults in Africa had diabetes, with 69.2 per cent of people unaware of their diabetic status (Pheiffer et al., 2021) and in 2021, 12.7 million people had undiagnosed DMII with a 53.6 per cent proportion of people undiagnosed (IDF Diabetes Atlas, 2021). In 2020, South Africa's public health sector had already spent ZAR 2.7 billion on all cases of DMII (diagnosed and undiagnosed), which is estimated to increase to ZAR 35.1 billion in 2030 (Erzse et al., 2019). Diabetes mellitus type 2 was the main cause of major lower limb amputations at the Tygerberg Hospital in 2020 and the leading cause of LLA in South Africa in 2015 (Dunbar et al., 2015), resulting in a direct increase in the number of major LLAs if DMII is not prevented.

Complications of DM II, such as diabetic foot ulcers, are very common, and this is the most common cause of lower limb amputation, which, in turn, could potentially lead to an

increase in diabetic-related deaths in South Africa. Diabetes mellitus type 2 poses a serious health and economic burden on under-resourced healthcare facilities. Africa had a diabetes-related expenditure of USD13 billion, one per cent of total global expenditure in 2021 (IDF Diabetes Atlas, 2021). Diabetes Mellitus type 2 has a primary burden due to the primary cost to the healthcare system for the management of DMII disease but it also has a secondary cost of potential LLA and the costs associated with that procedure.

In higher-income areas in the world, peripheral vascular disease ranked first as the cause of amputation, while trauma, infection, complications of diabetes mellitus and malignancy are indications for amputation in low- to middle-income countries. In an older study conducted in four public hospitals in Cape Town in 2015, 72.3 per cent of lower limb amputations resulted from diabetes mellitus (Dunbar et al., 2015). This correlates to the findings in this study, while peripheral vascular disease was the second most recorded cause of LLAs (28.3%; n = 30) in this study.

### **5.5 Comorbidities associated with lower limb amputation**

Several comorbidities were associated with the participants in this study of which the most frequently recorded comorbidity was hypertension (70%; n = 66). Hypertension was found to be more common in participants who smoke and those who have diabetes. The relationship between hypertension and diabetes has been associated with peripheral vascular disease. Hypertension coupled with peripheral vascular disease increases morbidity and mortality and is an important predictor of cardiac death (Kucharska-Newton et al., 2010). Hypertension does not directly impact mortality in South Africa (Diallo et al.,

2021); it can, however, lead to earlier deaths when coupled with other comorbidities associated with LLAs and post-LLA procedures. It is important that preventative strategies be implemented for hypertension as well as diabetes to prevent in-hospital mortality and prevent LLA.

### **5.6 In-hospital mortality rate of lower limb amputation**

There were (7.5%; n = 8) deaths which correlate with the in-hospital mortality rate of eight per cent of 348 participants who underwent major lower limb amputations in South Africa between 2013 and 2018 (Khan et al., 2020).

There was a 100 per cent in-hospital mortality rate of participants with hip disarticulation. In the United States, hip disarticulation accounts for 0.5 per cent of major lower limb amputations and only performed for the reasons of severe infection, necrotising fasciitis, tumours, infections following arthroplasty, extensive osteomyelitis, infection in vascular graft and severe decubitus ulcers in paraplegics. It was also reported that in the United States, there was a 44 per cent mortality rate in patients who had emergency hip disarticulation due to severe infection and infection following arthroplasty (Zalavras et al., 2009). Participants who underwent high transfemoral amputations and hip disarticulations have a higher morbidity rate, especially when associated with infection and other comorbidities. This may lead to a higher in-hospital mortality rate.

Transfemoral amputations (62.3%; n = 66) were most frequently reported, followed by transtibial amputations (34%; n = 36) at Tygerberg Hospital. This finding is similar to what

was reported in a study conducted at GF Jooste Hospital, Somerset Hospital, Groote Schuur and Victoria Hospitals between 2009 and 2010. In this older study, non-diabetic transfemoral lower extremity amputations 59.7 per cent and diabetic transfemoral amputations 28.5 per cent were more common compared to non-diabetic transtibial lower extremity amputations 14.7 per cent and diabetic transtibial amputations at 27.6 per cent (Dunbar et al., 2015). This compared to the international care institute of Trinidad and Tobago, which showed 60 per cent of all major lower limb amputations to have been transfemoral amputations and 28.9 per cent transtibial amputations (Pran et al., 2021). It is well known that patients with lower-level amputations (transtibial) have better functional outcomes when compared to transfemoral amputations (Adams & Lakra, 2022). At the institute of Trinidad and Tobago, records indicated that most of the participants had a history of diabetic foot problems and sepsis, which led to LLA being performed as a lifesaving procedure (Pran et al., 2021). This is also true for Tygerberg tertiary hospital, as the risk for re-amputation is so high that surgeons opt for high-level amputations, especially in patients with DMII, for the first procedure. This might have a direct impact on prosthetic use due to the higher energy demand of transfemoral and higher prosthesis use which, will lead to loss of function (Adams & Lakra, 2022).

### **5.7 Length of hospital stay for lower limb amputation**

Participants spent a mean length of 22.58 days, ranging from four days to the longest at 89 days at Tygerberg Hospital. Between 2009 and 2010, Groote Schuur, GF Jooste, Somerset and Victoria Hospitals had a mean hospital stay of nine days (Dunbar et al., 2015). More similar to Tygerberg was Trinidad and Tobago, with a mean length stay of

15.2 days. There could be several reasons to hypothesise why the hospital stay length was longer than prior studies at other Cape Town Municipality hospitals and compared to Trinidad and Tobago; during the COVID-19 pandemic, there was less operating time and only lifesaving procedures were done, which led to the triage system being used for surgery. Participants might have been admitted before surgery, which could have influenced the length of their hospital stay. Prolonged waiting periods could have had an effect as the patient's health may have worsened, and post-operative complications and care would have intensified, leading to a prolonged hospital stay.

This is the first incidence study of major lower limb amputations at Tygerberg tertiary hospital within the Tygerberg sub-district of the City of Cape Town Municipality. The rate of DMII in South Africa is increasing, with predictions of a more staggering increase by 2030 and 2045. Diabetes Mellitus type 2 is the leading cause of major lower limb amputations in people with low- to middle-incomes. It would be imperative to work on strategies to educate and implement preventative strategies for major lower limb amputations and to identify statistics of people who have diabetes, particularly with 67.9 per cent of all African people being unaware that they have DMII. Statistical studies will also help identify the areas with the most needs.



## CHAPTER SIX

### CONCLUSION

#### 6.1 Summary of findings

A total of 106 participants had LLA with an incidence rate of 19.8 per 100000 at Tygerberg tertiary hospital. Three were minors. The mean age of participants was 56. The leading cause of major lower limb amputations was DMII (51.9%; n = 56) and peripheral vascular disease (28.3%; n = 30). Hypertension (66%; n = 70) was the most prevalent comorbidity in participants, and this is a common trend for those suffering from diabetes and peripheral vascular disease. Most were in the middle to low socio-economic class with the majority of participants either unemployed (29%; n = 31) or on pension (37%; n = 39). Surgeons opted for a transfemoral (62.3%; n = 66) level of amputation while only 34 per cent (n = 36) were amputated at a transtibial level. Only two participants had hip disarticulation amputation; however, both died during the hospital stay. There were eight recorded deaths of patients during their hospital stay. The mean length of hospital stay was 22.58 days, with the shortest stay being four days and the longest stay 89 days.

#### 6.2 Limitations and strengths of this study

Data for this study was collected between December 2019 and December 2020. As a result of the COVID-19 pandemic lockdown, only front-line workers were permitted access to hospitals from March 2020. The restrictions placed on travel led to several delays in retrieving information and communication between the researcher and Karl



Bremer Hospital. As of 26 March 2020 to 18 August 2020, restrictions limited access to the facilities whereby only staff, patients and medical students and interns enrolled at Karl Bremer and Tygerberg Hospitals were allowed access to the institution; once access was granted, only a select number of people were allowed to enter the hospital at any given time. Karl Bremer, however, extended its restriction period over several months till October 2020 and due to time constraints, data from Karl Bremer was unobtainable, therefore, Karl Bremer Hospital was excluded, and only data from Tygerberg Hospital was collected. A retrospective descriptive study was used due to the access limitations to facilities. Irretrievable medical records also limited the study, as well as poorly recorded records with loss of clinical notes or poorly documented clinical notes. Relevant clinical information could have been lost and not recorded. This also means that participants could have been missed in the process of data collection and this would have affected the validity and reliability of the data and, therefore, might have an impact on the results of this study.

The incidence of LLA has not yet been explored at Tygerberg tertiary hospital or in the Tygerberg sub-district of the City of Cape Town Municipality. The researcher used all possible data sources to source all possible participants and record the most accurate data. Therefore, the incidence can be considered valid and reliable rather than the estimated rates and is described per 100000 of the population serviced in this district. The study also provides a baseline for benchmarking LLA incidence and common causes against other hospitals in the Western Cape and South Africa, as well as in Africa and other continents. This study also provides a database for follow-up studies on LLA

participants' rehabilitative needs, quality of life outcomes and reintegration into the community. The strength of the study is also in the methods employed in ensuring scientific rigour and validity of the analysis and reporting of results and transparency of the methodology.

### **6.3 Recommendations based on the study findings**

- There is a need for hospital essential studies at Tygerberg tertiary hospital and in the Tygerberg sub-district. Hospital essential studies record data about disease or surgery directly to a hospital's mainframe and could provide insight into the burden of disease. This will assist with financial planning and allocation of resources to specific areas within the health care facility and health department.
- There is a need for further research, specifically incidence studies such as the incidence of DMII and DMII associated with LLA in the Tygerberg sub-district region. There is little research to identify the burden of disease and cost specifically to Tygerberg. South Africa has the highest increase of newly diagnosed DMII cases on the African continent, and the causes and statistics are known and understood. This will assist policymakers and primary healthcare in implementing prevention strategies such as local foot care clinics and mass education.
- To implement anonymous registries for all lower limb or major lower limb amputations with the relevant clinical information. This will assist in identifying the number of LLA surgeries that take place annually and provide relevant information to the causes and risk factors associated with LLA in that hospital and possibly regions such as Tygerberg.

- Further studies should be conducted to understand the socio-economic risk factors of lower limb amputations. A large percentage of participants in this study were unemployed or on a pension and have a poor socio-economic status prior to amputation. This can be considered both a risk factor for disability as well as having a negative effect on functional outcomes and reintegration into the community. Further research may help clinicians, policymakers and government by implementing preventative programmes in the specific at-risk socio-economic regions.

#### Preventative Strategies:

- Pilot studies on the Implementation of Diabetic clinics, which include DMII foot care, wound care, nutritional education, and lifestyle change. Diabetic foot clinics have been shown to decrease foot ulcers and directly impact preventing LLA (Komelyagina et al., 2016).
- More frequent screening for DMII, which might be costly initially, might save future costs.

#### **6.4 Conclusion**

This study provides valuable information into the incidence of LLA at Tygerberg Hospital, which provides healthcare for approximately 533047 people in the referral system. It provides the essential information to accurately plan for human and financial resources to manage LLA and procure adequate assistive devices such as prosthetics. This study also provides information on the causes, comorbidities and demographic profiles of

people who have LLA. This gives us insight into its epidemiology and to learn whom it affects personally and institutionally. This is the first incidence study done in the Tygerberg sub-district region.

This research provides information into the common causes of LLA being DMII and, with DMII being on an upward trajectory, it currently presents a bleak picture on the possible increase in the number of LLA cases. The information in this study may contribute to pilot studies and further research into treatment and preventative measures for LLA.



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[death#:~:text=The%20top%20global%20causes%20of,birth%20asphyxia%20and%](https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death#:~:text=The%20top%20global%20causes%20of,birth%20asphyxia%20and%20birth%20trauma%2C)

[20birth%20trauma%2C](https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death#:~:text=The%20top%20global%20causes%20of,birth%20asphyxia%20and%20birth%20trauma%2C).

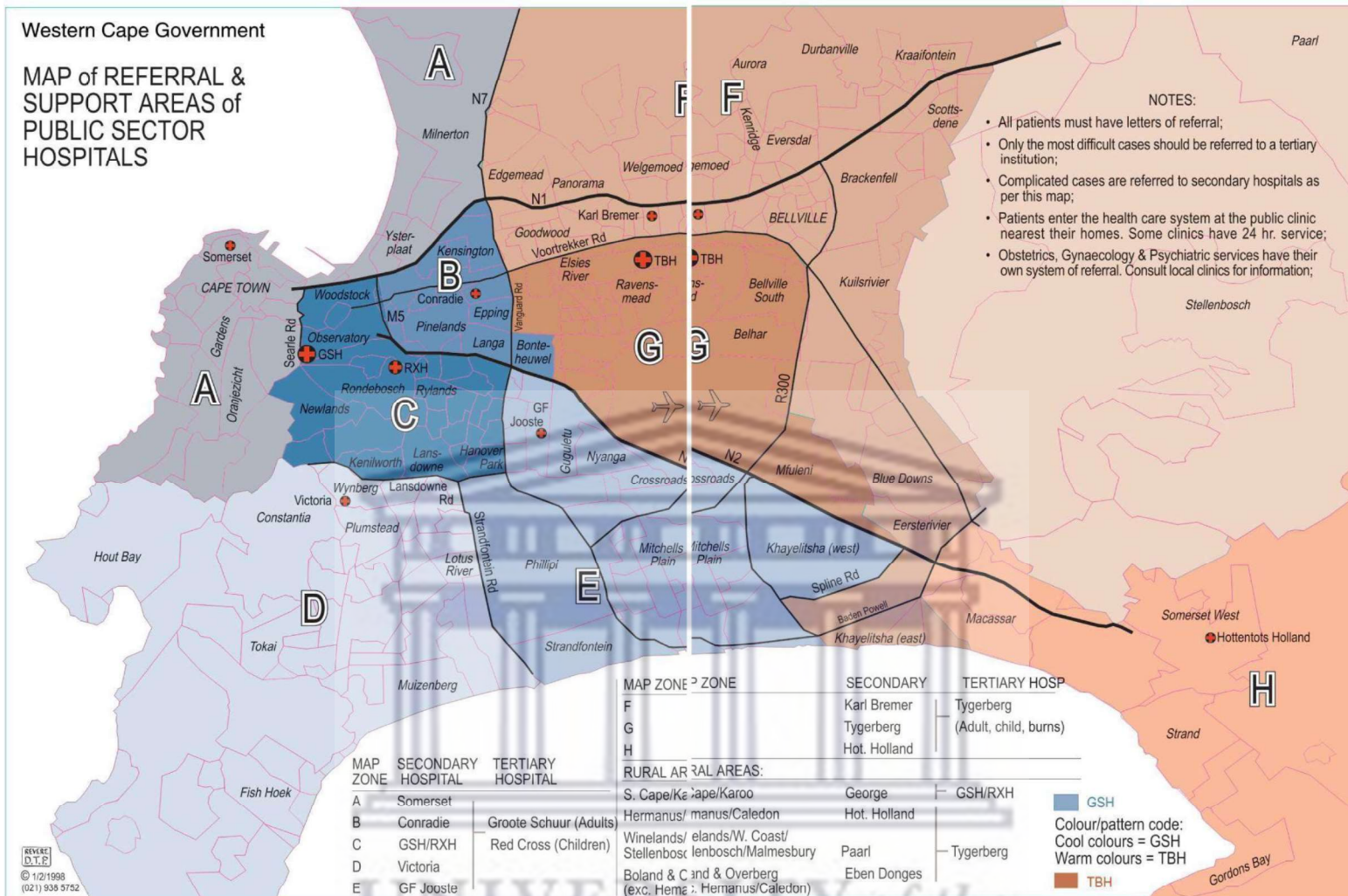


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# APPENDIX A - A Map of Referral and Support Areas of the Public Sector Hospitals



6 (Tygerberg Hospital, 2022).

7



## APPENDIX C - Ethical Approval Letter



### OFFICE OF THE DIRECTOR: RESEARCH RESEARCH AND INNOVATION DIVISION

Private Bag X17, Bellville 7535  
South Africa  
T: +27 21 959 4111/2948  
F: +27 21 959 3170  
E: [research-ethics@uwc.ac.za](mailto:research-ethics@uwc.ac.za)  
[www.uwc.ac.za](http://www.uwc.ac.za)

18 September 2019

Mr T Kaylor  
Physiotherapy  
Faculty of Community and Health Sciences

**Ethics Reference Number:** BM19/6/17

**Project Title:** Incidence and common causes of major lower limb amputation in the Tygerberg sub-district of the city of Cape Town

**Approval Period:** 17 September 2019 – 17 September 2020

I hereby certify that the Biomedical Science Research Ethics Committee of the University of the Western Cape approved the scientific methodology and ethics of the above mentioned research project.

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

**Please remember to submit a progress report in good time for annual renewal.**

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

A handwritten signature in blue ink, appearing to read 'Josias'.

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

**BMREC REGISTRATION NUMBER -130416-050**

FROM HOPE TO ACTION THROUGH KNOWLEDGE.



## APPENDIX D - Permission to Conduct Research at Tygerberg Hospital



TYGERBERG HOSPITAL  
REFERENCE:  
**Research Projects**  
ENQUIRIES: Dr GG  
Marinus  
TELEPHONE: 021 938 5752

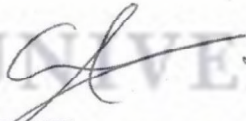
Ethics Reference: BM19/6/17


**TITLE: Incidence and common causes of major lower limb amputation in the Tygerberg sub-district of the city of Cape Town**

Dear Mr T Kaylor

### PERMISSION TO CONDUCT YOUR RESEARCH AT TYGERBERG HOSPITAL.

1. In accordance with the Provincial Research Policy and Tygerberg Hospital Notice No 40/2009, permission is hereby granted for you to conduct the above-mentioned research here at Tygerberg Hospital.
2. Researchers, in accessing Provincial health facilities, are expressing consent to provide the Department with an electronic copy of the final feedback within six months of completion of research. This can be submitted to the Provincial Research Co-Ordinator ([Health.Research@westerncape.gov.za](mailto:Health.Research@westerncape.gov.za)).

  
**DR GG MARINUS**  
**MANAGER: MEDICAL SERVICES**


  
**DR D ERASMUS**  
**CHIEF EXECUTIVE OFFICER**

Date: 21 February 2020  
Administration Building, Francie van Zijl Avenue, Parow, 7500  
tel: +27 21 938-6267 fax: +27 21 938-4890

Private Bag X3, Tygerberg, 7505  
[www.capegateway.gov.za](http://www.capegateway.gov.za)

Ethics Reference: BM19/6/17

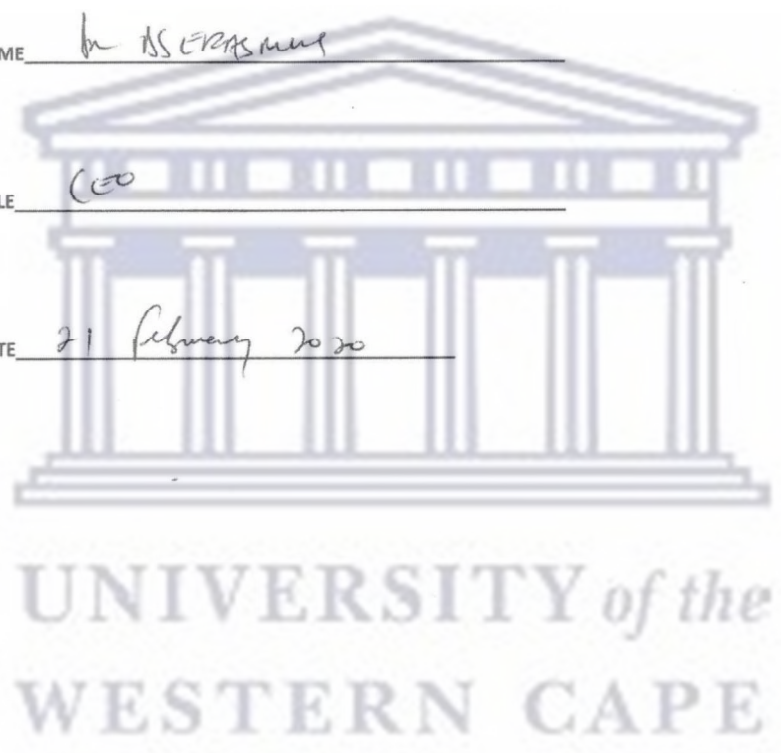
**TITLE:** Incidence and common causes of major lower limb amputation in the Tygerberg sub-district of the city of Cape Town

BY  \_\_\_\_\_  
An authorized representative of Tygerberg Hospital

NAME Dr. S. Erasmus

TITLE CEO

DATE 21 February 2020



## APPENDIX E - Data Capturing Sheets

	Age	Employment	Marital Status	Substance Abuse	Gender	Type of Surgical procedure	Side amputated	Level of amputation
TBH001	62	3	0	0	1	0	1	1
TBH003	61	3	1	0	0	0	0	0
TBH005	78	3	2	0	0	0	1	0
TBH006	71	3	1	0	1	0	0	1
TBH007	75	2	0	0	0	0	0	0
TBH008	77	3	3	0	0	0	1	0
TBH009	55	2	0	7	1	0	0	1
TBH010	42	3	1	8	0	0	0	1
TBH011	62	1	0	0	1	0	0	1
TBH013	55	0	0	3	1	0	1	1
TBH014	60	2	1	0	1	3	1	1
TBH015	61	1	1	6	1	0	0	1
TBH016	78	3	0	8	0	0	1	0
TBH017	35	1	1	7	0	0	1	0
TBH020	67	3	0	0	0	0	0	1
TBH021	17	5	1	8	0	3	0	1
TBH022	28	0	1	8	1	0	1	1
TBH023	59	1	0	0	0	0	1	1
TBH024	28	4	1	8	1	3	1	0
TBH025	53	1	0	8	0	1	3	0
TBH027	57	0	0	8	1	0	0	1
TBH028	46	1	0	8	0	0	0	0
TBH029	43	2	0	0	1	0	0	1
TBH031	58	0	2	0	1	0	0	0
TBH033	62	3	0	0	1	0	0	0
TBH034	58	1	2	0	0	0	1	1
TBH035	60	1	1	3	1	0	1	0
TBH036	66	3	2	0	1	0	1	1
TBH038	66	1	1	0	0	0	1	1
TBH039	68	3	0	0	1	0	1	1
TBH040	78	5	5	8	0	0	1	1
TBH041	53	0	0	8	1	3	1	1

	Age	Employment	Marital Status	Substance Abuse	Gender	Type of Surgical procedure	Side amputated	Level of amputation
TBH042	23	1	1	7	0	3	1	1
TBH044	53	3	0	0	1	3	1	1
TBH047	65	3	3	0	0	0	0	1
TBH048	71	3	0	0	1	2	0	2
TBH049	36	1	1	0	1	3	0	1
TBH050	28	1	1	6	1	3	3	3
TBH051	69	4	1	7	1	3	3	1
TBH052	37	0	1	8	1	0	0	1
TBH053	57	1	1	0	1	0	1	0
TBH054	63	3	0	7	0	0	1	1
TBH055	81	3	0	7	0	0	1	1
TBH056	46	0	2	0	0	0	1	1
TBH057	53	0	1	0	0	0	3	1
TBH058	60	1	2	0	1	0	1	1
TBH059	45	0	0	8	0	3	0	0
TBH060	26	1	0	0	1	3	0	1
TBH061	12	4	1	8	1	0	1	0
TBH063	30	1	1	7	0	0	0	1
TBH066	75	3	1	0	0	0	1	1
TBH067	54	2	1	8	1	2	1	2
TBH068	56	2	0	5	1	3	0	1
TBH069	67	3	0	0	1	0	1	1
TBH070	63	3	0	0	1	0	0	1
TBH071	46	0	0	5	1	0	1	0
TBH072	67	3	0	0	1	0	0	1
TBH074	60	1	1	0	1	2	0	0
TBH075	58	4	0	8	1	0	1	1
TBH077	39	2	2	0	1	0	3	1
TBH078	41	1	1	0	1	0	1	1
TBH079	58	1	0	8	1	0	1	1
TBH080	57	1	0	0	0	0	1	0
TBH081	62	2	0	0	0	2	1	4



	Age	Employment	Marital Status	Substance Abuse	Gender	Type of Surgical procedure	Side amputated	Level of amputation
TBH082	49	3	1	0	0	2	0	0
TBH084	72	3	0	0	0	0	2	1
TBH085	60	2	1	8	0	0	0	1
TBH086	63	3	1	0	0	0	1	1
TBH087	53	1	0	0	0	0	0	0
TBH089	78	3	1	3	1	0	1	1
TBH091	77	3	1	0	0	2	0	0
TBH093	71	5	4	8	1	0	1	0
TBH094	67	3	2	0	1	0	0	1
TBH095	65	3	2	0	1	0	0	1
TBH096	57	1	0	0	1	0	1	1
TBH097	59	1	0	0	0	0	0	1
TBH098	51	1	0	0	1	2	0	0
TBH099	48	1	1	0	0	2	1	0
TBH100	73	3	0	0	0	0	0	1
TBH102	54	2	1	0	1	0	1	1
TBH103	65	3	3	0	0	0	1	1
TBH104	31	1	1	3	1	3	1	0
TBH105	66	3	2	0	0	3	3	0
TBH106	35	0	2	7	0	0	1	1
TBH107	51	1	0	0	1	0	0	1
TBH108	65	3	2	0	0	0	0	1
TBH109	72	3	2	0	0	0	1	1
TBH110	66	3	2	0	0	0	0	0
TBH111	63	0	0	7	1	3	1	1
TBH112	40	1	0	0	0	0	1	0
TBH113	64	3	3	0	1	0	1	1
TBH116	15	4	1	8	1	0	1	1
TBH117	57	2	1	0	1	0	0	1
TBH118	62	3	0	0	0	1	1	0
TBH120	64	3	0	8	1	0	1	1
TBH121	62	0	1	0	1	0	1	1

	Age	Employment	Marital Status	Substance Abuse	Gender	Type of Surgical procedure	Side amputated	Level of amputation
TBH122	54	5	4	0	1	0	1	0
TBH123	67	3	1	0	1	0	1	1
TBH126	61	1	3	7	1	3	1	0
TBH127	53	2	0	7	0	3	0	0
TBH129	65	3	2	7	0	3	0	0
TBH130	69	3	0	0	0	3	0	0
TBH131	68	4	1	7	0	3	1	0
TBH132	36	1	0	6	1	3	1	1
TBH134	50	1	1	7	0	0	0	1
TBH135	55	0	1	0	0	3	0	0

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WESTERN CAPE

	Primary Reason for Amputaion	Length of hospital stay	Comorbidities	Survival	Readmission	Readmitted amputation level
TBH001	0	35	1	0	1	2
TBH003	1	21	8	0	1	2
TBH005	1	16	9	0	1	2
TBH006	0	7	13	0	0	1
TBH007	0	17	2	0	1	2
TBH008	1	25	1	0	0	2
TBH009	1	22	6	0	1	2
TBH010	5	17	1	0	1	2
TBH011	1	7	1	0	1	2
TBH013	0	16	12	0	1	2
TBH014	1	50	9	0	1	2
TBH015	1	18	8	0	1	2
TBH016	1	14	9	0	1	2
TBH017	1	33	12	0	1	2
TBH020	1	13	1	0	1	2
TBH021	2	25	14	0	0	2
TBH022	2	23	14	0	1	2
TBH023	1	23	1	1	1	2
TBH024	2	52	14	0	1	2
TBH025	1	35	9	0	1	1
TBH027	2	11	1	0	1	2
TBH028	1	27	8	0	1	2
TBH029	3	29	10	0	1	2
TBH031	0	26	12	0	1	2
TBH033	1	89	8	0	1	2
TBH034	1	46	1	0	1	2
TBH035	2	22	14	0	1	2
TBH036	1	9	9	0	0	1
TBH038	0	8	9	0	1	2
TBH039	1	8	9	0	1	2
TBH040	3	8	10	0	1	2
TBH041	4	18	0	0	1	2

	Primary Reason for Amputaion	Length of hospital stay	Comorbidities	Survival	Readmission	Readmitted amputation level
TBH042	2	76	14	0	0	2
TBH044	0	55	1	0	1	2
TBH047	1	11	8	1	1	2
TBH048	1	61	8	0	1	2
TBH049	0	7	14	0	1	2
TBH050	2	38	14	0	1	2
TBH051	2	54	14	0	1	2
TBH052	3	6	10	0	1	2
TBH053	1	26	9	0	1	2
TBH054	1	13	9	0	1	2
TBH055	5		15	2	1	2
TBH056	0	11	12	0	0	1
TBH057	0	42	1	0	1	2
TBH058	1	10	0	1	1	2
TBH059	0	23	1	0	1	2
TBH060	3	4	10	0	1	2
TBH061	3	8	10	0	1	2
TBH063	3	16	10	0	1	2
TBH066	0	10	12	0	1	2
TBH067	1	15	0	1	1	2
TBH068	1	13	0	0	1	2
TBH069	1	18	8	0	1	2
TBH070	0	18	1	0	1	2
TBH071	0	26	12	0	1	2
TBH072	1	11	8	0	1	2
TBH074	1	47	9	0	1	2
TBH075	1	4	9	0	1	2
TBH077	0	15	1	1	1	2
TBH078	0	18	12	0	1	2
TBH079	1	8	8	1	1	2
TBH080	1	31	8	0	1	2
TBH081	1	24	9	0	0	1

	Primary Reason for Amputaion	Length of hospital stay	Comorbidities	Survival	Readmission	Readmitted amputation level
TBH082	0	76	1	0	1	2
TBH084	0	21	1	0	1	2
TBH085	1	8	8	0	0	1
TBH086	0	5	12	0	1	2
TBH087	1	7	8	0	1	2
TBH089	0	12	1	1	1	2
TBH091	1	12	8	0	1	2
TBH093	1	26	8	0	1	2
TBH094	1	18	8	0	0	1
TBH095	1	13	8	0	1	2
TBH096	0	14	1	0	1	2
TBH097	0	9	1	0	1	2
TBH098	0	12	12	0	1	2
TBH099	2	45	1	0	1	2
TBH100	1	10	9	0	1	2
TBH102	0	10	12	0	0	1
TBH103	1	21	9	0	1	2
TBH104	2	81	14	0	1	2
TBH105	1	24	9	0	1	2
TBH106	1	26	9	0	1	2
TBH107	0	12	9	0	1	2
TBH108	0	10	1	0	1	2
TBH109	0	12	12	0	1	2
TBH110	1	50	9	0	1	2
TBH111	1	16	9	0	1	0
TBH112	0	16	1	0	1	2
TBH113	1	11	8	0	1	2
TBH116	3	13	10	0	1	2
TBH117	1	7	8	0	1	2
TBH118	1	18	9	0	1	2
TBH120	1	10	8	0	1	2
TBH121	1	4	8	0	1	2

	Primary Reason for Amputaion	Length of hospital stay	Comorbidities	Survival	Readmission	Readmitted amputation level
TBH122	1	51	9	0	1	2
TBH123	0	10	1	0	1	2
TBH126	1	16	9	0	1	2
TBH127	1	18	9	0	1	2
TBH129	1	18	9	0	1	2
TBH130	1	57	9	0	1	2
TBH131	1	8	8	1	1	2
TBH132	2	25	14	0	1	2
TBH134	0	12	1	0	1	2
TBH135	1	38	8	0	1	2

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	Diabetes	Hypertension	Hyperlipidemia	Peripheral vascular disease	Metabolic disease	Smoking	Morbidity rate
TBH001	1	0	1	0	1	0	3
TBH003	0	0	1	0	0	0	3
TBH005	0	0	0	0	0	0	3
TBH006	1	1	1	0	1	0	3
TBH007	1	1	1	0	1	2	3
TBH008	0	0	1	1	1	0	3
TBH009	0	0	0	0	0	1	3
TBH010	1	0	1	1	1	1	3
TBH011	0	0	1	0	1	0	3
TBH013	1	1	1	0	1	0	3
TBH014	0	0	0	0	0	0	3
TBH015	0	0	1	0	1	0	3
TBH016	0	0	0	1	0	1	3
TBH017	0	1	1	0	1	0	3
TBH020	0	0	1	0	1	0	3
TBH021	1	1	1	1	1	1	3
TBH022	1	1	1	1	1	1	3
TBH023	0	0	1	0	1	0	1
TBH024	1	1	1	1	1	1	
TBH025	0	0	0	0	0	1	
TBH027	1	0	1	1	1	1	
TBH028	0	0	0	1	1	0	
TBH029	1	1	1	1	1	0	
TBH031	1	1	1	0	1	0	
TBH033	0	0	1	0	1	0	
TBH034	1	0	0	0	0	0	
TBH035	1	1	1	0	1	0	
TBH036	0	0	0	0	0	0	
TBH038	1	0	0	0	0	0	
TBH039	0	0	0	0	0	0	
TBH040	1	0	1	1	1	1	
TBH041	0	1	1	1	1	1	

	Diabetes	Hypertension	Hyperlipidemia	Peripheral vascular disease	Metabolic disease	Smoking	Morbidity rate
TBH042	1	1	1	0	1	1	
TBH044	1	0	1	0	1	0	
TBH047	0	0	1	1	1	0	2
TBH048	0	0	1	0	1	0	
TBH049	1	1	1	0	1	0	
TBH050	1	1	1	1	1	0	
TBH051	1	1	1	1	1	2	
TBH052	1	1	1	1	1	1	
TBH053	0	0	0	0	0	0	
TBH054	0	0	1	1	1	2	
TBH055	2	2	2	2	2	2	
TBH056	1	1	1	0	1	0	
TBH057	1	0	1	0	1	0	
TBH058	0	1	1	0	1	0	1
TBH059	1	0	0	0	1	1	
TBH060	1	1	1	1	1	0	
TBH061	1	1	1	1	1	1	
TBH063	1	1	1	1	1	1	
TBH066	1	1	1	0	1	0	
TBH067	0	1	1	1	1	1	2
TBH068	0	1	1	1	1	0	
TBH069	0	0	1	0	1	0	
TBH070	1	0	1	0	1	0	
TBH071	1	1	1	0	1	0	
TBH072	0	0	1	0	1	0	
TBH074	0	0	0	0	0	0	
TBH075	0	0	0	0	0	1	
TBH077	1	0	1	0	1	0	
TBH078	1	1	1	0	1	0	
TBH079	0	0	1	1	1	1	1
TBH080	0	0	1	0	1	0	
TBH081	0	0	0	0	0	0	



	Diabetes	Hypertension	Hyperlipidemia	Peripheral vascular disease	Metabolic disease	Smoking	Morbidity rate
TBH082	1	0	1	0	1	0	
TBH084	1	0	1	0	1	0	
TBH085	0	0	1	0	1	1	
TBH086	1	1	1	0	1	0	
TBH087	0	0	1	0	1	0	
TBH089	1	0	1	0	1	0	1
TBH091	0	0	1	0	1	0	
TBH093	0	0	1	0	1	1	
TBH094	0	0	1	0	1	0	
TBH095	0	0	1	0	1	0	
TBH096	1	0	1	0	1	0	
TBH097	1	0	1	0	1	0	
TBH098	1	1	1	0	1	0	
TBH099	1	1	1	1	1	0	
TBH100	0	0	0	0	0	0	
TBH102	1	1	1	0	1	0	
TBH103	0	0	0	0	0	0	
TBH104	1	1	1	1	1	0	
TBH105	0	0	0	0	0	0	
TBH106	0	0	0	0	0	1	
TBH107	0	0	0	0	0	0	
TBH108	1	0	1	0	1	0	
TBH109	1	1	1	0	1	0	
TBH110	0	0	0	0	0	0	
TBH111	0	0	0	0	0	1	
TBH112	1	0	0	0	0	0	
TBH113	0	0	1	0	1	0	
TBH116	1	1	1	1	1	1	
TBH117	0	0	1	0	1	0	
TBH118	0	0	0	0	0	0	
TBH120	0	1	1	0	1	1	
TBH121	0	0	1	0	1	0	

	Diabetes	Hypertension	Hyperlipidemia	Peripheral vascular disease	Metabolic disease	Smoking	Morbidity rate
TBH122	0	0	0	0	0	0	
TBH123	1	0	1	0	1	0	
TBH126	0	0	0	0	0	2	
TBH127	0	0	0	0	0	2	
TBH129	0	0	1	0	1	1	
TBH130	0	0	0	0	0	0	
TBH131	0	0	1	0	1	2	0
TBH132	1	1	1	1	1	0	
TBH134	1	0	0	0	0	0	
TBH135	0	0	1	0	1	0	

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Age	Employment	Marital Status	Substance Abuse	Gender	Type of Surgical procedure
	employed=0	Married=0	Smoking= 0	Female=0	Fishmouth incision approach= 0
	unemployed=1	Single=1	Drugs=1	Male=1	Guillotine approach=1
	Grant(disability)=2	Widowed=2	Alcohol=2	No data=2	Other=2
	Pension=3	Divorced=3	smoking and alcohol=3		No data= 3
	No Data=4	No data= 4	Drugs and alcohol=4		
	not of working age=5		smoking and drugs=5		
			Alcohol, drugs and smoking=6		
			No data=7		
			None=8		

Side amputated	Level of amputation	Primary Reason for Amputation	Length of hospital stay
Left=0	Below knee=0	Peripheral Vascular Disease(excluding Diabetes)=0	
Right=1	Above Knee=1	Diabetes=1	
bilateral=2	Hip Disarticulation=2	Trauma=2	
both sides with same admission=3	above and below knee=3	Cancer=3	
no data=4	no data=4	infection(wet gangrene)=4	
		no data=5	

#### Comorbidities

Diabetes=0  
Hypertnsion(Conaray artery disease and peripheral artery disease)=1  
Chronic Obstructive Pulmonary disease(asthma)=2  
Cerebral Vascular Accident=3  
Spinal Cord injury(paraplegia)=4  
Arthritis(Rheumatoïd and Osteo)=5  
Hyperlipidemia=6  
Kidney Disease(acute and chronic)=7  
Diabetes and Hypertension=8  
Diabetes, hypertension and hyperlipidemia= 9  
Cancer= 10  
Diabetes and Hyperlipidemia=11  
Peripheral Vascular Disease=12  
Gout=13  
None=14  
NO data=15

#### Survival

Survived hospital stay=0  
Death during hospital stay=1  
No data=2



<b>Readmitted in time period for complications post amputation</b>	<b>Readmitted Amputation</b>	<b>Diabetes</b>	<b>Hypertension</b>	<b>Hyperlipidemia</b>
Yes=0	Higher level=0	Yes=0	Yes=0	Yes=0
No=1	contralateral side=1	No=1	No=1	No=1
no data=2	no data=2	No data=2	No data=2	No data= 2

<b>Peripheral vascular Disease</b>	<b>Lifestyle disease</b>	<b>Smoking</b>	<b>morbidity rate</b>
Yes=0	Yes=0	Yes=0	Transtibial=0
No=1	No=1	No=1	Transfemur=1
No data= 2	No data=2	No data=2	Hip Dysarticulation=2
			Survived= 3



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## APPENDIX F - Results

### Age of Participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	12	1	.9	.9	.9
	15	1	.9	.9	1.9
	17	1	.9	.9	2.8
	23	1	.9	.9	3.8
	26	1	.9	.9	4.7
	28	3	2.8	2.8	7.5
	30	1	.9	.9	8.5
	31	1	.9	.9	9.4
	35	2	1.9	1.9	11.3
	36	2	1.9	1.9	13.2
	37	1	.9	.9	14.2
	39	1	.9	.9	15.1
	40	1	.9	.9	16.0
	41	1	.9	.9	17.0
	42	1	.9	.9	17.9
	43	1	.9	.9	18.9
	45	1	.9	.9	19.8
	46	3	2.8	2.8	22.6
	48	1	.9	.9	23.6
	49	1	.9	.9	24.5
	50	1	.9	.9	25.5
	51	2	1.9	1.9	27.4
	53	6	5.7	5.7	33.0
	54	3	2.8	2.8	35.8
	55	3	2.8	2.8	38.7
	56	1	.9	.9	39.6
	57	5	4.7	4.7	44.3
	58	4	3.8	3.8	48.1
	59	2	1.9	1.9	50.0
	60	5	4.7	4.7	54.7
	61	3	2.8	2.8	57.5
	62	6	5.7	5.7	63.2
63	4	3.8	3.8	67.0	
64	2	1.9	1.9	68.9	
65	5	4.7	4.7	73.6	
66	4	3.8	3.8	77.4	
67	5	4.7	4.7	82.1	
68	2	1.9	1.9	84.0	
69	2	1.9	1.9	85.8	
71	3	2.8	2.8	88.7	
72	2	1.9	1.9	90.6	
73	1	.9	.9	91.5	
75	2	1.9	1.9	93.4	
77	2	1.9	1.9	95.3	
78	4	3.8	3.8	99.1	
81	1	.9	.9	100.0	
Total		106	100.0	100.0	

### Statistics

#### Age of Participants

N	Valid	106
	Missing	0
Mean		56.13
Median		59.50
Std. Deviation		14.818
Variance		219.582
Range		69
Minimum		12
Maximum		81

### Population Descriptive Statistics

	N	Mean	Std. Deviation	Variance
Age of Participants	106	56.132	14.748	217.511
Valid N (listwise)	106			

Std. Deviation and Variance use N rather than N-1 in denominators.

### Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	49	46.2	46.2	46.2
	Male	57	53.8	53.8	100.0
Total		106	100.0	100.0	

### Marital Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Married	44	41.5	41.5	41.5
	Single	40	37.7	37.7	79.2
	Widowed	15	14.2	14.2	93.4
	Divorced	5	4.7	4.7	98.1
	No data	2	1.9	1.9	100.0
Total		106	100.0	100.0	

### Employment Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Employed	14	13.2	13.2	13.2
	Unemployed	31	29.2	29.2	42.5
	Disability Grant	12	11.3	11.3	53.8
	Pension	39	36.8	36.8	90.6
	No data	6	5.7	5.7	96.2
	Not of working age	4	3.8	3.8	100.0
Total		106	100.0	100.0	

### Participants who smoke

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	74	69.8	69.8	69.8
	No	25	23.6	23.6	93.4
	No Data	7	6.6	6.6	100.0
	Total	106	100.0	100.0	

### Primary reason for amputation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Peripheral vascular disease excluding diabetes	30	28.3	28.3	28.3
	Diabetes	55	51.9	51.9	80.2
	Trauma	11	10.4	10.4	90.6
	Cancer	7	6.6	6.6	97.2
	Infection	1	.9	.9	98.1
	No data	2	1.9	1.9	100.0
	Total	106	100.0	100.0	

### Type of surgical procedure

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fishmouth approach	74	69.8	69.8	69.8
	Guillotine approach	2	1.9	1.9	71.7
	Other	8	7.5	7.5	79.2
	No data	22	20.8	20.8	100.0
	Total	106	100.0	100.0	

### Side of amputation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Left	43	40.6	40.6	40.6
	Right	56	52.8	52.8	93.4
	Bilateral	1	.9	.9	94.3
	Both sides with same admission	6	5.7	5.7	100.0
	Total	106	100.0	100.0	



### Level of amputation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below knee	36	34.0	34.0	34.0
	Above Knee	66	62.3	62.3	96.2
	Hip dysarticulation	2	1.9	1.9	98.1
	Above and below knee	1	.9	.9	99.1
	no data	1	.9	.9	100.0
Total		106	100.0	100.0	

### Statistics

		Comorbidities of participants	Participants with Diabetes Mellitus	Participants with Hypertension	Participants with Hyper/dyslipid emia	Participants with peripheral vascular disease	Participants with combination of diabetes, hypertension and hyper/dyslipid emia
N	Valid	106	106	106	106	106	106
	Missing	0	0	0	0	0	0
Std. Deviation		4.436	.521	.498	.464	.464	.464
Variance		19.677	.271	.248	.215	.215	.215

### Participants with Diabetes Mellitus

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	56	52.8	52.8	52.8
	No	49	46.2	46.2	99.1
	No Data	1	.9	.9	100.0
Total		106	100.0	100.0	

### Participants with Hypertension

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	70	66.0	66.0	66.0
	No	35	33.0	33.0	99.1
	No Data	1	.9	.9	100.0
Total		106	100.0	100.0	

### Participants with Hyper/dyslipidemia

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	29	27.4	27.4	27.4
	No	76	71.7	71.7	99.1
	No Data	1	.9	.9	100.0
	Total	106	100.0	100.0	

### Participants with peripheral vascular disease

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	79	74.5	74.5	74.5
	No	26	24.5	24.5	99.1
	No Data	1	.9	.9	100.0
	Total	106	100.0	100.0	

### Participants with combination of diabetes, hypertension and hyper/dyslipidemia

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	29	27.4	27.4	27.4
	No	76	71.7	71.7	99.1
	No Data	1	.9	.9	100.0
	Total	106	100.0	100.0	

### Statistics

#### Length of Hospital Stay

N	Valid	105
	Missing	1
Mean		22.58
Std. Deviation		17.791
Variance		316.515
Range		85
Minimum		4
Maximum		89



### Length of Hospital Stay

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	3	2.8	2.9	2.9
	5	1	.9	1.0	3.8
	6	1	.9	1.0	4.8
	7	5	4.7	4.8	9.5
	8	7	6.6	6.7	16.2
	9	2	1.9	1.9	18.1
	10	7	6.6	6.7	24.8
	11	5	4.7	4.8	29.5
	12	6	5.7	5.7	35.2
	13	5	4.7	4.8	40.0
	14	2	1.9	1.9	41.9
	15	2	1.9	1.9	43.8
	16	6	5.7	5.7	49.5
	17	2	1.9	1.9	51.4
	18	9	8.5	8.6	60.0
	21	3	2.8	2.9	62.9
	22	2	1.9	1.9	64.8
	23	3	2.8	2.9	67.6
	24	2	1.9	1.9	69.5
	25	3	2.8	2.9	72.4
	26	5	4.7	4.8	77.1
	27	1	.9	1.0	78.1
	29	1	.9	1.0	79.0
	31	1	.9	1.0	80.0
	33	1	.9	1.0	81.0
	35	2	1.9	1.9	82.9
	38	2	1.9	1.9	84.8
	42	1	.9	1.0	85.7
	45	1	.9	1.0	86.7
	46	1	.9	1.0	87.6
47	1	.9	1.0	88.6	
50	2	1.9	1.9	90.5	
51	1	.9	1.0	91.4	
52	1	.9	1.0	92.4	
54	1	.9	1.0	93.3	
55	1	.9	1.0	94.3	
57	1	.9	1.0	95.2	
61	1	.9	1.0	96.2	
76	2	1.9	1.9	98.1	
81	1	.9	1.0	99.0	
89	1	.9	1.0	100.0	
	Total	105	99.1	100.0	
Missing	System	1	.9		
	Total	106	100.0		

### Survival rate

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Survived hospital stay	97	91.5	91.5	91.5
	Died	8	7.5	7.5	99.1
	No data	1	.9	.9	100.0
	Total	106	100.0	100.0	

### Readmission following amputation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	10	9.4	10.2	10.2
	no	88	83.0	89.8	100.0
	Total	98	92.5	100.0	
Missing	System	8	7.5		
	Total	106	100.0		

### Readmission amputation level and side

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	higher level	1	.9	.9	.9
	contralateral side	8	7.5	7.5	8.5
	no data	97	91.5	91.5	100.0
	Total	106	100.0	100.0	

### Morbidity rate per level of amputation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below Knee/ Transfibial	1	.9	.9	.9
	Above Knee/ Transfemoral	5	4.7	4.7	5.7
	Through Hip/Hip Dysarticulation	2	1.9	1.9	7.5
	Survived	98	92.5	92.5	100.0
	Total	106	100.0	100.0	

### Readmission amputation level and side

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	higher level	1	.9	11.1	11.1
	contralateral side	8	7.5	88.9	100.0
	Total	9	8.5	100.0	
Missing	System	97	91.5		
Total		106	100.0		





## APPENDIX G – Afrikaans Information Sheet for Children Participants



### UNIVERSITEIT VAN WES KAAP

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E-pos: Timothykaylor08@gmail.com

#### INFORMASIEBLAD: Kinders

**Projek Onderwerp: Voorkoms en algemene oorsaak van die hoof laer ledemaat-amputasie in 'n sub-distrik in Kaapstad.**

#### **Waaroor gaan hierdie projek?**

Hierdie navorsingsprojek word uitgevoer deur Mnr Timothy Kaylor verbonde aan die Universiteit van Weskaap. Ons nooi u om deel te neem aan hierdie ondersoekprojek omdat u in die hospitaal is en u 'n gedeelte van u been verloor het. Die doel van hierdie projek is om vas te stel hoeveel mense hul bene verloor het en waarom dit gebeur het.

#### **Wat sal van u verwag word indien u bereid is om deel te neem?**

Iemand sal na u mediese leër kyk en 'n vorm voltooi met vrae wat gebaseer is op die informasie in u leer. Indien die informasie in u leër nie duidelik is, sal die persoon u nader vir duidelikheid.

#### **Sal my deelname aan hierdie studie vertroulik gehou word?**

Die navorsers onderneem om u identiteit te beskerm asook die aard van u bydrae. Om te verseker dat u identiteit anoniem en u informasie vertroulik sal bly ons die volgende doen: (1) u naam sal nie in die opname en ander versamelde data genoem word nie; (2) 'n kode sal geplaas word op die opname en ander ingesamelde data; (3) deur gebruik te maak van 'n identifisering-sleutel, sal die navorser hul opnames Koppel aan die identiteit; en (4) slegs die navorser sal toegang het tot hierdie identifiserings-sleutel.

Om u vertroulikheid te verseker, sal elektroniese data op die navorser se persoonlike rekenaar gestoor word, 'n wagwoord sal op die leër geplaas word. Indien die data elektronies aangestuur moet word, sal 'n enkriptiese boodskapdiens gebruik word. Die lêers sal in numeriese volgorde genummer word en onder verskuilde name aangestuur word. Indien ons 'n verslag of in 'n artikel oor die navorsingsprojek skryf, sal u identiteit anoniem wees.

#### **Wat is die risikos verbonde aan hierdie navorsing?**

U mag hartseer voel omdat u 'n been verloor het of u mag bedruk voel as u daarvoor praat. Indien u enige van hierdie emosies ervaar, sal ons u na 'n sielkundige verwys wat verbonde is aan die hospital sodat u oor u emosies kan praat.

#### **Wat is die voordele verbonde aan hierdie navorsing?**

Die navorsing is nie ontwerp om u persoonlik te help nie, maar die resultate sal die navorser help om vas te stel hoeveel mense het hul bene verloor het en wat die algemene redes daarvoor is. Hierdie informasie sal hospitale in staat stel om beter sorg te verseker aan pasiënte wat in die toekoms hul bene verloor.

**Moek ek deel wees van hierdie navorsing en mag ek my deelname enige tyd staak?**

U hoef geensins deel te neem aan hierdie navorsing indien u nie wil nie. Indien u besluit om nie deel te neem nie, sal u geensins gepenaliseer word nie of u sal geen voordele verloor waarvoor u andersins kwalifiseer nie.

**Wat indien ek vrae het?**

Hierdie navorsing word uitgevoer deur Mnr Timothy Kaylor verbonde aan die Universiteit van Weskaap. Indien u enige vrae oor die navorsing self het, kontak asseblief vir Mnr Timothy Kaylor by: [timothykaylor08@gmail.com](mailto:timothykaylor08@gmail.com). Indien u vrae het aangaande hierdie studie en u regte as deelnemer of u wil enige problem wat u ondervind het tydens hierdie studie rapporteer kontak asseblief:

Prof Michael Rowe  
Hoof van die Departement: Physioterapie  
Universiteit Weskaap  
Privaat Sak X17  
Bellville 7535  
[mrowe@uwc.ac.za](mailto:mrowe@uwc.ac.za)

Prof Anthea Rhoda  
Dekaan van die fakulteit van Gemeenskap en Gesondheid Wetenskap  
Universiteit van Weskaap  
Privaat Sak X17  
Bellville 7535  
[chs-deansoffice@uwc.ac.za](mailto:chs-deansoffice@uwc.ac.za)

**BIOMEDIESE NAVORSINGS ETIESE KOMITEE**

Tel: 021 959 2988

E-pos: [research-ethics@uwc.ac.za](mailto:research-ethics@uwc.ac.za)

Navorsings kantoor, Nuwe Kuns Gebou, C-Block, Boonste verdieping, Kamer 28, Universiteit van Weskaap, Privaat Sak X 17, 7535

Hierdie navorsing is goedgekeur deur die Universiteit van Weskaap se Navorsings Etiese Komitee. (VERWYSINGS NOMMER: moet ingesluit word by ontvangs van die toepaslike Navorsings Etiese Komitee)

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WESTERN CAPE



## APPENDIX H - Afrikaans Information Sheet for Adult Participants



### UNIVERSITEIT VAN WES KAAP

Privaatsak X 17, Bellville 7535, Suid-Afrika  
Tel: +27 21-939 9333 Fax: 27 21-939 1217  
E-pos: Timothykaylor08gmail.com

#### **INFORMASIE BLAD: Volwasenes**

**Projek Onderwerp: Voorkoms en algemene oorsake van die hoof laer ledemaat-amputasie in 'n sub-distrik in Kaapstad.**

#### **Waaroor gaan hierdie projek?**

Hierdie navorsingsprojek word uitgevoer deur Mnr Timothy Kaylor verbonde aan die Universiteit van Weskaap. Ons nooi u om deel te neem aan hierdie ondersoekprojek omdat u in die hospitaal is en u 'n gedeelte van u been verloor het. Die doel van hierdie projek is om vas te stel hoeveel mense hul bene verloor het en waarom dit gebeur het.

#### **Wat sal van my verwag word indien ek bereid is om deel te neem?**

'n Verpleegster of navorsingsassistent sal na u mediese lêer kyk en 'n vorm voltooi met vrae wat gebaseer is op die informasie in u lêer. Indien die informasie in u lêer nie duidelik is nie, sal die persoon u vrae vra om duidelikheid te kry of u kan ook telefonies gekontak word nadat u uit die hospitaal ontslaan is.

#### **Sal my deelname aan hierdie studie vertroulik gehou word?**

Die navorsers ondemeem om u identiteit te beskerm asook die aard van u bydrae. Om te verseker dat u identiteit anoniem bly en u informasie vertroulik hanteer sal word, sal ons die volgende doen: (1) u naam sal nie in die opname en ander ingesamelde data genoem word nie; (2) 'n kode sal geplaas word op die opname en ander versamelde data; (3) deur gebruik te maak van 'n identifiseringsleutel, sal die navorser hul opnames koppel aan u identiteit; en (4) slegs die navorser sal toegang het tot hierdie identifiseringsleutel.

Om u vertroulikheid te verseker, sal elektroniese data op die navorser se persoonlike rekenaar gestoor word, 'n wagwoord sal op die lêer geplaas word. Indien die data elektroniese aangestuur moet word, sal 'n enkriptiese boodskap diens gebruik word. Die lêers sal in numeriese volgorde genummer word, en onder verskuilde name aangestuur word. Indien ons 'n verslag of in 'n artikel oor die navorsingsprojek skryf, sal u identiteit beskerm word.

#### **Wat is die risikos verbonde aan hierdie navorsing?**

Daar is risikos verbonde aan alle interaksies met u self en ander. U mag hartseer voel omdat u 'n been verloor het of u mag bedruk voel as u daarvoor praat indien u u been in 'n ongeluk verloor het. Indien u enige van hierdie emosies ervaar, sal ons u na 'n sielkundige verwys wat verbonde is aan die hospital sodat u oor u emosies kan praat.

#### **Wat is die voordele verbonde aan hierdie navorsing?**

Die navorsing is nie ontwerp om u persoonlik te help nie, maar die resultate sal die navorser help om vas te stel hoeveel mense hul bene verloor het en wat die algemene redes daarvoor is.

Hierdie informasie sal hospitale in staat stel om beter sorg te verseker aan pasiënte wat in die toekoms hul bene verloor.

**Moek ek deel wees van hierdie navorsing en mag ek my deelname enige tyd staak?**

U deelname aan hierdie stude is volkome vrywillig. U mag verkies om geensins deel te neem nie. Indien u besluit om nie deel te neem nie, of op te hou, sal u geensins gepenaliseer word nie, of u sal geen voordele verloor waarvoor u andersins kwalifiseer nie.

**Wat indien ek vrae het?**

Hierdie navorsing word uitgevoer deur Mnr Timothy Kaylor verbonde aan die Universiteit van Weskaap. Indien u enige vrae oor die navorsing self het, kontak asseblief vir Mnr Timothy Kaylor by: [timothykaylor08@gmail.com](mailto:timothykaylor08@gmail.com). Indien u vrae het aangaande hierdie studie en u regte as deelnemer, of u wil enige probleem wat u ondervind het tydens hierdie studie rapporteer, kontak asseblief:

Prof Michael Rowe  
Hoof van die Departement: Physioterapie  
Universiteit Weskaap  
Privaat Sak X17  
Bellville 7535  
[mrowe@uwc.ac.za](mailto:mrowe@uwc.ac.za)

Prof Anthea Rhoda  
Dekaan van die fakulteit van Gemeenskap en Gesondheids Wetenskap  
Universiteit van Weskaap  
Privaat Sak X17  
Bellville 7535  
[chs-deansoffice@uwc.ac.za](mailto:chs-deansoffice@uwc.ac.za)

**BIOMEDIESE NAVORSINGS ETIESE KOMITEE**

Tel: 021 959 2988

E-pos: [research-ethics@uwc.ac.za](mailto:research-ethics@uwc.ac.za)

Navorsings kantoor, Nuwe Kuns Gebou, C-Block, Boonste verdieping, Kamer 28, Universiteit van Weskaap, Privaat Sak X 17, 7535

Hierdie navorsing is goedgekeur deur die Universiteit van Weskaap se Navorsings Etiese Komitee. (VERWYSINGS NOMMER: moet ingesluit word by ontvangs van die toepaslike Navorsings Etiese Komitee)

UNIVERSITY of the  
WESTERN CAPE



## APPENDIX I - Afrikaans Adult Consent Form



UNIVERSITEIT VAN WESKAAP

Privaat Bag X 17, Bellville 7535, South Africa  
Tel: +27 21-9592542 Fax: 27 21-959 1217  
E-pos: Timothykaylor08@gmail.com

### OUER /VOOG TOESTEMINGSVORM

**Onderwerp van navorsings projek: Voorkoms en algemene oorsake van die hoof laer ledemaat amputasie in 'n sub-distrik in Kaapstad.**

Hierdie studie is ten volle aan my en my kind verduidelik en ons toon begrip van wat ons moet doen. Ek gee hiermee toestemming dat my kind deel kan hê aan bogenoemde studie. Ek is tevrede daarmee dat alle vrae wat aan ons gevra is, beantwoord is. Ons verstaan dat ons kind se naam anoniem sal wees en dat hy/sy enige tyd van die studie kan onttrek, sonder dat enige rede verskaf word. Hy/sy sal nie gestraf word oor hierdie besluit nie.

Ouer naam .....

Ouer handtekening.....

Datum.....

UNIVERSITY of the  
WESTERN CAPE

Biomedical Research Ethics Committee Biomediese Navorsings Etiese Kommittee

Tel: 021 959 2988

E-pos: research-ethics@uwc.ac.za

Navorsings kantoor, Nuwe Kuns gebou, C-Block, Boonste verdieping, Kamer 28,  
Universiteit van Weskaap, Privaat Sak X 17, 7535

## APPENDIX J - Afrikaans Minor Consent Form



### UNIVERSITEIT VAN WESKAAP

Privaat Sak X 17, Bellville 7535, Suid-Afrika

Tel: +27 21-959 2542 Fax: 27 21-959 1217

E-pos: Timothykaylor08gmail.com

#### TOESTEMINGSVORM: Kinders

Onderwerp van navorsings projek: Voorkoms en algemene oorsake van die hoof laer ledemaat-amputasie in 'n sub-distrik in Kaapstad.

Iemand het, in 'n taal wat ek verstaan, aan my verduidelik dat my hospital-informasie vir hierdie navorsing gebruik sal word. My vrae aangaande hierdie studie is beantwoord. Ek verstaan wat van my verwag word en dat my naam anoniem sal bly. Ek verstaan dat ek enige tyd uit die navorsingsprogram kan onttrek sonder om enige redes te verskaf. Ek sal ook nie benadeel word indien ek besluit om te onttrek nie.

Deelnemer naam.....

Deelnemer handtekening.....

Datum.....

Biomediese Navorsings Etiese Komitee

Tel: 021 959 2988

E-pos: research-ethics@uwc.ac.za

Navorsings kantoor, Nuwe Kunste Gebou, C-Block, Boonste Verdieping, Kamer 28, Universiteit Weskaap, Privaat Sak X 17, 7535

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Toestemings vorm

## APPENDIX K - Information Sheet Adults



### UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa  
Tel: +27 21-959 9353 Fax: 27 21-959 1217  
E-mail: Timothykaylor08gmail.com

#### **INFORMATION SHEET: Adults**

**Project Title: Incidence and common causes of major lower limb amputation in a sub-district in Cape Town.**

##### **What is this study about?**

This is a research project being conducted by Mr Timothy Kaylor at the University of the Western Cape. We are inviting you to participate in this research project because you are in hospital because you lost a part of your leg. The purpose of this research project is to determine how many people suffer a lower limb amputation, and what the common causes of it is.

##### **What will I be asked to do if I agree to participate?**

A nurse or research assistant will look at your medical folder and complete a form based on the information in your folder. If the information is not clearly documented, someone might ask you a couple of questions for clarity, or contact you telephonically after you have been discharged from hospital.

##### **Would my participation in this study be kept confidential?**

The researchers undertake to protect your identity and the nature of your contribution. To ensure your identity will be protected and treated confidentially we will do the following: (1) your name will not be included on the surveys and other collected data; (2) a code will be placed on the survey and other collected data; (3) through the use of an identification key, the researcher will be able to link your survey to your identity; and (4) only the researcher will have access to the identification key.

To ensure your confidentiality, electronic data will be kept on the researcher's personal computer, in a password protected folder. If data is to be sent electronically, a security encryption message service will be used and the files will be labelled numerically or under an alias name. If we write a report or article about this research project, your identity will be protected.

##### **What are the risks of this research?**

All interactions with others and self, carry an amount of risk. You might feel sad because of losing your leg, or you might feel stressed talking about it if you lost your leg in an accident. If you experience any of these problems, we will refer you to the psychologist at the hospital that will help you talk about these feelings.

##### **What are the benefits of this research?**

This research is not designed to help you personally, but the results may help the investigator learn more about the number of people who suffer a lower limb amputation and what the



common causes are. This information will help the government health system plan to provide better care to patients who also lost their legs in future.

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

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify

**What if I have questions?**

This research is being conducted by Mr Timothy Kaylor at the University of the Western Cape. If you have any questions about the research study itself, please contact J Mr Timothy Kaylor at: [timothykaylor08@gmail.com](mailto:timothykaylor08@gmail.com). Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

Prof Michael Rowe  
Head of Department: Physiotherapy  
University of the Western Cape  
Private Bag X17  
Bellville 7535  
[mrowe@uwc.ac.za](mailto:mrowe@uwc.ac.za)

Prof Anthea Rhoda  
Dean of the Faculty of Community and Health Sciences  
University of the Western Cape  
Private Bag X17  
Bellville 7535  
[chs-deansoffice@uwc.ac.za](mailto:chs-deansoffice@uwc.ac.za)

**BIOMEDICAL RESEARCH ETHICS COMMITTEE**

Tel: 021 959 2988

E-mail: [research-ethics@uwc.ac.za](mailto:research-ethics@uwc.ac.za)

Research Office, New Arts Building, C-Block, Top Floor, Room 28, University of the Western Cape, Private Bag X 17, 7535

This research has been approved by the University of the Western Cape's Research Ethics Committee. (REFERENCE NUMBER: *to be inserted on receipt thereof from the applicable Research Ethics Committee*)

## APPENDIX L - Information Sheet for Children



### UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 9353 Fax: 27 21-959 1217

E-mail: Timothykaylor08gmail.com

#### **INFORMATION SHEET: Children**

**Project Title: Incidence and common causes of major lower limb amputation in a sub-district in Cape Town.**

##### **What is this study about?**

This is a research project being conducted by Mr Timothy Kaylor at the University of the Western Cape. We are inviting you to participate in this research project because you are in hospital and lost a part of your leg. The purpose of this research project is to determine how many people have lost their legs and why it happened.

##### **What will you be asked to do if you agree to participate?**

Someone will look at your medical folder and complete a form with some questions based on the information in your folder. If the information is not clearly documented in the folder, someone

##### **Would my participation in this study be kept confidential?**

The researchers undertake to protect your identity and the nature of your contribution. To ensure that your identity will be protected and treated confidentially we will do the following: (1) your name will not be included on the surveys and other collected data; (2) a code will be placed on the survey and other collected data; (3) through the use of an identification key, the researcher will be able to link their survey to their identity; and (4) only the researcher will have access to the identification key.

To ensure your confidentiality, electronic data will be kept on the researcher's personal computer, in a password protected folder. If data is to be sent electronically, a security encryption message service will be used and the files will be labelled numerically or under an alias name. If we write a report or article about this research project, your identity will be protected.

##### **What are the risks of this research?**

You might feel sad because of losing your leg, or you might feel stressed talking about it. If you experience any of these problems, we will refer you to the psychologist at the hospital that will help you talk about these feelings.

##### **What are the benefits of this research?**

This research is not designed to help you personally, but the results may help the investigator learn more about the number of people who lost their leg, and what the common reasons are. This information will help the hospitals plan to provide better care to patients who also lost their legs in future.



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

You do no have to take part in this study at all if you do not want to. If you decide not to take part, you will not be penalized or lose any benefits to which you otherwise qualify.

**What if I have questions?**

This research is being conducted by Mr Timothy Kaylor at the University of the Western Cape. If you have any questions about the research study itself, please contact J Mr Timothy Kaylor at: [timothykaylor08@gmail.com](mailto:timothykaylor08@gmail.com). Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

Prof Michael Rowe  
Head of Department: Physiotherapy  
University of the Western Cape  
Private Bag X17  
Bellville 7535  
[mrowe@uwc.ac.za](mailto:mrowe@uwc.ac.za)

Prof Anthea Rhoda  
Dean of the Faculty of Community and Health Sciences  
University of the Western Cape  
Private Bag X17  
Bellville 7535  
[chs-deansoffice@uwc.ac.za](mailto:chs-deansoffice@uwc.ac.za)

**BIOMEDICAL RESEARCH ETHICS COMMITTEE**

Tel: 021 959 2988

E-mail: [research-ethics@uwc.ac.za](mailto:research-ethics@uwc.ac.za)

Research Office, New Arts Building, C-Block, Top Floor, Room 28, University of the Western Cape, Private Bag X 17, 7535

This research has been approved by the University of the Western Cape's Research Ethics Committee. (REFERENCE NUMBER: *to be inserted on receipt thereof from the applicable Research Ethics Committee*)



UNIVERSITY of the  
WESTERN CAPE

## APPENDIX M - Consent Form for Children



### UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa  
Tel: +27 21-959 2542 Fax: 27 21-959 1217  
E-mail: Timothykaylor08@gmail.com

#### ASSENT FORM: Children

**Title of Research Project:**            **Incidence and common causes of major lower limb amputation in a sub-district in Cape Town.**

Someone has explained to me that my hospital information will be used for a study, in a language that I understand. My questions about the study have been answered. I understand what I will have to do, and that my name will be kept a secret. I understand that I may withdraw from the study at any time without giving a reason and that nothing bad will happen to me because of it.

**Participant's name**.....

**Participant's signature**.....

**Date**.....

UNIVERSITY of the  
WESTERN CAPE

Biomedical Research Ethics Committee  
Tel: 021 959 2988  
E-mail: research-ethics@uwc.ac.za  
Research Office, New Arts Building, C-Block, Top Floor, Room 28, University of the Western Cape,  
Private Bag X 17, 7535

## APPENDIX N - Consent Form for Parents or Guardians



### UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa  
**Tel: +27 21-9592542 Fax: 27 21-959 1217**  
**E-mail: Timothykaylor08@gmail.com**

### PARENTAL /GUARDIAN CONSENT FORM

**Title of Research Project: Incidence and common causes of major lower limb amputation in a sub-district of the city of Cape Town Municipality**

The study has been described to me and my child so that he/she understands what he/she has to do, and I consent for my child to participate in the above research study. I am happy that any questions myself and my child have asked have been answered. We understand that my child's name will not be used on any form and that he/she may stop participating in the study anytime he/she chooses without giving a reason and that he/she will not be punished in any way for stopping.

**Parent's name**.....

**Parent's signature**.....

**Date**.....

Biomedical Research Ethics Committee

Tel: 021 959 2988

E-mail: [research-ethics@uwc.ac.za](mailto:research-ethics@uwc.ac.za)

Research Office, New Arts Building, C-Block, Top Floor, Room 28, University of the Western Cape, Private Bag X 17, 7535



## APPENDIX O - Isixhosa Information Sheet for Parents or Guardians



### UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 9333 Fax: 27 21-959 1217

E-mail: Timothykaylor08@gmail.com

### Phepha Ngcaciso:Lwabantu Abadala

**Igama lophando: Izhlo eziqhelekileyo ngamandla kusiko lwemilenze  
Kwizikhululo eziphezulu Entshona koloni.**

#### Zimalunga nantoni ezi zifundo?

Olu luphando oluqhutywa ngu Mnumzane Timothy Kaylor kwisikolo esiphakamileyo iDyunivesithi Yase Ntshona Koloni. Siyakumema wena ukuba uthathe nxaxheba koluphando ngoba use sibhedlele ngenxa yokuphulukana nelinye lelungu lwakho lomlenze . Unobangela woluphando kukujonga bangaphi abantu abachaphazeleka kolu qhaqho lokusikwa kwamathambo amalungu omlenze.kwaye izintoni eziqhelekileyo ezenzakayo ukubangela oku.

#### Yintoni elindeleke Ndiyenze ukuba ndiyavuma ukuthatha inxaxheba?

Umongikazi okanye umncedisi woluphando olu uzakujonga ingxelo yakho yase sibhedlele aze aqakubhele ngobhala imininingwana leyo athe wayufumana kwingxelo leyo yakho. Ukuba kuthe kwafumaneka ukuba kule ngxelo yakho kukho izinto ezithile ezinga cacanga , kungakho umntu kwaba bakhakakanyiweyo bangakutsalela umnxeba ukuze babuze imibuzo ethile ukuze babe nokucacelwa kwimibuzo leyo sele use khaya.

#### Ingaba Ngokuthatha inxaxheba koluphando lwezifundo , igama lam lohlala lisemfihlakalweni?

Abaphandi aba bayabhabhatisa ngoku khusela igama lakho kunye nesimo eso ukuso. Ukuqinisekisa ukuba igama lakho kunye nawe likhuselekile bakulandela imiqathango ethile(1) Igama lakho soze lifakwe nanini koluphando naphina koluqokelelo lengxelo yakho : (2) Ngamanani athile azosetyenziswa nakweyiphi ingxelo emalunga nawe:(3) Kwi meko yokwahlula/ calula ingxelo, umphandi lowo nguye ozayazi ukuba yeka bani ingxelo:(4) kwaye nguye yedwa (umphandi) ozakwazi ukuhlala ukuba yekabani iyeka bani ingxelo leyo.

Ukuqinisekisa ukhuseleko lwengxelo leyo iqokelelweyo iya kungcinwa phantsi koshicilelo lwembhalelwano ye computha kwicandelo elohlukileyo ebucala apho kuzesetyenziswa amanani ohlukileyo abe esaziwa nguMphandi lowo. Ukuba lengxelo ihanjiswe ngembhalelwano ye computha kosetyenziswa indlela efihlakaleyo , kwaye ingxelo leyo iqulathiweyo iyakunombholwa ngamanani athile okanye kusetyenziswe amagama nje aqanjweyo / aqwetyiweyo . Ukuba sibhala iziphumo okanye isitanza malunga noluphando igama lakho lizakukhuselwa .

### **Zintoni ezibungozi koluphando?**

Lonke unxibelelwano nabanye abantu, nawe ziphathisana nobungozi. Ungaziva unxunguphele ngoba uphulukene nomlenze wakho, okanye ungaziva ungaphantsi konxinizelelo ukuthetha ngayo lemeko kuba uphulekene nomlenze wakho. Ukuba kwenzekile udlule kwezingxaki siyakuthi ke sikuthumele kugqirha wengqondo apho azokunika uxilongo ukuze benomelana noku apho esibhedlele ube noziva ukhululekile ukuthetha ngayo lemeko.

### **Zintoni Indzuzo koluphando?**

Oluphando alwenzelwanga ukucenda wena buqu, Kodwa ukucenda abaphandi aba bafunde nzulu malunga namanani abantu abacaphazeleka kolu siko lomlenze kwaye nonobangela woku. Oluphando luzakucenda urhulumente kwicandelo lwezempilo ukuza namacebo babenedlela engcono yokunakekela izigulane zabo ezo ziphulakane nemilenze yazo.

### **Ingaba Kufuneka Ndibekhona koluphando Kwaye ndingayeka uthatha inxaxheba nanini na?**

Ukuthatha inxaxheba koluphando kuxhomekeke kuwe. Ungakhetha ungathathi nxaxheba konke konke. Ukuba ugqibe ukuba awusathathi nxaxheba kolufundo okanye uyeke sele uqalile, soze ujeziswe okanye ungafumani uncedo bekumela ulifumane ngenxa yonku.

### **Ukuba Ndinemibuzo ndithini ?**

Oluphando luqulunqwa nguMnumzane Timothy Kaylor kwi Dyunivesithi Yase Ntshona Koloni. Ukuba unombuzo nowuphi na malunga noluphando, cela uqhangamishelane no Mnumzane Timothy Kaylor kwezi nkukacha :timothykaylor08gmail.com .Ukuba ukhe wane mibuzo malunga nezi zifundo okanye kukhona ongakuxela ongakuthanga ohlangabezane nayo kwezi zifundo, lilungelo lakho njengo mthathi nxaxheba kwezi zifundo ukuba uyidlulisele ku:

Prof Michael Rowe  
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Prof Anthea Rhoda  
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### **BIOMEDICAL RESEARCH ETHICS COMMITTEE**

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Private Bag X 17, 7535

This research has been approved by the University of the Western Cape's Research Ethics Committee. (REFERENCE NUMBER: to be inserted on receipt thereof from the applicable Research Ethics Committee)



## APPENDIX P - Isixhosa Information Sheet for Children



### UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 9333 Fax: 27 21-959 1217

E-mail: Timothykaylor08@gmail.com

#### Phepha Ngcaciso :Labantwana

**Igama Lophando: Izehlo Eziqhelekileyo ngamandla kusiko Lwemilenze  
Kwizikhululo eziphezulu Entshona Koloni.**

#### **Zimalunga Nantoni ezi zifundo?**

Olu luphando oluqhutywa ngu Mnumzane Timothy Kaylor Kwisikolo esiphakamileyo Kwi Dyunivesithi Yase Ntshona koloni. Siyakumema ukuba uthathe nxaxheba koluphando ngoba use sibhedlele ngenxa yokuphulukana nelinye ilungu lakho lwenyawo. Unobangela woluphando kukujonga bangaphi abantu abachaphazeleka kolu qhaqho lokusikwa kwamathambo malungu omlenze, kwaye izintoni eziqhelekileyo ezenzekayo ukubangela oku.

#### **Yintoni elindeleke ndiyenze ukuba ndiyavuma ukuthatha inxaxheba?**

Kukho umntu ozakujonga ingxelo yakho yase sibhedlele aze aqukumbele ngokubhala ingxelo kwi phepha eline mibuzo ngako oko athe wakufumana kwingxelo leyo yakho. Ukuba kuthe kwafunyaniswa kukho ingxelo enga cacanga , kuyobakho umntu ozakubuza imibuzo ethile ukuqokumbela lengxelo.

#### **Ingaba Ngokuthatha inxaxheba koluphando lwezifundo igama lam lohlala lilemfihlakalweni?**

Abaphandi aba bayabhambathisa ngokukhusela igama lakho kunye nesimo eso ukuso. Ukuqinisekisa ukuba igama lakho kunye nawe kuhlala kukhuselekile bakulandela imiqathango ethile: (1) Igama lakho soze lifakwe nanini koluphando naphina koluqokelelo ngxelo yakho: (2) Ngamanani athile azosetyenziswa nakweyiphi ingxelo emalunga nawe: (3) Kwi meko yokwahlua/ calula ingxelo , umphandi lowo nguye ozayazi kuba yeka bani ingxelo: (4) Kwaye nguye yedwa (umphandi) ozakwazi ukuhlala ukuba yekabani yeka bani longxelo leyo.

Ukuqinisekisa ukhuseleko lwengxelo leyo iqokelelweyo iyakungcinwa phantsi koshicilelo lwembalelwano ye computha kwicandelo elohlukileyo ebucala, apho kusetyenziswa amanani ohlukileyo abe esaziwa nguMphandi lowo. Ukuba lengxelo ihanjiswa ngembalelwano ye computha kuyosetyenziswa indlela efihlakeleyo, Kwaye ingxelo leyo iqulathweyo iyakunombolwa ngamanani athile okanye kusetyenziswe amagama nje aqanjweyo/ aqwetyiweyo. Ukuba sibhala iziphumo okanye isitanza malunga noluphando igama lakho lizakukhuselwa.

#### **Zintoni ezibubungozi Koluphando?**

Ungaziva unxunguphele ngenxa yesisehlo okanye uzive uphantsi konxanzelelo ngoku thetha ngalento. Ukuba kwenzekile udlule kwezinxaki siyakuthi ke sikuthumele ku gqirha wengqondo apho azokunika uxilongo kuze ukwazi ukumelana noku apho esibhedlele ube noziva ukhululekile ukuthetha ngesisihlo.

**Zintoni indzuzo Koluphando?**

Oluphando alwanzelwanga ukucenda wena buqu, kodwa ukucenda abaphandi aba bafunde nzulu malunga namanani abantu abachaphazeleka kolu siko lomlenze kwaye nonobangela woku. Oluphando luzakucenda urhulumente kwicandelo lwezempilo ukuza namacebo babenedlela engcono yokunakekela izigulane zabo ezo ziphulukane nemilenze yazo.

**Ngaba kufuneka Ndibekhona koluphando kwaye Ndingayeka uthatha inxaxheba nanini?**

Ukuthatha inxaxheba koluphando kuxhomekeke kuwe . Ungakhetha ungathathi nxaxheba konke konke. Ukuba ugqibe ukuba ungathathi inxaxheba kolufundo okanye uyeke sele uqalile, soze ujeziswe okanye ungafumani ncedo bekumela uyalifumana ngenxa yoku.

**Ukuba Ndinemibuzo Ndithini?**

Oluphando luquluqwa nguMnumzane Timothy Kaylor Kwi Dyunivesithi Yase Ntshona koloni. Ukuba unombuzo nowuphi na malunga noluphando, ceta uqhagamishelane no Mnumzane Timothy Kaylor kwezi nkukacha:timothykaylor08gmail.com . Ukuba kuthe wane mibuzo malunga nezi zifundo okanye kukhona ongakuxela ongakuthandanga ohiangabezane nayo kwezi zifundo, lilungelo lakho njengo mthathi nxaxheba kwezi zifundo ukuba uyidlulisele ku:

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## APPENDIX Q - Isixhosa Consent Form for Parents and Guardians



UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-9592542 Fax: 27 21-959 1217

E-mail: Timothykaylor08@gmail.com

**Phepha Vume Lo Mzali / Mnakekeli Womntwana.**

**Igama lophando ngenkcukacha :** Izehlo Eziqhelekileyo ngamandla kusiko lwemilenze  
Kwizikhululo eziphezulu Entshona Koloni.

Ezi zifundo zicacisiwe kum naku mntwana wam kuze abanekuqonda kwenziwani kwaye azi okumele akwanze. Ndiyavuya kuba yonke imibuzo bendinayo nomntwana wam ebenayo iphendulwe. Siyazi ukuba igama lomntwana wam soze lisetyenziswe nanini kwaye angayeka uthatha inxaxheba nanini na kwezi zifundo xa efuna ngaphandle konikezela isizathu kwaye soze ajeziswe.

Igama Lo Mzali.....

Isivumelwano no Mzali.....

Isuku.....

Biomedical Research Ethics Committee

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## APPENDIX R - Isixhosa Consent Form for Children



### UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa  
Tel: +27 21-959 2542 Fax: 27 21-959 1217  
E-mail: Timothykaylor08@gmail.com

#### Phepha Vume : Labantwana

#### Igama Lophando ngenkcukacha: Izehlo Ezizhelekileyo ngamandla kusiko lwemilenze kwizikhululo eziphezulu Entshona Koloni.

Kukho umntu ondicaciseleyo ukuba ingxelo yam yase sibhedlele izakusetyenziswa kwizifundo ngo lwimi endiluvayo. Imibuzo ebendinayo malunga nezifundo ezi iphendulwe yonke. Ndiyayazi okumele ndikwenze , kwaye igama lam lizohlala lise mfihlakalweni ngaxesha lonke. Ndiyazi ukuba ndinga rhoxa nanini kwezi zifundo ngaphandle konikisa isizathu kwaye akukhonto embi engenzeka kum ngenxa yoko.

Igama Lo mthathi Nxaxheba.....

Isivumelwano so Mthathi Nxaxheba.....

Isuku.....

Biomedical Research Ethics Committee  
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E-mail: research-ethics@uwc.ac.za  
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Consent Form

## APPENDIX S - Data Extraction Sheet



**UNIVERSITY OF THE WESTERN CAPE**

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E-mail: timothykaylor08@gmail.com

### Incidence of Major lower limb amputation in the Tygerberg sub-district of Cape Town Survey

Socio-demographic profile information:

Gender: M / F  
 Age: \_\_\_\_\_  
 Date of Birth: \_\_\_\_/\_\_\_\_/\_\_\_\_  
 Race: B / W / A / I / other

Residential address: \_\_\_\_\_

Employment status: (please tick the most appropriate)

Too young to work (under 18 years)	
Retired	
Unemployed (under 65 years)	
On disability grant	
Self-employed (informally)	
Formal permanent employment	

Marital status: (please tick the most appropriate)

Too young to be married (under 18 years)	
Married	
Divorced	
Widowed	
In a partnership / relationship (with or without children) but not married	

Lifestyle: (please tick all that apply)

Smokes tobacco	
Abuses alcohol (> 14 drinks per week)	
Uses other substances	

Record #: \_\_\_\_\_



## UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

Tel: +27 21-959 9353 Fax: 27 21-959 1217

E-mail: timothykaylor08@gmail.com

### Medical information:

<b>Type of amputation – surgical procedure used: (eg. Guillotine)</b>				
<b>Side of amputation: (left or right)</b>	Left		Right	
<b>Level of amputation: (please tick)</b>	Trans-tibial	Through-knee	Transfemoral	Hip-disarticulation
<b>Reason / primary cause for amputation: Traumatic or dysvascular (specify)</b>	Dysvascular	Diabetes	Traumatic	
		Peripheral vascular disease		
<b>Presence of Co-morbidities: (please list all)</b>				
<b>Length of hospital stay:</b>	Admission date:		Discharge date:	
<b>Number of days in hospital:</b>				
<b>Date of death (if applicable):</b>				
<b>Cause of death (if applicable):</b>				

Record #: \_\_\_\_\_

(van Netten et al., 2016)

## APPENDIX T – Professional Editors Declaration

35 Narnia Lane  
Knysna 6570

Email: [imarion100@gmail.com](mailto:imarion100@gmail.com)  
Cell: 083 5906762

12 June 2023

### DECLARATION OF PROFESSIONAL EDIT

Document Title: **INCIDENCE AND COMMON CAUSES OF MAJOR LOWER LIMB AMPUTATION AT A HOSPITAL IN A SUB-DISTRICT OF THE CITY OF CAPE TOWN MUNICIPALITY.**

NAME: Timothy Kaylor

Student No: 3219901

I declare that I have edited and proofread this research proposal. My involvement was restricted to language usage and spelling, completeness and consistency, referencing style and formatting of headings, captions and Table of Contents.

Sincerely,



Marion Pfeiffer  
Freelance Copy-Editor and Proofreader  
Member of SAFREA and PEG  
Professional Member CIEP UK



## APPENDIX U – Similarity Index Report

INCIDENCE AND COMMON CAUSES OF MAJOR LOWER LIMB AMPUTATION AT A HOSPITAL IN A SUB-DISTRICT OF THE CITY OF CAPE TOWN MUNICIPALITY.

ORIGINALITY REPORT

<b>12</b> %	<b>11</b> %	<b>4</b> %	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

MATCH ALL SOURCES (ONLY SELECTED SOURCE PRINTED)

4%

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Internet Source

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	On		



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