Locally Manufactured Wheelchairs in Tanzania: Do they meet the Needs of Tanzanian Wheelchair users?

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DECLARATION

I, *Aston Ndosi*, hereby declare that the work on which this dissertation is based is my original work (except where acknowledgements indicate otherwise) and have used the Harvard system for citation and referencing. I declare that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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LIST OF ABBREVIATIONS

APDK	Association of Physically Disabled in Kenya
CCBRT	Comprehensive Community Based Rehabilitation in Tanzania
CHAWATA	Chama cha Walemavu Tanzania (The Tanzania Association of Disabled People)
FEW	Functioning Everyday with a Wheelchair
ICC	Intraclass Correlation Coefficient
ISPO	International Society for Prosthetics and Orthotics
KASI	Kilimanjaro Association for Spinally Injured
MoHSW	Ministry of Health and Social Welfare
QUEST 2.0	Quebec User Satisfaction with Assistive Technology, Version 2.0
SPSS	Statistical Package for Social Sciences
TATCOT	Tanzania Training Centre for Orthopaedic Technologists
UNCRPD	United Nation Convention on the Rights of Persons with Disabilities
WHO	World Health Organization

DEFINITION OF TERMS

Term	Description
Activity	The execution of a task or action by an individual (WHO, 2001)
Appropriate	Suitable for a particular person, condition, occasion, or place; fitting (WHO, 2008)
Disability	The outcome or result of a complex relationship between an individual's health condition and personal factors, and of the external factors that represent the circumstances in which the individual lives (WHO, 2001)
Functional performance	How a wheelchair performs for different users in different environment (WHO, 2008)
Impairment	A problem in body function or alterations in body structure. (WHO, 2011a)
Inappropriate	Incorrect, wrong, incompatible, unfitting (WHO, 2008)
Manual wheelchair	A wheelchair that is propelled by the user or pushed by another person (WHO, 2008)
Orthotics	The science and art of rehabilitation of physical deformity or impairment or disability of the human locomotion system by means of design, manufacture and fitting of orthoses (Kaphingst and Lemaire, 2011)
Participation	Involvement in life situations (WHO, 2001)
Prosthetic	Pertaining to a prosthesis (Kaphingst and Lemaire, 2011)
Seating and postural support	How user's body is supported by the wheelchair (WHO, 2008)

Satisfaction	Is an individual's positive or negative value of a specific quality or characteristic of equipment which is influenced by the person's expectations, experience, attitudes or personal values (Bergstrom and Samuelsson, 2006).
Wheelchair	A device providing wheeled mobility and seating support for a person having difficulties in walking or moving around (WHO, 2008).
Wheelchair provision	An overall term for wheelchair design, production, supply and service delivery (WHO, 2008)

ABSTRACT

Access to suitable wheelchairs may seriously impact the ability of people with physical disabilities to integrate into regular community life. The overall aim of this study was to determine the extent to which the needs of users of wheelchairs manufactured locally in Tanzanian are met. The specific objectives of the study were to determine users' satisfaction with the wheelchairs manufactured in Tanzania, their satisfaction with services associated with the provision, repair and maintenance of these wheelchairs, and the extent to which these wheelchairs enabled them to carry out their daily activities.

A quantitative descriptive cross-sectional study was carried out among 75 users of locally manufactured manual wheelchairs, aged 18-65 years and residing in Dar es Salaam, Arusha and the Kilimanjaro regions of Tanzania. Data was collected using a questionnaire consisting of demographic items and two existing instruments, the Functioning Everyday with a Wheelchair (FEW) and Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST) 2.0. Data were analysed with the Statistical Package for the Social Sciences (SPSS) software program version 20.0. Descriptive analysis was performed using frequencies and proportions for categorical data or median and ranges for numerical data. The chi-square test was conducted to determine whether there were significant difference between gender and place of residence (rural/urban) and satisfaction with functional needs, wheelchair and activity and participation.

Among the 75 wheelchair users, the female to male ratio was 1:2.7. Respondents resided in both rural and urban areas and had used a wheelchair for several years. The median value for the period of using a wheelchair median (range) was 8.0 (1.0-30.0) years. The majority (n=57, 76.0%) used three-wheeler wheelchairs. With respect to functional needs, participants were satisfied with their ability to carry out daily routines (n=64, 85.3%), comfort (n=68, 90.6%), health needs (n=66, 88.0%), operating the wheelchair (n=64, 85.3%), reaching

different surface heights (n=64, 85.4%), transferring from one place to another (n=67, 89.3%), personal care (n=64, 85.3%), moving around indoors (n=54, 80.0%), moving around outdoors (n=60, 76.0%) and using personal or public transport (n=43, 57.3%) for each of these. With regards to wheelchair features the majority of participants were satisfied with the durability of the wheelchair (n=67, 89.4%) and least satisfied with ease of adjusting (n=52, 69.3%). With respect to service provision of wheelchairs, the majority of participants (n=61, 71.4%) were satisfied with professional services and least satisfied with follow-up services (n=7, 9.3%). In relation to aspects of activity and participation needs, results indicated that the wheelchair had positively influenced more than 90% of participants. This study revealed that with the use of wheelchair they were able to work, lead an active leisure, go to shopping, socialize, mobility and participation in sports.

In conclusion the majority of participants were more satisfied with wheelchair features than the services provided. The majority of participants (n=58, 77.4%) were dissatisfied with follow-up services.

CHAPTER 1: INTRODUCTION

It is estimated that tens of millions of people in the world need some form of assistive technology such as a wheelchair for mobility. The World Report on Disability estimated that over a billion people live with some kind of disability that corresponds to approximately 15% of the global population (UNCRPD, 2010). According to Community Comprehensive Based Rehabilitation in Tanzania (CCBRT, 2008) it is assumed that about three and half million people in Tanzania (10%) face some form of disability.

The United Nations Convention on the Rights for People with Disabilities (UNCRPD) article 20 states that it is the responsibility of State Parties to ensure personal mobility with the highest possible independence for people with disabilities including the time of their choice and at an affordable cost (United Nations, 2008). People with physical disabilities have mobility limitations that hamper social and community participation (Edwards and McCluskey, 2010). Wheelchairs are one of the most commonly used assistive devices for enhancing personal mobility which is a precondition for enjoying human rights, living in dignity, and improving function and quality of life (WHO 2008). People who cannot obtain a wheelchair may be restricted to staying in their homes.

According to Harrison and Rochette (2013) mobility aids including wheelchairs not only compensate for a locomotor disability, they also increase user's opportunities for social participation. It is further estimated that 80% of these people live in low-income countries and often cannot afford the devices that they need, and their governments also do not have the funds to provide citizens with these devices (Constantine and Mines, 2009).

A common response to the lack of availability of this equipment in low-income countries is for high-income countries to donate them. Tanzania is one such low-income country which finds itself the recipient of donated wheelchairs (Winter,

2006). Currently wheelchair service provision in Tanzania is mostly dependent on donations from high-income countries.

1.1 Donated wheelchairs

Donors do not consider durability of the wheelchair, maintenance or the availability of spare parts (Winter, 2006). Repair and maintenance become a common problem since users experience difficulties finding spare parts. Sometimes broken-down wheelchairs are still used by people who have no other options, therefore causing more harm than help (Association of Physically Disabled in Kenya (APDK) 2008). A report by Winter (2006) indicates that wheelchairs in Tanzania are often imported, poorly made, improperly fitted and harmful to users.

According to the International Society for Prosthetics and Orthotics (ISPO) (2007a) and the World Health Organization (WHO) (2008) "*An appropriate wheelchair should meet the individual needs and environmental conditions of the user, provide proper fit and postural support based on sound biomechanical principles. It should also be safe and durable, available, easily accessed, maintained and sustained within the country at the most economical and affordable price*". Donated wheelchairs in low-income countries seldom adhere to these requirements. They are often 'one-size fits all' with few adjustments being possible. They therefore do not meet the individual needs of the user. Since they were developed and manufactured for urban use in industrial countries, donated wheelchairs are often not suitable for the environmental conditions encountered in low-income countries. This reduces their durability, and repairs are costly and often not possible (Fitzgerald et al., 2005).

1.2 Appropriate wheelchair

In August 2008, the WHO launched Guidelines on the Provision of Manual Wheelchairs in less-resourced settings. The purposes of these guidelines are to promote personal mobility with the greatest possible independence for people

with disabilities, as well as to enhance the quality of life of users in less-resourced settings through improved access to wheelchairs. The guidelines also assist member states in developing a system for wheelchair provision.

All wheelchairs whether locally manufactured or imported should be appropriate and improve the quality of life of users (WHO, 2008). This means they should adhere to the aforementioned qualities of an appropriate wheelchair. The design and distribution of appropriate wheelchairs requires in-depth evaluation of the user needs including environment where the wheelchair will be used (Saunders and Leavitt, 2001).

Furthermore, low-income countries want to ensure implementation of strategies for basic preventive, curative and rehabilitative health services throughout their disabled populations (United Nations, 2008). The Tanzanian National Third Health Sector Strategy Plan for implementing these principles was enforced through the parliamentary resolution of 2009 and the desired provision of health services for all is to be achieved by 2015 (Ministry of Health and Social Welfare (MoHSW), 2007).

1.3 Wheelchair services - the Tanzanian context

In 2007, a start was made in the provision of locally manufactured appropriate wheelchairs by training wheelchair technicians and establishing small wheelchair workshops in some regions. These workshops are, however, not accessible to all parts of the country for geographical reasons. The motivation for producing local wheelchairs is to enable the population of Tanzania to have access to affordable wheelchairs suitable to their needs and environmental requirements with local availability of spare parts.

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Tanzania is one of the low-income countries in which efforts have been made to improve wheelchair fabrication and distribution channels (Winter, 2006). Trying to bridge the gap, Tanzania has established some wheelchair manufacturing

workshops which are managed by wheelchair technicians who are trained and equipped with the necessary knowledge and practical skills required to assess, prescribe, select locally available materials and provide wheelchairs to persons with various physical disabilities. However, wheelchairs and parts must be produced within a regulated system and within acceptable standards. Currently, wheelchair users still experience many barriers including too few wheelchair workshops and suitably qualified personnel for prescription, production and provision of individually appropriate wheelchairs (Constantine & Mines, 2009). People with physical disabilities in Tanzania, which is considered a low-income country, face many challenges in integrating into regular life.

According to Winter (2006) if people with disabilities cannot obtain a wheelchair they may be forced to stay in their homes or crawl as their only means of transportation. Winter furthermore argues that some people with physical disabilities in Tanzania have makeshift mobility devices such as pushcarts, but the terrain can be difficult to navigate both in the urban environment and in rural settings. In Tanzania small wheelchair workshops have been established to manufacture wheelchairs with the intention of meeting the users' needs particularly with regard to environmental requirements. However, due to the high demand for wheelchairs, workshops continue to receive orders for, and provide wheelchairs to users without assessing user's needs.

Assessments of user needs may be done by the workshops or by a professional (rehabilitation team member - physiotherapist, occupational therapist or prosthetist/orthotist, who sends the requirements to the workshop for production. This casts doubts on whether local manufacturers are adhering to the WHO wheelchair guidelines for less-resourced settings (WHO, 2008). Winter (2006) argued that wheelchairs need to be fitted with the consideration to the user's size, age and nature of disability among other factors. Furthermore, follow-up is not done to evaluate whether users' needs have been met by the wheelchair due to the scarcity of rehabilitation professionals in Tanzania (Njelesani et al., 2011).

In addition, the majority of wheelchair users in Tanzania reside in rural areas far from wheelchair workshops and have advised the researcher of their difficulties/challenges in accessing, repairing broken wheelchairs and replacing worn out parts.

1.4 Focus of the study

The focus of this study is found in the Comprehensive Community Based Rehabilitation in Tanzania (CCBRT) strategic plan for 2008 – 2012 which deals with wheelchair provision (CCBRT, 2008). This plan motivated the researcher to carry out a study to determine users' satisfaction with wheelchairs manufactured in Tanzania, their satisfaction with services associated with the provision, repair and maintenance of these wheelchairs, and the extent to which these wheelchairs enable them to carry out their daily activities.

The study is also aligned with the Tanzanian National Third Health Sector Strategy Plan principles which were legislated through parliamentary resolution in 2009 and express the desire to provide health services for all by 2015. The government has to deliver quality, promotive and rehabilitative services of which wheelchair provision is one (MoHSW), 2007).

1.4.1 Significance of the study

To the best of the researcher's knowledge there is no published information on the extent to which locally manufactured wheelchairs meet the needs of Tanzanian wheelchair users. Therefore this study will be the first of this kind and will provide valuable information on the needs of wheelchair users in this setting and will inform local manufacturers about how to address these needs.

This study is important because it will describe how, and to what extent, the needs of wheelchair users are being met by locally manufactured wheelchairs and will also describe their functional performance and participation. The study

will identify limitations related to wheelchair features and provision - areas which can be addressed to improve wheelchair services in Tanzania.

The results will be used to make recommendations to wheelchair manufacturers, suppliers, wheelchair users, Disabled People's Organizations (DPOs), not for profit organizations (NPO), the Government (Ministry of Health and Social Welfare), policy makers and health care professionals. The results may also be used to develop a manual for wheelchair users, and a policy on wheelchair service delivery. The results will also influence the development of policy guidelines on the production, distribution and follow-up of people using low cost wheelchairs in Tanzania.

1.5 Research question, aims and objectives

1.5.1 The research question

Are the needs of Tanzanian wheelchair users being met through their use of locally manufactured wheelchairs?

1.5.2 Aim of the study

The aim of this study was to determine the extent to which the needs of Tanzanian wheelchair users are met through locally manufactured wheelchairs.

1.5.3 The study objectives

The objectives for this study were:

1. To determine the demographic and wheelchair use profile of users of locally manufactured wheelchairs
2. To determine the satisfaction level of users of locally manufactured wheelchairs in meeting their functional needs.
3. To determine the extent to which locally manufactured wheelchairs meet users' needs in terms of their features and services provided.

4. To determine the extent to which locally manufacturing wheelchairs meet the activity and participation needs of users.
5. To assess the observed differences between:
    - satisfaction with locally manufactured wheelchairs in meeting functional needs, gender and place of residence.
    - type of wheelchair, gender and place of residence.
    - satisfaction with wheelchair features, gender and place of residence.
    - satisfaction with activity and participation, gender and place of residence.

Research hypothesis: There is a difference in:

- participant satisfaction with wheelchairs meeting functional needs
- wheelchair features and services
- activity and participation
  and gender or place of residence.

Null hypothesis: There is no difference in:

- participant satisfaction with wheelchairs meeting functional needs
- wheelchair features and services
- activity and participation
  and gender or place of residence.

1.6 Overview of the dissertation

The literature review in Chapter 2 highlights wheelchairs as important mobility assistive devices that are used all over the world. The literature review covers the specific aspects of wheelchair needs and satisfaction for users in different contexts around the globe, in Africa and specifically in the Tanzanian context.

Chapter 3 clearly describes the methodology used in the study which includes the design, study settings, study population and sampling. A description of the

instruments used and process of translation into Swahili is also given. The rest of the chapter contains details about the process of training the research assistants, the pilot study, data collection procedure, data management, data analysis and ethical considerations.

Chapter 4 presents the results. Participant responses and profile information including age, gender, residential area, age at which the participant became disabled, mobility before acquiring a wheelchair, type of wheelchair currently being used, landscape characteristics and history of wheelchair usage are given. The chapter also provides descriptive data on user satisfaction levels, the extent to which locally manufactured wheelchairs meet users functional and participation needs and satisfaction with wheelchair features and service provision.

Chapter 5 discusses the key findings in relation to the literature. It starts with an introduction of the chapter, it is followed by profile of participants which includes age, gender, educational level, settings, diagnoses, mobility before acquiring a wheelchair, duration of use of wheelchair, wheelchair types and features, satisfaction of users' needs in the aspects of function and participation, environment in which the wheelchair was used, provision of services, how locally manufactured in Tanzania align to WHO wheelchair guidelines, influence of wheelchair features to the users, and the importance of having a wheelchair services policy/guideline in Tanzania.

Chapter 6 presents the conclusions of the study and recommendations. It highlights the main findings and makes recommendations about and makes recommendations about gaps or key issues as they appeared in the study.

CHAPTER 2: LITERATURE REVIEW

This chapter will present literature to support this study. The researcher reviewed a number of articles related to assistive devices as well as instruments used to collect data in this study. The review covers information related to description of a wheelchair, wheelchair design, statistics on the need of wheelchairs, disability prevalence in Tanzania, Impact of and barriers in accessing wheelchairs, expectations and satisfaction of wheelchair users, influence of a wheelchair on activity and participation, satisfaction with wheelchair characteristics, satisfaction with wheelchair services, maintenance and repairs, evaluating user satisfaction with wheelchairs, policy for wheelchair provision and summary of Chapter 2:

2.1 Description of a wheelchair

The WHO guidelines define a wheelchair as *"a device providing wheeled mobility and seating support for a person with difficulty in walking or moving around*" (WHO, 2008:11). The wheelchair is among many types of assistive technologies that enable mobility for people with walking difficulties. Accessing an affordable and appropriate wheelchair can provide independence and confidence, as well as a life of dignity (APDK, 2008). Wheelchairs enable people with disabilities to function in multiple contexts. The usability of the wheelchair is indicative of the user's level of participation in multiple roles and occupations (Arthanat et al., 2009). The literature reports that wheelchairs can be used to enhance functional performance and participation (Kumar et al., 2013).

The wheelchair is regarded as the most important assistive technology enabling activity and participation for the individual with spinal cord injuries and other disabilities (Bergstrom and Samuelsson, 2006). However a wheelchair has to be appropriate for the user. Greer et al. (2012) argued that identifying the appropriate wheelchair has implications for disabled people. A further study by Fitzgerald et al. (2005) confirmed that wheelchairs that are appropriately

prescribed based on a user-centered approach can significantly enhance users' mobility and social participation.

The WHO (2008) defines a wheelchair as "appropriate" if it meets the user's needs and environmental conditions; provides proper fit and postural support; is safe and durable; is available in the country; and can be obtained and maintained and services sustained in the country and at the most economical and affordable price. Assistive technology that is appropriate for the user and their environment, have been shown to be powerful tools to increase independence and improve participation (WHO, 2011a). Saunders and Leavitt (2001) confirmed that appropriate devices including wheelchair cannot be designed without consideration of the environment, i.e. physical environment in which they will be used. This includes moving within the home and outside.

2.2 Wheelchair design

There are different models or types of wheelchair. The design and type of a wheelchair depends on the need of user and the environment where the wheelchair will be used. According to WHO (2008) variety among users causes the need for different types of wheelchairs. Wheelchairs can be for temporary or permanent use, indoor or outdoor use, or sports. Wheelchair design should comprise consideration of various uses and geographical conditions, i.e. environment. Wheelchairs can be for indoor use, outdoor use, long distance travel, urban use, rural use, and quite often must function well in dirt, mud, fields, and on gravel (Pfaelzer and Krizack, 2009).

Although there are several factors which determine the design of a wheelchair, the physical need of the user is one of the determinant factors for the design of wheelchair needed. Wheelchairs which are to be used in hospitals are different from those to be used on rough terrain. This is because hospital wheelchairs are needed just to move patient from one place to another (temporary use) therefore do not need to provide the user with a close fit, postural support or pressure relief

(WHO, 2008). Therefore wheelchairs can be classified as; for temporary use, long-term use and postural support needs (WHO, 2008).

In Tanzania there are two main designs of wheelchairs which are manufactured. These are four-wheeler which is categorized into two, i.e. foldable and non-foldable or rigid. Foldable is specifically designed for home or office use as well as on smooth terrain. Rigid is used in moderately rough terrain. The second type or design is three -wheeler which is in rigid form only. The three -wheeler is specifically manufactured for rough terrain, rural settings and different landscapes such as hilly, mountainous and flat. The three -wheeler is the most commonly used design in Tanzania. However, this type can also be used indoors if the room is modified to allow wide turning of the wheelchair. Wheelchairs design should tolerate daily use in the user's environments (WHO, 2008).

2.3 Statistics on the need of wheelchairs

Global statistics indicate that in low-income countries there is a massive need for appropriate wheelchair support that is not being met. The WHO estimates that between 20 to 25 million people worldwide who need a wheelchair are unable to access one (ISPO, 2007a; Smith, 2010). It is further estimated that between 20 and a 100 million wheelchairs are needed in low-income countries. Efforts to provide wheelchairs either through donations or by starting small-scale workshops have been made for decades, but estimates suggest that less than 1 million wheelchairs have been provided (Pearlman et al., 2006)

In Africa, only two percent of people who need a wheelchair actually have one (Winter, 2006). A report from Kenya indicates that about 350,000 people or one percent of the Kenyan population requires a wheelchair. Very few of those in need have access to appropriate wheelchairs (APDK, 2008). According to Shia and Nilsson (2011), Tanzania has a population of about 35 million (2002 national census) of which the disabled population constitutes about nine percent.

According to available statistics about three and half million disabled persons in Tanzania require or use a wheelchair (KASI, 2007).

2.4 Disability prevalence in Tanzania

There are no reliable data on disability prevalence in many low-income countries of which Tanzania is one. Most low-income countries including Tanzania report disability prevalence rate below those reported in many industrial countries. This is because data is collected in a narrow set of impairments which gives lower estimates of disability prevalence (WHO, 2011b). Disability prevalence data in Tanzania is collected through a national census. Census and surveys all over the world use different approaches to measuring disability (Mont, 2007). Furthermore Mont clarifies that different instruments within the same country often report very different rates of disability. This may lead the country such as Tanzania to have different statistics data on disability prevalence.

According to Njelesan et al. (2011) Tanzania has no comprehensive national database for disability statistics. However, Njelesani et al. mentioned that Tanzania is estimated to have eight percent of the population living with disabilities. Moreover, due to lack of reliable statistics, there is inadequate information about the prevalence and profile of disabilities experienced in Tanzania (Njelesani et al., 2011).

From the National Census in 2002, the proportion of people with disabilities in Tanzania, of a total population of 34,443,603, was two percent (Yamauchi, 2008). The census further revealed that people in Tanzania experience various types of disabilities such as physically impaired, visual impairment, hearing impairment and intellectual impairment.

The need for assistive devices including wheelchairs is very high for people with disabilities in low-income countries amongst which is Tanzania , as they enable people with disabilities to participate in daily activities such as being able to go to

work and socialization. The Tanzania Association of Disabled People (CHAWATA) estimates there are 30,000 people who need wheelchairs (Winter, 2006). Assistive devices such as wheelchairs are not easily accessible due to financial government constraint which has severely limited the provision of assistive devices (Njelesani et al., 2011).

2.5 Impact of and barriers in accessing wheelchairs

According to Fitzgerald et al. (2005), wheelchair use can improve participation of individuals with mobility impairment in community events and social activities. Some impact due to lack of wheelchairs for people with disabilities in low-income countries including Tanzania is the lack of mobility whereby it is impossible for children to attend school and adults with disabilities are unable to participate in community life or earn an income which increases their chances of living in poverty. The need for wheelchairs for people with disabilities in Tanzania is approached through a psychosocial model focusing mainly on the human right like rights to inclusion, access to basic services such as rights to health, education, employment and social participation (Njelesani et al., 2011).

There are many barriers for those needing wheelchairs in low-income countries, of which finance is one. WHO (2011a) confirmed that limited fund resources in many countries have significant impact on the availability and accessibility of assistive technology including wheelchairs. Other obstacles such as inhospitable terrain, lack of materials, lack of suitable wheelchairs of acceptable quality, lack of trained staff and lack of a distribution system further complicates the situation (Constantine and Mines, 2009; Smith, 2010).

For many years, the most common approach to wheelchair provision in low-income countries including Tanzania has been the donation of ready-made Western-designed wheelchairs which have proven to be a failure in the local environment. Donations, in most cases, are an ineffective and short term solution for the needs of the developing world (Constantine and Mines, 2009).

The users are not the target of most donors. They focus on the wheelchair and not the end user. As long as this is the case people with disabilities will remain dependent and unproductive, a drain on society's resources. When the needs of the end user are considered first, the most appropriate wheelchair (not only the cheapest) will be provided, and with other targeted assistance the wheelchair user can go to school, get a job and become a contributor to society (APDK, 2008).

The situation is further aggravated because rehabilitation budgets are not sufficient to meet wheelchair users' needs. The study by Njelesani et al. (2011) revealed that financial government constraints in Tanzania have severely limited the provision of assistive devices including wheelchairs for people with disabilities. Wheelchairs are generally purchased directly from small workshops which do not have the capacity to develop a comprehensive wheelchair service which include assessment, prescription, fitting, education and follow-up (Beattie and Cornick, 2007).

2.6 Expectations and satisfaction of wheelchair users

Research has shown that wheelchair users have specific expectations of their wheelchairs. They expect that the wheelchair will improve their quality of life, enable them to maintain or attain a level of mobility, and help the user to achieve an acceptable level of independence. Wheelchair users also require a wheelchair that is comfortable, easy to propel, is safe, and of an acceptable appearance (Smith et al., 1995). The wheelchair should be well fitting also good looking. Saunders and Leavitt (2001) commented that even though the wheelchair may be magnificently functional for the user, if it is not attractive it will be rejected. Saunders and Leavitt further argued that self-image and attractiveness are important to everyone in various ways. When a choice needs to be made between an assistive device that is more useful and one that is more attractive (or perhaps no aid at all), Werner (1998) suggested the importance of considering cultural factors and respecting the wishes of the user. Safety is a

very important aspect for wheelchairs. Studies has indicated that, when a wheelchair is used improperly or in ways other than intended, injury or even death can result (Karmarkar et al., 2009).

What is also most important is user satisfaction; therefore level of satisfaction should be incorporated as an outcome measure for evaluating wheelchair prescription and service delivery programs (Karmarkar et al., 2009). According to Bergstrom and Samuelsson (2006) satisfaction in QUEST 2.0 is defined as individual's positive or negative value of a specific quality or characteristic of equipment which is influenced by the person's expectations, experience, attitudes or personal values. Karmakar et al. (2009) clarified that studies have indicated that user satisfaction is the strongest determinant of acceptance or rejection of a wheelchair.

Understanding extent of satisfaction each variable should be decided as suggested by Bergstrom and Samuelsson (2006) that relative importance of each variable needs to be determined by the user in order to interpret the satisfaction data. The variables of QUEST 2.0 are dimensions, weight, ease in adjusting, safe and secure, durability, ease to use, comfort and effectiveness all these are in relation to the device, i.e. wheelchair. In regards to services, the variables are service delivery, repair and servicing, professional service and follow-up service. In respect to follow-up services the QUEST 2.0 was designed to be administered in its total in a specified period of time after the user has received the wheelchair (Lambrou et al., 1999).

Fitzgerald et al. (2005) describe that when assistive technology, of which a wheelchair is among them, fails to meet user's performance expectations, user satisfaction is negatively affected and therefore unmet expectations may lead to assistive technology abandonment. A continuous re-evaluation process of wheelchair fit is also recommended as the users' age, support needs and functional requirements change (Karmarkar et al., 2009).

Understanding the client's needs can be challenging, especially across cultures. It is important to get details of wheelchair users since culture differs from one place to another therefore, before a wheelchair is delivered; one needs to know why the individual requires a wheelchair and what the perception of the community about wheelchairs is in general. An understanding of the need is the first step before prescribing a wheelchair (Saunders and Leavitt, 2001) and it should be realized that each wheelchair user is unique and therefore each individual will have different needs and expectations (Reid et al., 2003). Some studies have found that failure to consider user opinions, preferences and needs can lead into abandonment and rejection of the wheelchair (Lambrou et al., 1999).

2.7 Influence of a wheelchair on activity and participation

The assistive devices including wheelchairs can influence the activity and participation of the users. The aim or need for assistive devices including wheelchairs is to enable the user to be able to perform activities and participate which was unable to be performed without the wheelchair. A study by Wressle and Samuelsson (2004) indicated that most wheelchair users considered the wheelchair had a positive effect on their ability to be active, to feel safe and to be mobile.

Wressle and Samuelsson further reported that the wheelchair had also a positive effect on the users feeling of safety, independence and self esteem. The study by Samuelsson and Wressle (2008) has shown that wheelchair for the users include the possibility to be at work and benefit some leisure activities which would not be possible at all without the wheelchair. Mortenson and Miller (2008) stated that wheelchairs enhances well-being by promoting comfort, increasing independent mobility, facilitating social interaction, and enabling participation in desired activities. A study by Harrison and Rochette (2013) revealed a positive tendency

following acquisition of a wheelchair with respect to the child's participation and the impact of the immediate social environment.

2.8 Satisfaction with wheelchair characteristics

Wheelchair manufacturers must put into consideration characteristics or features of a locally manufactured wheelchair. The characteristics of a wheelchair which should meet the demand or need of the user includes dimension, adjustments, safety, durability, weight, simplicity of use of wheelchair, effectiveness and comfort. A study by Bergstrom and Samuelsson (2006) indicated that respondents considered the items of comfort, safety, simplicity of use and durability as the most important. The item durability is in line with the study by Fitzgerald et al. (2005) which revealed that wheelchair durability was rated very high among respondents. Fitzgerald et al. further confirmed that wheelchair durability is related to the intensity of the use, functionality of the user, conditions of use, and age of the wheelchair and user.

2.9 Satisfaction with wheelchair services

In relation to the wheelchair service provision processes it covers aspects of service delivery, repairs and servicing, professional services and follow-up service.

2.9.1 Follow-up services

Several studies have reported the importance of follow-up services. The purpose of follow-up plan is to enable the rehabilitation professional to understand whether the wheelchair is working as expected or not, whether is there anything to be changed, or whether the user needs more education or training. Without a follow-up, it is not possible to correct unsatisfactory solutions and extend the therapist's or manufacturer's knowledge and experience (Samuelsson and Wressle, 2008). Follow-up services may also offer maintenance and repair in case of technical problems (WHO, 2008). According to Fitzgerald et al. (2005) follow-up will enable identification of any obstacles, challenges or wear-and-tear

of a wheelchair and will help the designers/manufacturers identify any area of improvement.

To carry out follow-up in the environment of the user is very important. WHO furthermore recommends that it is appropriate to carry out follow-up activities at the community level. This is because the rehabilitation professionals will observe the real environment where the wheelchair is used. Wressle and Samuelsson (2004) argued that follow-up in the homes are necessary as the need for a wheelchair changes over time.

In many cases as far as assistive devices are concerned, follow-up is not done. A study by Samuelsson and Wressle (2008) revealed that the question on follow-up service received the lowest mean value on the QUEST 2.0 score 3.51. A study in Sweden by Bergstrom and Samuelsson (2006) also revealed user's lower satisfaction with follow-up service, i.e. only 31% of the users had responded positively. Although wheelchair users may need follow-up service sometimes they do not get it. Results from a study by Samuelsson and Wressle (2008) indicated that participants answered that they had a need for follow-up but very few of them had a follow-up service.

Sund et al. (2013) confirmed that findings in a study measuring satisfaction with the service delivery programme of powered wheelchairs score on follow-up service were very low. A study on user satisfaction with assistive devices by Samuelsson and Wressle (2008) shows that follow-up indicated the largest number of users who reported "not very satisfied" with follow-up service. According to TATCOT (2005) by carrying out follow-up the strengths and weaknesses of the wheelchair can be assessed for improvement. The same applies to the user in that any difficulties encountered can be addressed and come up with solutions.

Further study findings indicated that follow-up schedule are crucial as far as monitoring appropriateness of the wheelchair fit, postural support, function and use in the environment is concerned (Visagie et al., 2013). However, they outlined that study findings have indicated lack of follow-up services in South Africa therefore this is a gap in wheelchair services.

2.9.2 Maintenance and repairs

It is understood that the aim of repair and maintenance is to make wheelchair last longer as well as reducing or avoiding accidents. Fitzgerald et al. (2005) argued that more repeated wheelchair use may affect the durability of the wheelchair and may result in more repairs and maintenance. Locally manufactured wheelchairs should allow repairs that can be performed by the users. Fitzgerald et al. (2005) pointed out that manual wheelchair repairs do not necessarily require a specialized merchant since users can make many of the repairs themselves. However minor repairs should be done closer or near to the user or even at home.

In Tanzania wheelchair workshops which could be used to repair wheelchairs are often located very far away from where they are required. Due to the distance of workshops it is difficult for the users to attend for repair. Visagie et al. (2013) confirmed that users do not report wheelchairs deterioration in good time and therefore recommend for regular mechanical maintenance in the user's home in a specified period of time. Not only should the users be able to maintain and repair their wheelchairs at home but spare parts must be also be available and affordable. This is in accordance to WHO (2008) wheelchair guidelines that locally made wheelchairs should be obtained, maintained and serviced within the country at an affordable cost.

2.10 Evaluating user satisfaction with wheelchairs

Several studies have been carried out to assess users' satisfaction with assistive devices using the QUEST 2.0 and the FEW which are the most commonly used instruments for assessment of wheelchairs. The QUEST is considered to be a global assessment tool for assistive technology, measuring satisfaction related to an assistive device usage and the service delivery (Kumar et al., 2013). Samuelsson and Wressle (2008) used the QUEST 2.0 to evaluate user satisfaction with mobility assistive devices while Demers et al. (2002) used it to analyse the Quebec user evaluation of satisfaction with assistive technology.

Bergstrom and Samuelsson (2006) used QUEST 2.0 in the evaluation of manual wheelchairs by individuals with spinal cord injuries. Generally the QUEST 2.0 instrument has proved to be reliable and valid self-administered questionnaire designed to evaluate user satisfaction and it has shown a highly applicable, reliable and valid instrument to assess user-satisfaction of users of all kinds of assistive device provisions. In a study by Demers et al. (2002) to investigate the measurement properties of the QUEST 2.0 test-retest stability it was found that all the results were above the level of acceptability of 0.70 indicating good reliability. Content validity was shown to range between 50% - 92% for the relative importance of the items, this is according to 12 International experts involved in the study who had used the tool with a variety of devices and the tool was positively received by participants indicating its applicability.

A study of the Dutch version of QUEST 2.0 conducted on 2002 respondents by Wessels and Witte (2003) revealed that on the reliability coefficient of the devices scale was high (Cronbach's alpha=0.8) for all types of assistive devices. Wessels and Witte (2003) argued that including a not-applicable option improved the feasibility of the instrument without affecting content validity. They concluded that the Dutch version of the QUEST 2.0 was highly applicable, reliable and valid instrument to assess user-satisfaction of all kinds of assistive device provision.

In respect to measuring perceived user function relating to wheelchair use, Fitzgerald et al. (2005) found the FEW to be more reliable and useful than other instruments. Holm et al. (2003) also argued that this instrument was specifically designed to measure functional performance as a self-report questionnaire to be administered over time to users of wheeled mobility and seating technology, as a dynamic indicator or profile of perceived user function related to wheelchair/scooter use as well as in assessing issues related to the maintenance and repair of wheelchairs.

The study by Holm et al. (2003) to test the stability of the instrument used a test-retest reliability procedure for a one week interval whereby the instrument demonstrated good test-retest reliability. Mills et al. (2007) reported that in a test-retest and cross-validation of the instrument in a study on the performance of individuals who use wheelchair or scooter as their primary seating-mobility device indicated high stable in the measurement of the participants seating mobility goals over a one-week interval.

2.11 Policy for wheelchair provision

Tanzania is among low-income countries which lack wheelchair policy. The need for wheelchair policy is important so as to make sure that wheelchair users receive wheelchairs which are of standard, i.e., which in summary meet safety measures are durable and strong, should be appropriate. Wheelchair provision policy is developed aiming at effective measures to ensure personal mobility with the greatest possible independence for people with disabilities (WHO, 2008). Furthermore WHO suggests governments and authorities to develop and adopt national wheelchair standards applicable to all wheelchairs whether locally manufactured or imported in a country. Another key factor which should be in the policy is to ensure that wheelchairs are provided by trained professionals who have knowledge and skills on the assessment of the user's needs. According to Visagie et al. (2013) only trained professional should provide wheelchairs services.

Another policy document which support wheelchair provision is the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD, 2010) article 20; that describes the importance of States Parties to take effective measures to ensure personal mobility (including using wheelchair) of the greatest possible independence for persons with disabilities. Prescription of a wheelchair should be according to the policy.

In order to provide the wheelchair according to policy, assessment should provide all necessary information on the user's lifestyle and social roles, level of functioning, environmental and postural support needs, cognitive and health needs, body measurements as well as safety and stability requirements to determine the specifications of an optimal wheelchair for the user (Visagie et al., 2013).

In Tanzania wheelchair provision services is under the general rehabilitation policy which include all assistive devices. There is no specific or separate policy for wheelchair provision. It is also under the international policies like WHO wheelchair guidelines on the provision of manual wheelchairs in less resourced settings of 2008 and United Nations Convention on the Rights of People with Disabilities (UNCRPD).

2.12 Accessing transportation services for wheelchair users

In low income countries, those who are concerned with the provision of public transport services have shifted their concern from transport as a means of communication to the effect of transport provision to overcome poverty and inequality (Sohail et al., 2006). Moreover, Sohail et al. reported that with respect to urban poor, deregulation was intended to improve access by providing low cost methods of transport that are better able to respond to user needs and provide a variety of services with different qualities and fares. This is not the case because if the wheelchair user is lucky to get access to transport then he/she has to pay a double fare i.e. for him/her and the wheelchair.

Transport system in most of low income countries is inaccessible for people with disabilities including wheelchair users. This tendency hinders them to participate in many activities e.g. access to employment as well as attending school. WHO (2011a) confirmed that lack of transport is a common reason for a person with disability being depressed from searching for work or prevented from accessing health care. Transport services are frequently limited for wheelchair users in low-income countries and wheelchair users depends on their wheelchairs as their primary means of mobility from one place to another (Visagie et al., 2013).

Access to public transport services for wheelchair users in Tanzania is a big challenge in urban as well as in rural. The government should develop transport regulations which should benefit all groups. The current transport regulations does not favour disadvantaged groups such i.e. women, children and people with disabilities. Sohail et al. (2006) argued that for the transport regulations to be effective the poor and disadvantaged groups - children, elderly and people with disabilities should benefit.

All Acts in the transport sector in Tanzania do not provide people with disabilities access to transport services (Oscar, 2014). Most buses in Tanzania don't allow people with disabilities especially wheelchair users to ride; this is because they are accused of occupying more space (Winter, 20006).

2.13 Summary of Chapter 2

The literature reviewed in Chapter 2 supports the findings of this study and opinions of the participants of locally manufactured wheelchair users in Tanzania that for the user to be satisfied the wheelchair should be appropriate according to WHO guideline (2008). Understanding user needs is the most important aspect in prescribing wheelchairs. Instruments used QUEST 2.0 and FEW have been used in various studies and proved to be reliable in evaluating user satisfaction with assistive devices including wheelchairs and functional and participation needs. However, literature has indicated that a follow-up service is one of the

gaps which were revealed in many studies, accessing wheelchair is a major problem in low-income countries including Tanzania.

CHAPTER 3: METHODOLOGY

This chapter describes the methodology used to collect and analyse the data in order to answer the research question and meet the study's aim and objectives.

3.1 Research Design

The study used a quantitative descriptive cross-sectional analytical design. This design was suitable because data was collected at one point in time only with no follow-up of participants (Kothari, 2003). Analytical cross-sectional study was used to assess the observed differences with the satisfaction with locally manufactured wheelchairs in meeting their functional needs, users' needs in terms of the wheelchair features and the services provided and the activity and participation needs of users between the place of residence and gender. This design was important because assesses the strength of an association and significance outcome (Barratt and Kirwan, 2009). According to Kothari (2004:3) in analytical designs the researcher uses facts or information that already exists and analyses it to make a critical evaluation of the matter.

3.2 Study Setting

The study was carried out in Tanzania. A convenience sample of three regions was identified for the study. The regions of Kilimanjaro, Arusha and Dar es Salaam (Fig. 3.1) were selected because they exhibit great differences between rural and urban settings and landscapes, have many people using locally manufactured wheelchairs, and receive services from local wheelchair workshops. These regions were also convenient for the researcher to access. According to the records of the Kilimanjaro Association for Spinal Cord Injured (KASI) (2007), the total number of users of locally manufactured wheelchairs in these regions at the time of study was approximately 250.

3.3 Study Population and Sampling

The study population consisted of all registered users of locally manufactured wheelchairs and non-registered users residing in the selected regions (approximately 250). At the time of data collection, lists of registered wheelchair users were obtained from KASI and local manufacturing wheelchair workshops. The researcher included as many users of locally manufactured wheelchairs as possible provided they met the inclusion criteria.

Figure 3.1: Selected regions for the study (Map of Tanzania adapted from Winter (2008))

3.3.1 Inclusion criteria

Participants were adults aged 18 – 65 years who were active wheelchair users. Eighteen years was selected as it is the age of employment according to the Tanzanian government. Participants had to be in possession of a locally

manufactured wheelchair for at least three months at the time of the study. This ensured that participants had experience using the wheelchair and were therefore able to provide insightful responses to the questions. They should also have lived in the same area for at least six months at the time of recruitment to eliminate the influence of changes in living conditions.

3.3.2 Exclusion criteria

The only exclusion criterion was people with cognitive impairment as they may not have been capable of expressing themselves satisfactorily or giving accurate responses to questions. Cognitive impairment was assessed by asking participants questions about their background and checking the accuracy of their responses.

3.3.3 Sample Size

The approximate size of the population of registered and unregistered wheelchair users was 250. As it was not possible to access all registered wheelchair users due to floods which occurred in Dar es Salaam and drought in Arusha where people were relocated, convenience sampling was used to recruit as many participants as possible. According to Denscombe (2007) convenience sampling is constructed upon selections which are convenient to the researcher.

3.4 Instruments

A structured questionnaire (Appendix1) containing mostly closed-ended questions was utilised in this study. The questionnaire is divided into four sections, namely:

Section A: This contains the profile of participants including age, marital status, level of education, area of residence of participants, diagnosis that led to disability, age at which became disabled, mobility before acquiring a wheelchair, type of wheelchair, history about the use of wheelchair, length of use of

wheelchair, number of wheelchair used, happiness with wheelchair, nature of landscape and nature of roads.

Section B: This section contains the FEW instrument which measured perceived user function relating to wheelchair use (Holm et al., 2003). The FEW consists of 10 statements which assess ability to perform tasks in a wheelchair (functional needs) and examines the influence of the fitting and postural support provided by the wheelchair on the aspects of ability to carry out daily routine, comfort, health needs, operate the wheelchair, reach different height surfaces, transfer from one surface to another, carry out personal care, move around indoors, move around outdoors and use of personal or public transport.

The FEW uses a six-point rating scale that ranges from “completely agree” to “completely disagree”. A study by Mills et al. (2007) on reliability and validity of the instrument revealed that the test-retest reliability and cross validation of the instrument has been shown to be highly stable over a one-week interval. Intraclass Correlation Coefficient (ICC) = .86 $p < .001$for five (5) samples of seating mobility was found to be 0.86 ($p<.0.001$) which captured 98.5% of users. Mills et al. (2007) confirmed that FEW instrument had strong content validity because it was developed by user and practitioner input. It was also reviewed by seating-mobility literature. The instrument was also validated by several samples of wheelchair users as well as being capable of detecting user’s perceived function with a seating-mobility device over time.

Section C: This section is made up of the QUEST 2.0 instrument which consists of 12 questions related to satisfaction with wheelchair features and satisfaction with service provision (Demers et al., 2002). In respect to wheelchair features it measures user satisfaction in areas such as the size and weight of the wheelchair, ease in adjusting, safe and secure of the wheelchair, durability, ease to use, comfort and effectiveness.

With regards to service provision the instrument measures satisfaction of participants in respect to service delivery, repairs and servicing, professional service and follow-up services. The instrument uses a five point rating scale that ranges from "not satisfied at all" to "very satisfied". Number 1 represents "not satisfied at all" while number 5 represent "very satisfied". Scores on each item are totaled to give an overall count.

Section D: This section is made up of 6 additional questions as proposed by Samuelsson and Wressle (2008) which examine the influence of the wheelchair on activity and participation. It measures possibilities to work, lead an active leisure life, go to shopping, socialize mobility and participate in sports. The questions use a five point rating Likert scale ranging from "not applicable" to "positively".

3.5 Procedure

3.5.1 Process of translation of instrument

The researcher translated the questionnaire into Swahili which is the common language in Tanzania. This was checked by an independent person who was fluent in English and Swahili to ensure that the questionnaire had been translated accurately. The translated questionnaire was back-translated into English by a second independent person who was also fluent in both English and Swahili to make sure that the meaning had not been altered substantially (Joubert and Ehrlich, 2007). The two translations were compared and any discrepancies were resolved.

To check for content validity of the translated questionnaire it was first reviewed by a team consisting of three colleagues working in the rehabilitation profession and an independent researcher who prescribes and has knowledge of wheelchairs. The team reviewed all translated items for clarity, ambiguity and

comprehensiveness until they reached agreement and had decided on any changes needed, for example, rewording of items, removing items, adding items or revising researcher's questionnaire layout.

3.5.2 Training of research assistants

Two research assistants assisted with data collection received training prior to the start of the data collection process. The purpose of training was to ensure that the assistants had a common understanding of the purpose of and contents of the study, were proficient at implementing the selection procedures, were able to administer the instrument in the language of the participants, were able to administer the instrument accurately and document responses correctly, as well as training on general interviewing skills.

The researcher observed five interviews for each and documented them after which he compared his recordings with those of the research assistants. Close supervision and periodic checks were carried out throughout the data collection process. The research assistants were also trained on how to countercheck the participant's background information to ensure they met the inclusion criteria, and checking the correctness of the responses on the questionnaires.

The questionnaire was used during training of assistants so as to enable them to familiarize themselves with it. Other aspects that were included during training was preparing participants for data collection including screening of participants for inclusion, ethical issues and making appointments with interviewees for interview.

3.5.3. Pilot study

The aim of the pilot study was to give the researcher a general picture on how the data collection would proceed in the main study and to test the questionnaire (Domholdt, 2005). The objectives of the pilot study were to determine the average time spent to complete questionnaire, assessing the assistants'

adherence to the data collection procedure, and testing the clarity of the language used. For the pilot study, five wheelchair users who were not included in the main study were used. They had used a wheelchair for at least one year and lived in similar conditions to the participants' in the study.

The pilot study participants were informed that they were not going to participate in the main study but were invited to participate in the pilot study. They were asked to give feedback on the level of the language used, i.e. if questions were understandable, whether questions have met their expectations, whether the cultural issues have been considered, or was there any question which they felt to be too sensitive?. They were requested to answer truthfully. All responses were done in presence of the researcher and assistants in order to clarify any issues that came up.

Based on the responses any gaps or misunderstanding were rectified before the main study began. Information gathered was used to make amendments on a specific part. Finally data from the pilot study were analyzed to see if the information would satisfy the study's aim and objectives. To test for inter-rater reliability, the researcher and one assistant collected data by the assistant asking questions while the researcher was listening and filling the questionnaire independently. Then they independently scored it for the same participants and analysed their scoring to determine whether there were any significant differences between them. To determine these, intraclass correlation coefficients was calculated. Test re-test reliability was tested to measure the stability of the instruments. This was done by administering the instrument to the selected pilot participants on two occasions at the interval of one week. Correlations between the scores at time one and those at time two were then calculated.

The language used in the FEW seemed to be difficult for the participants to understand as it required the researcher to explain some of the words used, for example, stability, durability and dependability. This also applied to other words

such as fit, postural support and functional features. This made the questionnaire time consuming to complete.

The researcher simplified the language used in the first item in the FEW, for example “The stability, durability and dependability features of my wheelchairs/scooter contribute to my ability to carry out my daily routine as independently, safely, and efficiently as possible.” This was shortened and simplified as “My wheelchair contributes to my ability to carry out my daily routines as independently, safely and efficiently as possible”. This minimized researcher’s and assistants workload when administering the tool and eliminated the extra time needed for clarifying and explaining the questions This is indicated in appendix 1 Section B – FEW instrument. Also the participants time to answer the questions were minimized as they would have used less time to understand the language used and to rate items. This is in agreement with a study on test-retest reliability of the functional mobility assessment (FMA) by Kumar et al. (2013) where the wording in the FEW was changed to make it simple and understandable for participants.

3.5.4. Data collection procedures

Participants were contacted using the addresses or telephone numbers obtained from the local manufacturing wheelchair workshops and KASI. Provisional consent was obtained by telephone and an appointment was made to meet with the participant in his/her home or any other place of their choice. On meeting with the participant an information leaflet (Appendix 5) was given to the participants to read; if he/she could not read, it was read to them. They were asked to sign a consent form before any data was collected. Before completing the questionnaire, participants were given an explanation on the nature of the questions. They were also given an example of how to answer the questions.

Data were collected by visiting users at their premises/homes or a convenient location. Participants placed an “X” or circled the appropriate response option that best described their opinions. Time spent to complete the data lasted approximately 30 – 40 minutes depending on the level of understanding of the participant. To ensure complete responses to all questions, the researcher and research assistants interviewed participants and recorded their responses verbatim.

For participants who were visually impaired, the researcher or research assistants read the questions and answer options. These participants were asked to choose a witness to assist them in answering the questions. For deaf participants a sign language interpreter was used where possible. If there was no sign language interpreter available the participant was excluded from the study. Spot checks was carried out by the researcher and assistants to make sure that all data were collected and correctly entered by the researcher/assistants which was done after the participant had completed the questionnaire. To achieve this, the researcher observed some of the interviews that the assistants did to check and make sure that they have been correctly scored. If potential participants were not at home during the time of data collection the researcher made another appointment to meet with them.

3.6 Data Management

Data were captured by the researcher and assistants on the hard copy questionnaires. To ensure accuracy, each questionnaire was counter-checked for missing data by each person collecting data before they left the participant and by the researcher before entry into the computer (Joubert and Ehrlich, 2007). A data capture sheet was prepared in Excel. The first row contained column headings for each variable. Data for each participant were entered on separate rows based on the number of questionnaire; if data were missing the cells were left vacant.

To check for accuracy each item on the form should have coincided with the order in which the information was collected. Those incomplete or incorrectly completed were given back to the respondent before leaving the place and the appropriate section re-administered. Also the researcher and assistants cross-checked with respondents and compare with data collected to find out if there was any difference and this was done for every questionnaire completed this included making sure that the participant had signed the consent form.

3.7 Data Analysis

Data were analyzed with the Statistical Package for the Social Sciences (SPSS®) software program version 20.0 (SPSS Inc. 2006). Frequencies and proportions were calculated for all categorical responses in sections A (participant profile), section B (FEW) and section C (QUEST 2.0). As numerical data were not normally distributed, medians and ranges were determined for all numerical items e.g. age of participants. The chi-square test was conducted to determine observed differences between gender and place of residence (rural/urban) and satisfaction with functional needs, wheelchair preferences and activity and participation. To conduct the Chi-square Test, categories were collapsed where necessary, for example:

- Categories for satisfaction in relation to functional needs were collapsed into two by combining completely, mostly and slightly agree (renamed ‘ agree’ and completely, mostly and slightly disagree renamed ‘disagree’;
- Categories for satisfaction in relation to functional needs were collapsed into three ‘satisfied, not satisfied and unsure’;
- The ‘not applicable’ column was excluded for satisfaction with activity and participation needs and–and three categories were included, namely ‘positively, negatively and not at all’.

3.8 Ethical considerations

The study was approved by the Faculty of Health Sciences Human Research Ethical Committee of the University of Cape Town (HREC REF: 477/2012) (refer

to Appendix 7). Written permission to conduct the study in Tanzania was obtained from the Ethical Committee of the Kilimanjaro Christian Medical College of Tumaini University.

Written informed consent (Appendix 4) was requested from participants after they had been provided with an information sheet (Appendix 5) about the study written in Swahili, the common language for all Tanzanians. For those who could not read, this information was read aloud/explained to them. Participants were given opportunity to ask questions. Confidentiality was fully respected and any information to be taken was with their consent. Participants were informed that they would not be paid and were clearly explained how they would benefit from the study. In case their wheelchairs might need servicing, they were directed to nearby service centres. Provisional consent was obtained by telephone and an appointment was made to meet with the participant in his/her home.

The researcher recognized that many of the people who would participate in the research might be vulnerable and/or marginalized. Possible obstacles to their understanding of the information such as levels of literacy were taken into consideration. The participant kept the information sheet and the signed consent forms were retained by the researcher and stored in a locked cupboard and the key was kept by the researcher.

The principle of non-maleficence was upheld by making sure that data were collected at participants homes/premises or another place of their choice according to their preferences. The place at which data was collected must have been perceived by participants as ‘safe’ and non-threatening to ensure that participants should not be harmed in any way, either intentionally or unintentionally. Arrangements were made for help or referral should any participants’ became emotional during data collection; the researcher would have stopped the process of data collection and the participant would be referred for

counseling. If the case would be serious then the researcher might seek psychologist consultation.

Regarding autonomy, participants were assured that participation was absolutely voluntary and that they had the right to withdraw from the study at any time. Declining to participate or withdrawal would not have affected them in any way. Their decision should be respected. All information was treated with complete confidentiality.

The researcher was fully prepared to overcome unexpected challenges such as abrupt withdrawal of participants from the study, refusal to participate or some participants feeling that they would need compensation for their lost time during data collection. These challenges were managed by the researcher contacting participants beforehand and informed them about the importance of the study and request them to participate. They were requested to be honest that they would participate in the study. They were also informed that although they could withdraw from the study if they wished, the researcher would appreciate if they would participate. They were also informed that this study will benefit wheelchair users in future in Tanzania thus their participation was very important. All participants were also informed that they would not be paid for their participation.

Understanding of the information leaflet by participants was tested during the pilot study. This was adjusted immediately if it was proved to be too complicated or sophisticated. No participants were excluded in this study if she/he could not read or write provided he/she met the inclusion criteria.

To make sure professionalism was maintained, the researcher undertook to abide by professional and ethical principles as well as Good Clinical Practice in Research and the Declaration of Helsinki of 2008 (Kuroyanagi, 2009). He undertook to treat participants with the highest consideration and to respect the dignity, privacy and autonomy of participants throughout. The researcher was

aware that ethical values, for instance the primacy of the individual relative to the larger community, are not a common stable but were influenced by cultural and contextual variations.

The researcher did ensure sensitivity to different understandings of ethics whilst also maintained the principles of the Constitution of the United Republic of Tanzania (2001) on Guidelines on Ethics for Health Research in Tanzania.

3.9 Summary of Chapter 3

This chapter has described the methodology procedures and processes which were used to collect and analyse the data. The results are presented in Chapter 4.

CHAPTER 4: RESULTS

This chapter presents a report on the data analysis from 75 participants' users of locally manufactured manual wheelchairs from three selected areas of Kilimanjaro, Arusha and Dar es Salaam in Tanzania. The report is arranged according to the order of objectives. Descriptive analysis i.e. frequency and proportion, median and range was done.

4.1 Profile of participants

Seventy five wheelchair users (hereafter referred to as participants) met the inclusion criteria and participated in the study. Table 4.1 shows participants' profile.

Table 4.1: Profile of Participants (n=75)

Variable	Median	Range
Age (years)[1] (N=74)	34.0	18.0 -65.0
Age at disability (years)[2] (N=72)	22.0	0.0 -55.0
	n	**%**
Gender:		
Male	54	72.0
Female	21	28.0
Total	75	100.0
Level of education:		
None	6	8.0
Primary	43	57.3
Secondary	14	18.7
Tertiary	12	16.0
Total	75	100.0
Marital status:		
Single	42	56.0
Married	26	34.7
Divorced/Separated	4	5.3
Widowed	3	4.0
Total	75	100.0
Area of residence:		
Rural	43	57.3
Urban	32	42.7
Total	75	100.0

[1] Missing data for one respondent who did not know or did not want to disclose year of birth

[2] Missing data for three participants who did not know or remember the age at which they became disabled

The diagnoses that led to the participant's disabilities are shown in Figure 4.1. Spinal cord injuries were the most common cause of disability (n=46, 61.3%).

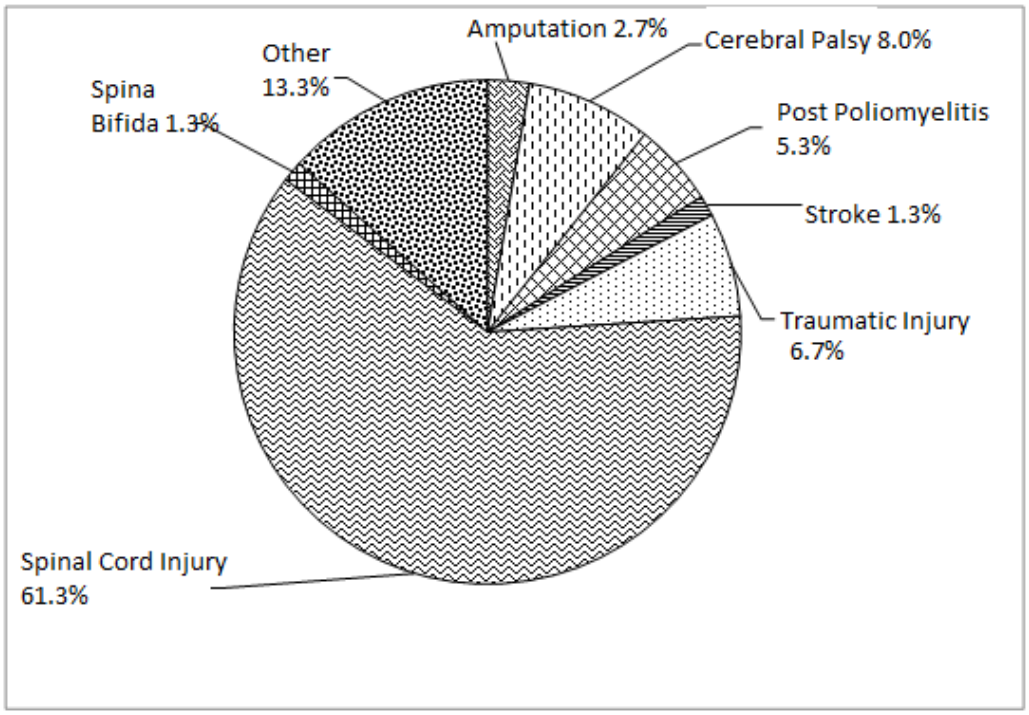

Figure 4.1: Diagnoses of participants

4.2 Usage of locally manufactured wheelchairs

The median duration of using a wheelchair was 8.0 (range: 1.0-30.0) years and the median. Age at which participants started using their wheelchairs was 25.0 (2.0-56.0) years. Table 4.2 shows the data for wheelchair usage.

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The majority (n=63, 84.0%) of participants were satisfied with their wheelchairs. Table 4.2 shows the data for wheelchair usage.

Table 4.2: Usage of Locally manufactured wheelchairs (n=75)

Variable	Median	Range
Duration of using wheelchair (years):	8.0	1.0 -30.0
Age of starting to use wheelchair (years):	25.0	2.0 -56.0
Number of wheelchairs used to date:	2.0	1.0 - 7.0
Characteristics of terrain	n	%
Flat	24	32.0
Hilly	39	52.0
Mountainous	3	4.0
Sandy	9	12.0
Satisfaction with the wheelchair		
Yes	63	84.0
No	12	16.0

[1] Missing data for one participant who could not remember the duration of using the wheelchair

4.3 Extent to which locally manufactured wheelchairs meet the functional needs of participants

The majority of participants agreed mostly or completely that their wheelchair met their functional needs (Table 4.3). With respect to transportation participants who rated slightly agree (n=31, 41.3%) were mostly four -wheeler users who could fold their wheelchairs or three -wheeler users who could detach the rear wheels to make the wheelchair easy to carry to the vehicle. However, they could not do it independently.

Table 4.3 shows the results for participant satisfaction regarding the extent to which their wheelchairs met their functional needs.

Table 4.3: Satisfaction with respect to functional needs as measured by FEW (n=75)

Statement: My wheelchair…	Completely Agree No (%)	Mostly agree No (%)	Slightly agree No (%)	Slightly disagree No. (%)	Mostly disagree No (%)	Completely disagree No (%)
contributes to my ability to carry out my daily routines as independently, safely and efficiently as possible	33 (44.0)	31 (41.3)	7 (9.3)		3 (4.0)	1 (1.3)
matches my comfort needs as I carry out my daily routines	40 (53.3)	28 (37.3)	5 (6.7)		1 (1.3)	1 (1.3)
matches my health needs	37 (49.3)	29 (38.7)	7 (9.3)		1 (1.3)	1 (1.3)
allows me to operate it as independently, safely, and efficiently as possible	36 (48.0)	28 (37.3)	10 (13.3)			1 (1.3)
allows me to reach and carry out tasks at different surface heights as independently, safely, and efficiently as possible	29 (38.7)	35 (46.7	9 (12.0)		1 (1.3)	1 (1.3)
allows me to transfer from one surface to another as independently, safely, and efficiently as possible	46 (61.3)	21 (28.0)	7 (9.3)			1 (1.3)
allows me to carry out personal tasks as independently, safely, and efficiently as possible	33 (44.0)	31 (41.3)	10 (13.3)			1 (1.3)
allows me to get around indoors as independently, safely, and efficiently as possible	15 (20.0)	39 (52.0)	18 (24.0)	2 (2.7)	1 (1.3)	
allows me to get around outdoors as independently, safely, and efficiently as possible	43 (57.3)	17 (22.7)	14 (18.7)			1 (1.3)
allows me to use personal or public transportation as independently, safely, and efficiently as possible	13 (17.3)	30 (40.0)	31 (41.3)	1 (1.3)		

The Chi-square test indicated that no observed difference between gender and satisfaction with respect to functional needs was found ($p>0.05$) for all FEW items (Table 4.4).

Table 4.4: Observed significance differences between gender and satisfaction with functional needs (n=75)

Variable	Male n=54 n (%)	Female n=21 n (%)	Chi-square	df	p-value
Ability to carry out daily routines independently, safely and efficiently					
Agree	51 (94.4)	20 (95.2)			
Disagree	3 (5.6)	1 (4.8)	0.019	1	1.000
Wheelchair matches comfort needs					
Agree	53 (98.1)	20 (95.2)			
Disagree	1 (1.9)	1 (4.8)	0.487	1	0.484
Wheelchair matches health needs					
Agree	53 (98.1)	20 (95.2)			
Disagree	1 (1.9)	1 (4.8)	0.487	1	0.484
Wheelchair allows to operate it as independently, safely and efficiently as possible					
Agree	54 (100.0)	20 (95.2)			
Disagree	0 (0.0)	1 (4.8)	2.571	1	0.280
Wheelchair allows to reach and carry out tasks at different surface levels					
Agree	53 (98.1)	20 (95.2)			
Disagree	1 (1.9)	1 (4.8)	0.487	1	0.484
Wheelchair allows transfer from one surface to another					
Agree	54 (100.0)	20 (95.2)			
Disagree	0 (0.0)	1 (4.8)	2.571	1	0.280
Wheelchair allows to carry out personal care tasks					
Agree	54 (100.0)	20 (95.2)			
Disagree	0 (0.0)	1 (4.8)	2.571	1	0.280
Wheelchair allows to get around indoors					
Agree	52 (96.3)	20 (95.2)			
Disagree	2 (3.7)	1 (4.8)	0.044	1	1.000
Wheelchair allows to get around outdoors					
Agree	54 (100.0)	20 (95.2)			
Disagree	0 (0.0)	1 (4.8)	2.571	1	0.280
Wheelchair allows to use personal or public transport					
Agree	53 (98.1)	21 (100.0)			
Disagree	1 (1.9)	0 (0.0)	0.396	1	1.000

Table 4.5 shows the Chi-square results for observed significant different between rural and urban location and satisfaction with regard to the extent to which the

wheelchair met their functional needs. There were no observed significance difference in the satisfaction with functional needs and rural-urban location was found (p>0.05).

Table 4.5: Observed significant difference between rural-urban location and satisfaction with functional needs

Variable	Rural n=43 n (%)	Urban n=32 n (%)	Chi-square	df	p-value
Ability to carry out daily routines independently, safely and efficiently					
Agree	41 (95.3)	30 (93.8)			
Disagree	2 (4.7)	2 (6.3)	0.092	1	1.000
Wheelchair matches comfort needs					
Agree	42 (97.7)	31 (96.9)			
Disagree	1 (2.3)	1 (3.1)	0.045	1	1.000
Wheelchair matches health needs					
Agree	42 (97.7)	31 (96.9)			
Disagree	1 (2.3)	1 (3.1)	0.045	1	1.000
Wheelchair allows to operate it as independently, safely and efficiently as possible					
Agree	42 (97.7)	32 (100.0)			
Disagree	1 (2.3)	0 (0.0)	0.744	1	1.000
Wheelchair allows to reach and carry out tasks at different surface levels					
Agree	41 (95.3)	32 (100.0)			
Disagree	2 (4.7)	0 (0.0)	1.509	1	0.504
Wheelchair allows transfer from one surface to another					
Agree	42 (97.7)	32 (100.0)			
Disagree	1 (2.3)	0 (0.0)	0.744	1	1.000
Wheelchair allows to carry out personal care tasks					
Agree	42 (97.7)	32 (100.0)			
Disagree	1 (2.3)	0 (0.0)			1.000
Wheelchair allows to get around indoors					
Agree	40 (93.0)	32 (100.0)			
Disagree	3 (7.0)	0 (0.0)	2.295	1	0.256
Wheelchair allows to get around outdoors					
Agree	42 (97.7)	32 (100.0)			
Disagree	1 (2.3)	0 (0.0)	0.744	1	1.000
Wheelchair allows to use personal or public transport					
Agree	42 (97.7)	32 (100.0)			
Disagree	1 (2.3)	0 (0.0)	0.744	1	1.000

4.4 Relationship between type of wheelchair and place of residence

We tested whether there was a relationship between the type of wheelchair used and the place of residence. Results revealed that the majority of users used three-wheeler (n=57, 76.0%). Moreover, three-wheeler wheelchairs appeared to be mostly used in rural settings (33, 44.0%) compared to four-wheeler wheelchairs (10, 13.3%) as shown in Table 4.6.

Table 4.6: Relationship between the type of wheelchair and the place of residence

		place of residence		Total
		rural	urban	
		No (%)	No (%)	
Type of wheelchair	3 wheeler	33 (44.0%)	24 (32.0%)	57 (76.0%)
	4 wheeler foldable	10 (13.3%)	5 (6.7%)	15 (20.0%)
	4 wheeler rigid	0 (0.0%)	3 (4.0%)	3 (4.0%)
Total		43 (57.3%)	32 (42.7%)	75 (100.0%)

4.5 Satisfaction with the features and service provision related to locally-manufactured wheelchairs

The QUEST 2.0 items measuring satisfaction with wheelchair features and service provision showed that the majority of the participants were very or quite satisfied with all items excepting follow-up services a shown in Table 4.7. With regards to wheelchair features, the participants were very satisfied with the durability, ease of use and effectiveness of their chairs. Ease of adjusting was highest for more or less satisfied and may need to be investigated. With respect to service provision, the participants were very satisfied with professional service while repairs and servicing was highest for more or less satisfied.

Table 4.7: Satisfaction with wheelchair features and service provision (n=75)

Statement: How satisfied are you with …… of your wheelchair?	Very Satisfied	Quite Satisfied	More or less satisfied	Not Satisfied	Not Satisfied at All
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Wheelchair features					
Dimensions	16 (21.3)	45 (60.0)	7 (9.3)	6 (8.0)	1 (1.3)
Weight	15 (20.0)	41 (54.7)	12 (16.0)	6 (8.0)	1 (1.3)
Ease of adjusting	18 (24.0)	34 (45.3)	17 (22.7)	5 (6.7)	1 (1.3)
Safety and security	18 (24.0)	44 (58.7)	11 (14.7)	2 (2.7)	0 (0.0)
Durability	29 (38.7)	38 (50.7)	6 (8.0)	2 (2.7)	0 (0.0)
Ease of use	29 (38.7)	32 (42.7)	11 (14.7)	3 (4.0)	0 (0.0)
Comfort	18 (24.0)	45 (60.0)	8 (10.7)	2 (2.7)	2 (2.7)
Effectiveness	27 (36.0)	37 (49.3)	9 (12.0)	1 (1.3)	1 (1.3)
Service provision					
Service delivery programme	13 (17.3)	38 (50.7)	20 (26.7)	3 (4.0)	1 (1.3)
Repairs and servicing	10 (13.3)	36 (48.0)	23 (30.7)	3 (4.0)	3 (4.0)
Professional service	20 (26.7)	41 (54.7)	9 (12.0)	2 (2.7)	3 (4.0)
Follow-up services	1 (1.3)	6 (8.0)	10 (13.3)	26(34.7)	32(42.7)

Although the proportion of males was relatively higher than that of females there were no observed significance difference between gender and satisfaction with the wheelchair was found as shown in Table 4.8.

Table 4.8: Observed significant difference between gender and satisfaction with wheelchair features and service.

Variable	Male n=54 n (%)	Female n=21 n (%)	Chi-square	df	p-value
Satisfaction with dimensions of wheelchair					
Satisfied	45 (83.3)	16 (76.2)			
Unsure	6 (11.1)	1 (4.8)			
Dissatisfied	3 (5.6)	4 (19.0)	3.697	2	0.157
Satisfaction with weight of wheelchair					
Satisfied	41 (75.9)	15 (71.4)			
Unsure	8 (14.80	4 (19.0)			
Dissatisfied	5 (9.30	2 (9.5)	0.211	2	0.900
Satisfaction with ease of adjusting parts of wheelchair					
Satisfied	39 (72.2)	13 (61.9)			
Unsure	11 (20.4)	6 (28.6)			
Dissatisfied	4 (7.4)	2 (9.5)	0.765	2	0.682
Satisfaction with safety and security of wheelchair					
Satisfied	45 (83.3)	17 (81.0)			
Unsure	8 (14.8)	3 (14.3)			
Dissatisfied	1 (1.9)	1 (4.8)	0.493	2	0.781
Satisfaction with durability of wheelchair					
Satisfied	50 (92.6)	17 (81.0)			
Unsure	3 (5.6)	3 (14.3)			
Dissatisfied	1 (1.9)	1 (1.9)	2.150	2	0.341
Satisfaction with ease of use of wheelchair					
Satisfied	44 (81.5)	17 (81.0)			
Unsure	7 (13.0)	4 (19.0)			
Dissatisfied	3 (5.6)	0 (0.0)	1.549	2	0.461
Satisfaction with comfort of wheelchair					
Satisfied	45 (83.3)	18 (85.7)			
Unsure	6 (11.1)	2 (9.5)			
Dissatisfied	3 (5.6)	1 (4.8)	0.064	2	0.969
Satisfaction with effectiveness of wheelchair					
Satisfied	47 (87.0)	17 (81.0)			
Unsure	5 (9.3)	4 (19.0)			
Dissatisfied	2 (3.7)	0 (0.0)	2.051	2	0.359

There were no observed significance difference for rural/urban location and satisfaction with the different features of the wheelchair was found (Table 4.9)

Table 4.9: Observed significant difference between rural-urban location and satisfaction with wheelchair features and services.

Variable	Rural n=43 n (%)	Urban n=32 n (%)	Chi-square	df	p-value
Satisfaction with dimensions of wheelchair					
Satisfied	34 (79.1)	27 (84.4)			
Unsure	3 (7.0)	4 (12.5)			
Dissatisfied	6 (14.0)	1 (3.1)	2.968	2	0.227
Satisfaction with weight of wheelchair					
Satisfied	29 (67.4)	27 (84.4)			
Unsure	8 (18.6)	4 (12.5)			
Dissatisfied	6 (14.0)	1 (3.1)	3.437	2	0.179
Satisfaction with ease of adjusting parts of wheelchair					
Satisfied	26 (60.5)	26 (81.3)			
Unsure	12 (27.9)	5 (15.6)			
Dissatisfied	5 (11.6)	1 (3.1)	4.022	2	0.134
Satisfaction with safety and security of wheelchair					
Satisfied	32 (74.4)	30 (93.8)			
Unsure	9 (20.9)	2 (6.3)			
Dissatisfied	2 (4.7)	0 (0.0)	5.014	2	0.082
Satisfaction with durability of wheelchair					
Satisfied	36 (83.7)	31 (96.9)			
Unsure	6 (14.0)	0 (0.0)			
Dissatisfied	1 (2.3)	1 (3.1)	4.864	2	0.088
Satisfaction with ease of use of wheelchair					
Satisfied	33 (76.7)	28 (87.5)			
Unsure	9 (20.9)	2 (6.3)			
Dissatisfied	1 (2.3)	2 (6.3)	3.663	2	0.160
Satisfaction with comfort of wheelchair					
Satisfied	35 (81.4)	28 (87.5)			
Unsure	6 (14.0)	2 (6.3)			
Dissatisfied	2 (4.7)	2 (6.3)	1.190	2	0.552
Satisfaction with effectiveness of wheelchair					
Satisfied	36 (83.7)	28 (87.5)			
Unsure	6 (14.0)	3 (9.4)			
Dissatisfied	1 (2.3)	1 (3.1)	0.395	2	0.821

4.6 Satisfaction with activity and participation needs

For all aspects of activity and participation, the use of the wheelchair positively influenced more than 90% of participants. With regard to participation in sport, 28

(37.3%) did not participate as indicated by their selection of the 'not applicable' option. Please see the summary in Table 4.10.

Table 4.10: Satisfaction with the wheelchair in activity and participation (n=75)

Statement How wheelchair has influenced your possibility to ……..	Positively n (%)	Not at all n (%)	Negatively n (%)	Not applicable n (%)
Work	73 (97.3)		1 (1.3)	1 (1.3)
Lead an active leisure life	73 (97.3)	1 (1.3)		1 (1.3)
Go shopping	69 (92.0)	3 (4.0)	2 (2.7)	1 (1,3)
Socialize	74 (98.7)			1 (1.3)
Be mobile	74 (98.7)		1 (1.3)	
Ability to participate in sports	41 (54.7)	4 (5.3)	2 (2.7)	28 (37.3)

Almost equal proportions of respondents in rural and urban areas reported positive experiences in the use of the wheelchair with regard to participation in various activities (Table 4.11).

Table 4.11: Observed significant difference between rural-urban location and satisfaction with activity and participation

Variable	Rural	Urban	Chi-square	df	p-value
	n (%)	n (%)			
Ability to work	n=43	n=31			
Positively	42 (97.7)	31 (100.0)			
Not at all	0 (0.0)	0 (0.0)			
Negatively	1 (2.3)	0 (0.0)	0.731	1	1.000
Ability to lead an active leisure life	n=43	n=31			
Positively	43 (100.0)	30 (96.8)			
Not at all	0 (0.0)	1 (3.2)			
Negatively	0 (0.0)	0 (0.0)	1.406	1	0.419
Ability to go shopping	n=42	n=32			
Positively	40 (95.2)	29 (90.6)			
Not at all	0 (0.0)	3 (9.4)			
Negatively	2 (4.8)	0 (0.0)	5.503	2	0.064
Ability to socialize	n=43	n=31			
Positively	43 (100.0)	31 (100.0)			
Not at all	0 (0.0)	0 (0.0)			
Negatively	0 (0.0)	0 (0.0)	-	-	-
Independence	n=43	n=32			
Positively	42 (97.7)	32 (100.0)			
Not at all	0 (0.0)	0 (0.0)			
Negatively	1 (2.3)	0 (0.0)	0.754	1	1.000
Self-esteem	n=43	n=32			
Positively	42 (97.7)	31 (96.9)			
Not at all	0 (0.0)	1 (3.1)			
Negatively	1 (2.3)	0 (0.0)	2.089	2	0.352
Mobility	n=43	n=32			
Positively	42 (97.7)	32 (100.0)			
Not at all	0 (0.0)	0 (0.0)			
Negatively	1 (2.3)	0 (0.0)	0.754	1	1.000
Ability to participate in sport	n=29	n=18			
Positively	26 (89.7)	15 (83.3)			
Not at all	1 (3.4)	3 (16.7)			
Negatively	2 (6.9)	0 (0.0)	0.634	1	0.168

There were no observed significance differences between satisfaction with activity participation and gender (Table 4.12).

Table 4.12: Observed significant difference between gender and satisfaction with activity and participation

Variable	Male	Female	Chi-square	df	p-value
	n (%)	n (%)			
Ability to work	n=54	n=20			
Positively	54 (100.0)	19 (95.0)			
Not at all	0 (0.0)	0 (0.0)			
Negatively	0 (0.0)	1 (5.0)	2.737	1	0.270
Ability to lead an active leisure life	n=54	n=20			
Positively	53 (98.1)	20 (100.0)			
Not at all	1 (1.9)	0 (0.0)			
Negatively	0 (0.0)	0 (0.0)	0.375	1	1.000
Ability to go shopping	n=54	n=20			
Positively	52 (96.3)	17 (85.0)			
Not at all	2 (3.7)	1 (5.0)			
Negatively	0 (0.0)	2 (10.0)	5.660	2	0.059
Ability to socialize	n=54	n=20			
Positively	54 (100.0)	20 (100.0)			
Not at all	0 (0.0)	0 (0.0)			
Negatively	0 (0.0)	0 (0.0)	-	-	-
Mobility	n=54	n=21			
Positively	54 (100.0)	20 (95.2)			
Not at all	0 (0.0)	0 (0.0)			
Negatively	0 (0.0)	1 (4.8)	2.606	1	0.280
Independence	n=54	n=21			
Positively	54 (100.0)	20 (95.2)			
Not at all	0 (0.0)	0 (0.0)			
Negatively	0 (0.0)	1 (4.8)	2.606	1	0.280
Self-esteem	n=54	n=21			
Positively	53 (98.1)	20 (95.2)			
Not at all	1 (1.9)	0 (0.0)			
Negatively	0 (0.0)	1 (4.8)	2.973	2	0.226
Ability to participate in sport	n=33	n=14			
Positively	30 (90.9)	11 (78.6)			
Not at all	2 (6.1)	2 (14.3)			
Negatively	1 (3.0)	1 (7.1)	2.408	1	0.511

4.7 Summary of Chapter 4

This chapter has described the results related to the extent to which locally manufactured wheelchairs met the needs of the participants. No significant differences were observed for any of the groups, and therefore the null hypothesis is accepted and there is no difference between the groups (gender and place of residence) in terms of:

- participant satisfaction with wheelchairs meeting functional needs
- wheelchair features and services
- activity and participation.

The key findings from the study will be discussed in Chapter 5.

CHAPTER 5: DISCUSSION

This Chapter discusses the key results as revealed from the analysis of the data obtained from 75 participants of the study as presented in Chapter 4. The discussion addresses the study aim of determining the extent to which the needs of Tanzanian wheelchair users are met through locally manufactured wheelchairs through meeting the following objectives:

1. To determine the demographic and wheelchair use profile of users of locally manufactured wheelchairs
2. To determine the satisfaction level of users of locally manufactured wheelchairs in meeting their functional needs. .
3. To determine the extent to which locally manufactured wheelchairs meet users' needs in terms of their features and services provided.
4. To determine the extent to which locally manufacturing wheelchairs meet the activity and participation needs of users.
5. To assess the observed differences between:
    - Satisfaction with locally manufactured wheelchairs in meeting functional needs, gender and place of residence.
    - Type of wheelchair, gender and place of residence.
    - Satisfaction with wheelchair features, gender and place of residence.
    - Satisfaction with activity and participation, gender and place of residence.

5.1 Profile of participating users of locally manufactured wheelchairs

The male to female ratio was1:2.6; more than half with primary education, single living in rural and hilly areas. The majority of them (61%) were persons with disability due to spinal cord injury. They resided from different geographical conditions or environment with completely different infrastructure. These study regions fully represented both urban and rural wheelchair operating environment. The male to female ratio is similar to that reported in the study by Bergstrom and Samuelsson (2006) whereby the male to female ratio among persons with spinal

cord injury was 1:2.5 and also concurrent with that in the study by Samuelsson and Wressle (2008) with a male to female ratio of 1:2.7. These ratios, though showing the preponderance of males over females, may not be indicative that males are more prone to disability than females since the study population comprises only wheelchair users rather than persons with disability and as such may be a reflection of gender differences in access to rehabilitation services. Thus, according to the World Health Organization (2011a), it was demonstrated that gender differences exist in Malawi and Zambia whereby women have less access to rehabilitation services than men with disabilities. Maya and Thomas (2013) attribute the gender difference in access to assistive devices in Asia to predominance of male orthotics and prosthetics technicians and cultural taboos of women not being comfortable when examined by men.

The mean age in the study population was 34 years in contrast with the studies by Bergstrom and Samuelsson (2006) and Samuelsson and Wressle (2008) in which the mean age of persons with disability was about 50 and 70 years respectively. The variations in age distribution of wheelchair users could be due to the recruitment procedure of respondents. While in this study, majority of wheelchair users were selected from the register of KASI (an Association of Spinal cord Injured patients in Kilimanjaro region) who were visited at their homes, the Bergstrom and Samuelsson studies used a mail questionnaire. The willingness to participate in the study and respond could be influenced by the age of respondents in that older people would be more willing to participate and complete the questionnaire than young disabled persons.

5.2 History of usage of locally manufactured manual wheelchairs

The median age of starting using wheelchair, i.e. median (range) for 73 participants, was 25.0 (2.0-56.0) years which concurs with the age of 22 years reported by Winter (2006). This could be reflective of some delay in acquiring a mobility assistive device in most of the low-income countries (mean age of disability is 22 years). Delay of acquiring a wheelchair influences participants to

use other means of locomotion as revealed in this study that majority were carried by care givers and crawling. A study by Winter (2006) revealed that majority of users depended on crawling as their means of locomotion before acquiring a wheelchair.

5.3 Types of wheelchairs being used

Two types of wheelchair which are locally manufactured in Tanzania are three -wheeler and four -wheeler; but the four -wheeler is of two categories i.e. rigid and foldable. The three -wheeler was found to be more used in this study than four -wheelers. The three -wheelers have been reported to be mechanically simpler, easier to maneuver in all kinds of terrains than four -wheeler (TATCOT, 2005). This is indicated by the results on landscape characteristics in the area of residence of wheelchair users which shows that majority live in rural areas characterized by moderately rough roads and hilly landscapes. However, according to TATCOT (2005) one of the advantages of the four -wheeler is that it has a shorter wheel base which makes them more compact than three- wheeler. Moreover, the three -wheeler has a long base which can be difficult to use indoor if rooms are small. Arthanat et al. (2012) suggested that the wheelchair need relatively larger space for turning.

Although the three-wheeler design was more preferred by the users it is important to note that its base is long making it more difficult to use indoors if the house is not modified to accommodate it. According to Visagie et al. (2013) wheelchair provision should take into consideration small houses and narrow doors which are commonly found in rural settings. Some wheelchair users require modifying their houses and doors once they acquire their wheelchairs.

With respect to satisfaction with wheelchair features, this study revealed that there were lower scores for weight of the wheelchairs particularly for females and those in rural areas than any other aspects. The reason may be due to the fact

that it is easier for males to handle or maneuver the wheelchair than females; it is also difficult to ride wheelchairs in rural areas due to environmental barrier.

According to WHO (2008), a wheelchair that is used in rough environments needs to be robust hence more energy expenditure when propelling. In regards to adjustment of the wheelchair rural wheelchair users were less satisfied than the urban users. This may be due to the fact that the type of wheelchair used commonly in rural areas is three-wheelers. In this type of wheelchair most of the parts are fixed and are therefore difficult to adjust. In four-wheelers most of the parts are not fixed and therefore easier to adjust. The ability to adjust or customize a wheelchair to meet the user's physical needs will vary depending on the type of wheelchair (WHO, 2008).

5.4 Extent to which locally manufactured wheelchairs meets the functional needs of participating users in Tanzania

Satisfaction level to functional needs of users of locally manufactured wheelchairs was investigated.

The majority of participants agreed slightly to completely on all ten FEW aspects related to functional needs. Mulholland et al. (1998) confirmed that in low-income countries quality of life may be a very important consideration in the provision of assistive technology than increased independence. According to WHO (2008), independent mobility makes it possible for people to perform different activities like studying, work, participate in community activities and the like. Thus, it would be expected that majority of respondents perceived to have had their quality of life improved after acquiring the mobility assistive device.

Another explanation to satisfaction on functional needs of manual wheelchairs could be that majority of manual wheelchair users had adequate experience with using the wheelchairs (mean duration of 8 years) which could have influenced them to accept their condition and realize the benefit of the wheelchair. This explanation is in line with that given by Rossen et al. (2012) who showed that it took some wheelchair users many years before recognizing the wheelchair was a

very important support for them. WHO (2008) confirm that without a wheelchair disabled individuals would be unable to participate in any income generating or community activities outside the home. The researcher realized from this study that the wheelchair has become important part of users' daily life. This coincides with findings in a study by Wressle and Samuelsson (2004) which showed that according to wheelchair users, the device was found to be of great importance with a high usage rate and positive on daily living

5.5 Access to transportation

As regards to public transportation aspect, those participants who rated slightly agree (n=31, 41.3%) were mostly four-wheeler users who could not fold their wheelchairs and some of the three-wheeler users who could not detach rear wheels to make wheelchairs easy to carry them into the vehicle. This finding is supported by a survey done in Uganda whereby 31 out of 48 wheelchair users (62%) were dissatisfied with wheelchair because of difficult in transporting the wheelchair (Uganda National Action on Physical Disability (UNAPD), 2006). Also, Chaves et al. (2004) noted that an important barrier to using transportation among manual wheelchair users was the wheelchair itself.

An unexpected result in this study was related to the question about independent use of public or private transport. Although the majority of the participants rated slightly to completely agree, this is in contradiction to what is in the real situation in Tanzania. Wheelchair users in Tanzania cannot use public or private transport independently although users of four-wheeler foldable can fold their wheelchairs and make them small to be carried in the vehicle but they cannot access transportation independently. This tendency was the same for the three -wheeler users who could detach rear wheels and make the wheelchair slightly smaller to be able to put them in the vehicle. This is because there are no special vehicles in Tanzania (as in high-income countries) which can allow the wheelchair user to use transport independently. This question could have not been understood by participants. The local buses in Tanzania are rarely equipped for or permit

disabled people to use them, forcing them to rely only on themselves to travel long distances using their wheelchairs (Winter, 2006) or if they are to use public transport they need assistance from another person. Bergstrom and Samuelsson (2006) contend that optimal transportation should enable the wheelchair user to move the chair in and out of a car independently.

Throughout the study, i.e. during data collection, the researcher used public transport as his primary means of transportation but could not at any time observe the wheelchair user as one of the passengers. This tendency is denying wheelchair users to travel where they want, therefore unable to enjoy most of their social rights. Fitzgerald (2005) clarifies that if a wheelchair user does not have a specialized vehicle to transport his/her wheelchair or if accessible public transportation is not available, community participation may be hindered.

Findings from a study by Winter (2006) on assessment of wheelchair technology in Tanzania indicated that many wheelchair users were being turned away when trying to use a bus. This is one of the most important aspects of the wheelchair users in Tanzania especially for employees or a student as far as distance is concerned. According to the United Republic of Tanzania (2004) on the Tanzania National Policy on Disability article 3.17 (i) states that “the government and other stakeholders shall take measures to ensure that transport facilities are accessible to people with disabilities”. It was realized that this has not been effective as well as some participants not even been aware of this part of policy.

However, in the present study it was observed that, although three-wheeler design rear wheels can be detached to make it easy to put inside the bus or taxi, it does not make it small enough. Detaching rear wheels (quick release) does not make a wheelchair small enough. On the other hand, four -wheeler foldable design once folded, its size changes completely, i.e. it becomes easier to carry inside public or even private transportation. While majority of the three -wheeler design were satisfied with stability of their wheelchair on uneven terrain, the four-

wheeler users were satisfied with their wheelchair to be foldable and easy for transportation. Moreover, trying to change three -wheeler design completely, e.g. shortening its long base, will affect its stability on uneven surfaces. Detaching rear wheels slightly decrease the width of a wheelchair.

5.6 Safety, security and durability

Though adjusting parts, safety and security, and durability of the wheelchair exhibited non-significant differences between urban and rural users; satisfaction on the functioning of the wheelchair in these aspects was demonstrated by a relatively higher proportion of urban wheelchair users. Physical environmental factors have been identified as barriers to engagement in activities outside home especially when the manual wheelchair requires the individual to use extra efforts to maneuver with the wheelchair (Hoenig et al., 2003; Reid et al., 2002). Most of the rural environments in Kilimanjaro region are hilly and with surface rough roads. Such impeding physical environments may lead the users to associate difficult in mobility with adjustment of parts, safety and security and also durability of the wheelchair. It has been noted that access to environment would positively influence satisfaction with life (Richards et al., 1999). Furthermore, Cooper (1998) and Chaves et al. (2004) observed that physical environment leads to decreased individual participation in activities of daily life.

With respect to the relationship between the type of wheelchair used and the place of residence, our study indicated that the three-wheeler wheelchairs (about 44.0%) were used in rural settings compared to four-wheeler wheelchairs of which only 10.0% were used in the rural settings. The differences are due to the facts that the wheelchair which would be used in rough and hilly/mountainous to be more stable and durable. Wheelchairs should be appropriate for the environment in which they will be used (WHO, 2008). The three-wheeler wheelchair is very stable therefore better performance. This is supported by WHO (2008) that functional performance of a wheelchair is determined by its design. The functionality of a wheelchair relies on the interaction between the

user, the wheelchair and the environment (Visagie et al., 213). The three-wheeler wheelchair type in rural settings 33 (44%) in this study is in line with the study by Visagie et al. (2013) that wheelchair provision in the rural areas should take into account the uneven terrain as well as lack of unpaved roads. However there were about 10 (13.3%) users of four-wheeler wheelchair (foldable type) in the rural settings. These are believed to be using their wheelchairs indoor only since this type is very unstable and not suitable in rough and hilly environment.

5.7 Participant's satisfaction related to service provision of locally manufactured wheelchairs

With regards to service provision the majority of participants were satisfied with professional service and least satisfied with follow-up services. This has also been reported in other similar studies (Sund et al., 2013; Wressle and Samuelsson, 2004; Bergström and Samuelson, 2006). For example, the study by Bergstrom and Samuelsson (2006) showed that satisfaction with follow-up was rated lowest among the four additional QUEST 2.0 questions. They argue that the low satisfaction level could also be linked high concentration of interventions in the initial stages of wheelchair provision and creation a vacuum after issuing of the wheelchair, that is, neglecting following-up users to evaluate their satisfaction with wheelchair.

Samuelsson and Wressle (2008) showed that follow-up indicated the largest number of users who reported "not very satisfied" with follow-up service. It has been shown that there is an association between successful use of wheelchair with service delivery that starts from evaluation and ends with follow-up (Smith 1996). The World Health Organization (2008), in its guidelines on the provision of manual wheelchairs, eight steps in service delivery were identified, namely, referral and appointment, assessment, prescription/selection, funding and ordering, product preparation, fitting, user training and follow-up, maintenance and repairs.

The present study reveals that most of the manual wheelchair users reside in the remote rural areas with limited access to delivery services. They are therefore unable to afford to pay for costs related to assistive device service provision as was noted in a study in Malawi (Magnusson et al., 2013). In resource-limited countries, including Tanzania, characterized by inadequate number of professionals, limited number of service provision centres (mostly concentrated in urban areas) and other resources such as mobile/outreach services, the issue of follow-up will take a long time to be incorporated in the provision of wheelchairs (Njelesani et al., 2011). A follow-up activity is a role of Rehabilitation professionals which includes Physiotherapists, Occupational Therapists, Orthopaedic Technologists and wheelchair technicians. Apart from follow-up activities, rehabilitation professionals are also trained to assess, prescribe and fit the wheelchair (WHO, 2008).

A follow-up plan is also very important because it enables the rehabilitation professional to understand whether the wheelchair is working properly or not, is there anything to be changed or whether the user needs more education or training. According to WHO (2008) follow up service may also offer maintenance and repair in case of technical problems. A study by Samuelsson and Wressle (2008) confirmed that follow–up is crucial both to the user and the service provider and that without a follow-up it is not possible to correct insufficient solutions and expand service provider's knowledge and experience. A further study by Sund et al. (2013) revealed that follow-up is important because it will ensure the wheelchair is appropriately utilized and whether it is effective in the environment where it is been utilized as well as the user.

WHO, furthermore recommends that it is appropriate to carry out follow-up activities at the community level. This is because the rehabilitation professionals will observe the real environment where the wheelchair is used. Vasagie et al. (2013) demonstrated that follow-up schedule are crucial as far as monitoring appropriateness of the wheelchair fit, postural support, function and use in the

environment is concerned though it was noted to be a problem in a better resourced country such as South Africa.

5.8 Extent to which locally manufactured wheelchairs meet activity and participation needs of participating users

For all aspects of activity and participation, the use of wheelchair has positively influenced more than 90% of participants for persons to whom the activities were applicable.

The possibility to go shopping had a positive impact on a higher proportion of rural than urban wheelchair users. The differences were largest in terms of ability to go shopping between males and females ($p=0.059$) and rural and urban place of residence and also positive impact on a higher proportion of male than female wheelchair users. The relatively higher proportion of rural compared to urban manual wheelchair users having positive impact to go shopping could be explained by the fact that in rural settings the shops are in most instances located some distance away from residences of wheelchair users. It would therefore be expected that, with the availability of a wheelchair which provides mobility to users, the shops become reachable and hence positive impact. On the other hand, in urban centres, maneuvering to the shops with assistance of a manual wheelchair is hampered by sometimes traffic-jammed roads and especially when crossing the road is necessitated. This may create a feeling of negative impact of wheelchair in shopping. This assertion could be supported by findings from various studies whereby it has been shown that access to environment predicts the level of wheelchair user in community participation including shopping (Meyers et al., 2002; Rimmer et al., 2004; Dijkers et al., 2000).

The possible explanation why male than female perceive positive impact of wheelchair on the possibility to go shopping could be that, in case of disabled persons, especially with SCI, we would expect male to be more tempting to lead

an independent life compared to female and thus would find the wheelchair as an enabling device to go shopping. Also, male disabled persons could easily ask for navigation assistance as opposed female due to socio-cultural reasons. Given that navigation when shopping, due to infrastructural limitations (lack of ramps, wider doors or lifts), may need someone to help, male than female wheelchair users may be likely to perceive positive impact on the wheelchair for shopping activity. Thus, Bockenek (1997) pointed out that persons with disability (especially women) may not feel comfortable to seek assistance from others due to their disability because they could feel they are surrendering part of their independence to another person.

5.9 Strengths of this study

The strength of this study is that it gave a broad spectrum of the disability experience in the aspects of profile of users which includes gender, age, and marital status, duration of use of wheelchairs, wheelchair type, and geographical condition. The study area represents the rest of the country where locally manufactured wheelchairs are used. This includes states of roads i.e. rough, moderately rough and paved also landscapes i.e. hilly, mountainous, flat and sandy. It also covered rural and urban settings.

5.10 Limitations of this study

The choice of a cross-sectional study design provided only a snapshot of information about user satisfaction and functioning with their wheelchairs and did not allow a comparison of donated and locally manufactured wheelchairs. Future researchers should consider comparing the level of satisfaction and functioning of users of locally manufactured wheelchairs and donated / imported wheelchairs in order to ascertain which of these best serves the needs of people in Tanzania. A qualitative study would allow for in-depth information from wheelchair users about their reasons for being satisfied or not with various aspects of the wheelchair. This would enable manufacturers to improve the design of the wheelchairs.

The number of participants in this study was limited by the inaccuracy of some of the addresses obtained. In addition, due to unexpected events, such as a drought in Arusha, and floods in Dar es Salaam, many people were forced to re-locate in search of better living conditions. This resulted in time delays in collecting data as well as not being able to locate some users as they were no longer living at their documented addresses. Including all users of locally manufactured wheelchair (provided they meet inclusion criteria) even if not registered was very useful in obtaining the highest possible number of participants. It was however not possible to access all 250 users as discussed above. The sample size of 75 was convenient in the study although large sample could be ideal.

The sample size for this study was not sufficient to make generalizations about the total population of wheelchair users in Tanzania.

5.11 Summary of Chapter 5

In this chapter key findings from the study were discussed. It appeared that users of locally manufactured wheelchairs were satisfied or were positive in many aspects, However there were also some gaps which were identified during this study and need attention to wheelchair manufacturers and other stakeholders including the government of Tanzania. These gaps include lack of policy on wheelchair provision, lack of follow-ups, inadequate number of wheelchair manufacturing workshops, lack of ideal public transportation for wheelchairs users. Other gaps include inadequate number of rehabilitation professionals.

In the following Chapter 6 conclusions of the study and recommendations on key issues will be presented.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

This chapter outlines the conclusions arising from the study results. Several recommendations for policy implementation, improvements in wheelchair service delivery, and further research are then presented.

6.1 Conclusion

The aim of this study was to determine whether locally manufactured wheelchairs in Tanzania meet the needs of Tanzania wheelchairs users. All participants in this study had used their wheelchairs for more than one year, which should guarantee experience and possibility to respond to most of the questionnaire. Participants' opinions on the satisfaction with locally manufactured wheelchair in Tanzania on various aspects has been examined and analysed in this study.

Generally, the majority of participants were more satisfied with their wheelchair than service delivery procedures. However follow-up service was rated least, most participants indicated they did not get a follow-up service. It was revealed in this study that participants had to wait for quite a long time from the time they are prescribed a wheelchair until the time they get.

Of the types of wheelchairs manufactured in Tanzania, the three-wheeler wheelchair was observed to be appropriate in all types of terrains and landscapes. It was also appropriate to be used in rural settings due to its strength and stability on rough terrains. Three-wheeler users were more satisfied than four-wheeler users.

An interesting aspect concerns satisfaction of participants with transport either private or public. Results in this study indicated that majority of participants were satisfied with locally manufactured wheelchairs in Tanzania in respect to independent use of personal or public transport. This is contrary to what was

found because the users cannot use transport independently. Folding the wheelchairs as in the case of four-wheeler foldable or detachment of rear wheels in case of three-wheeler does not enable the user to use transport independently.

Environmental factors seemed to be the factor which can facilitate or limit performance of a wheelchair therefore impact on the user.

Majority of participants indicated that the wheelchair had enabled them to participate in the community, access to employment and education

6.2 Recommendations

The recommendations are based on the key findings from the results.

6.2.1 Policy implementation

There is a need for the Tanzanian government to implement the current national policy on disability so that transport issues for people with disabilities including wheelchair users can be effective. Another alternative can be for the government to develop transportation policy for people with disabilities including wheelchair users which will be publicly known. Public transport should have specific spaces for disabled people including wheelchair users. It should also be easy to get in and out of the vehicle independently.

It is further recommended to introduce types of public buses which will allow users and non-users of wheelchairs and other types of disabled persons to use them freely and independently. Therefore the researcher suggests therefore that there is a need to create awareness to the public in regards to transport, policy and guideline for wheelchair users in Tanzania

Wheelchair services and provision should be part of the rehabilitation services in Tanzania.

6.2.2 Integrating wheelchair service provision in CBR programme

A Community Based Rehabilitation (CBR) programme has been in existence in Tanzania for about 20 years. Some aims of CBR are to provide rehabilitation, reduce poverty, equalize opportunities and promote the inclusion of people with disabilities in the community. This programme will make sure that wheelchair services including follow-up will reach wheelchair users in the community. It is one way of creating awareness and includes wheelchair users into the community development activities.

6.2.3 Integrating wheelchair services into rehabilitation

Integration of wheelchair services into the rehabilitation services is very important. Efforts should be made by the government and other stakeholders to implement this. In Tanzania only two wheelchair services are integrated into rehabilitation services. These are Kilimanjaro Christian Medical Center (KCMC) in Moshi and Comprehensive Community Based Rehabilitation Tanzania (CCBRT) in Dar es Salaam. Integrating wheelchair services in rehabilitation services will ensure that wheelchair services are accessible to those who need them. It is critical that apart from the wheelchair services meeting essential criteria, locally appropriate solutions must be integrated into national rehabilitation services and structures as suggested by Constantine et al. (2006).

6.2.4 Follow-up service

Follow-up has been revealed in several studies as a major problem, it needs therefore the government to come up with the guideline on service provision and delivery system. It is recommended follow-up that be planned and implemented. This is a very important aspect in the wheelchair service. Within the checklist of wheelchair service provision, Follow-up issues should be included in the prescription and assessment forms. There should be a comprehensive follow-up

indicating specific time, the name of rehabilitation professional, the activity done and the general comment.

6.2.5 Inadequate number of wheelchair workshops

The wheelchair workshops are few and number of people trained to assess and prescribe wheelchairs is also limited. It is critical for the government to put into consideration on training more wheelchair technologists as well as rehabilitation professionals in general.

Appropriate wheelchair service models should be developed in Tanzania. The government should consider the need of wheelchair users by increasing the number of wheelchair professionals within health services and spread the services to the rural community. In summary, wheelchair provision should be sustainable to ensure wheelchair provision is long-term and appropriate.

6.2.6 Further research

There is a need for further study to acquire a deep understanding of the wheelchair users using a purely qualitative methodology. It was not possible to capture the in-depth feeling of the user when assessing level of satisfaction in various parameters especially where the answer was supposed to be “Yes” or “No” as well as “Very satisfied” or “Quite satisfied”. Because of the nature of this study the quantitative data did not give details information as to the reasons for agree or disagree as well as satisfied or not satisfied.

The researcher therefore concludes that user satisfaction is the consumer’s opinion of the extent to which the assistive device achieves the expected goal(s) and that it is a dimensional phenomenon that requires qualitative approach. It can be concluded here that a mix of qualitative and quantitative data (triangulation) could provide more useful information.

A number of participants were not involved in the wheelchair prescription process. Lack of involvement in the prescribing process was suggested by some participants as one of factors contributed to failure to achieve their desire with a wheelchair. The effect of locally manufactured essential criteria wheelchairs on daily living was positive in most aspects.

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Appendix 1: Questionnaire – English version

Date of Interview_____ User Code_____

Site of Interview_____ Name/Initials of interviewer_____

Section A: General information

1. Gender: ☐Male ☐Female
2. Age (yrs) _____
3. Marital status: ☐Married ☐Divorced ☐Separated ☐Widowed ☐Single
4. What is your highest level of education: ☐Primary school ☐ Secondary school ☐Tertiary ☐University
5. Where do you live now: ☐Rural area ☐Urban area
   Other_____If other please specify
6. What is your nature of disability?
   ☐Post-poliomyelitis ☐ Post-Spinal cord injured ☐ Spina bifida
   ☐Amputation ☐Post-stroke ☐Post-traumatic injury
   ☐ Cerebral palsy. ☐ Quadriplegia ☐ Other (specify)_____
7. At what age did you become disabled?..... years
8. How did you move around before you got the wheelchair?
9. What kind of wheelchair do you primarily use?
   ☐4-Wheeler rigid ☐4-Wheeler foldable ☐3-Wheeler
   Other_____Please specify
10. For how long have you been using a wheelchair? _____ years
11. How many wheelchairs have you used in your life time?
12. Are you happy with your current wheelchair? ☐ Yes ☐ No
13. What is the nature of the landscape in your residential area?
    ☐Flat ☐Hilly ☐Mountainous ☐Sandy ☐Rocky ☐ Stony
14. What is the nature of roads in your residential area?
    ☐Rough ☐ Moderately rough ☐Paved

Section B: Functioning Everyday with a Wheelchair (FEW) (Holm et al., 2003)

DIRECTIONS: Please answer the following 10 questions by **placing an 'X' in the box under the response** that best matches your ability to function while in your wheelchair.

1. My wheelchair contributes to my ability to carry out my daily routines as independently, safely and efficiently as possible: *(e.g., tasks I want to do, need to do, am required to do when and where needed*	**Completely Agree**	**Mostly Agree**	**Slightly Agree**	***Slightly Disagree**	***Mostly Disagree**	***Completely Disagree**	**Does not apply**
Comments:							
2. My wheelchair matches my comfort needs as I carry out my daily routines:*(e.g.,heat/ moisture, sitting tolerance, pain, stability)*	**Completely Agree**	**Mostly Agree**	**Slightly Agree**	***Slightly Disagree**	***Mostly Disagree**	***Completely Disagree**	**Does not apply**
Comments:							
3. My wheelchair matches my health needs: *(e.g., pressure sores, breathing, edema control, medical equipment)*	**Completely Agree**	**Mostly Agree**	**Slightly Agree**	***Slightly Disagree**	***Mostly Disagree**	***Completely Disagree**	**Does not apply**
Comments:							
4. My wheelchair allows me to operate it as independently, safely, and efficiently as possible: *(e.g., do what I want it to do when and where I want to do it)*	**Completely Agree**	**Mostly Agree**	**Slightly Agree**	***Slightly Disagree**	***Mostly Disagree**	***Completely Disagree**	**Does not apply**
Comments:							
5. My wheelchair allows me to reach and carry	**Completely Agree**	**Mostly Agree**	**Slightly Agree**	***Slightly Disagree**	***Mostly Disagree**	***Completely Disagree**	**Does not apply**

out tasks at different surface heights as independently, safely, and efficiently as possible:*(e.g., table, counters, floors, shelves)*							
Comments:							
6. My wheelchair allows me to transfer from one surface to another surface as independently, safely, and efficiently as possible:*(e.g., bed, toilet, chair)*	**Completely Agree**	**Mostly Agree**	**Slightly Agree**	***Slightly Disagree**	***Mostly Disagree**	***Completely Disagree**	**Does not apply**
Comments:							
7.My wheelchair allows me to carry out personal care tasks as independently, safely, and efficiently as possible:*(e.g., dressing, bowel/bladder care, eating, hygiene)*	**Completely Agree**	**Mostly Agree**	**Slightly Agree**	***Slightly Disagree**	***Mostly Disagree**	***Completely Disagree**	**Does not apply**
Comments:							
8. My wheelchair allows me to get around indoors as independently, safely, and efficiently as possible:*(e.g., home, work, mall, restaurants, ramps, obstacles)*	**Completely Agree**	**Mostly Agree**	**Slightly Agree**	***Slightly Disagree**	***Mostly Disagree**	***Completely Disagree**	**Does not apply**
Comments:							
9. My wheelchair allows me to get around outdoors as independently, safely, and efficiently as possible:*(e.g.,*	**Completely Agree**	**Mostly Agree**	**Slightly Agree**	***Slightly Disagree**	***Mostly Disagree**	***Completely Disagree**	**Does not apply**

uneven surfaces, dirt,grass,gravel, ramps, obstacles)							
Comments:							
10. My wheelchair allows me to use personal or public transportation as independently, safely, and efficiently as possible: *(e.g., secure, stow, ride)*	**Completely Agree**	**Mostly Agree**	**Slightly Agree**	***Slightly Disagree**	***Mostly Disagree**	***Completely Disagree**	**Does not apply**
Comments:							
For questions #2 thru #10: **size** *(e.g., wheelchair and seating frame- width, length, height)* **fit** *(e.g., not too large, not too small, allows desired movement)* **postural support** *(e.g., provides support, stability, and control for the body- bones, muscles, and tissues)* **functional** *(e.g., speed, wheels, cushion, controller, backrest, legrests, seat belt, tilt/recline system, seat elevator, llaptray, basket, cane holder, horn, lights)*							

Section C: QUEST 2.0 (Demers et al., 2002)

Encircle the number that best matches your level of satisfaction with your wheelchair. Mark each question only one time.

	1	2	3	4	5
	Not satisfied at all	Not very satisfied	More or less satisfied	Quite satisfied	Very satisfied
Wheelchair How satisfied are you with;					
1 The **dimensions** (size, height, length, width) of your wheelchair Comment	1	2	3	4	5
2. The **weight** of your wheelchair Comment	1	2	3	4	5
3.The **ease in adjusting** (fixing, fastening) the parts of your wheelchair Comment	1	2	3	4	5
4 How **safe and secure** your wheelchair is? Comment	1	2	3	4	5
5. How satisfied are you with the **durability** of your wheelchair? Comment	1	2	3	4	5
6. How satisfied are you with the **ease to use** of your wheelchair? Comment	1	2	3	4	5

7. How satisfied are you with the **comfort** of your wheelchair? Comment	1	2	3	4	5
8. How satisfied are you with the **effectiveness** of your wheelchair? Comment	1	2	3	4	5
Services: How are you satisfied with……					
9. The **service delivery** programme (procedures, length of time) in which you obtained your wheelchair Comment	1	2	3	4	5
10. The **repairs and servicing** (maintenance) provided for your wheelchair? Comment	1	2	3	4	5
11. **Professional service** *(attitudes, education, need consideration).* Comment	1	2	3	4	5
12. **Follow-up services** Comment	1	2	3	4	5

Section D: Additional questions (Samuelsson and Wressle, 2008).

We kindly ask you to answer the following questions concerning your manual wheelchair.

How would you say that the wheelchair has influenced the following? Cross (x) inside the box

	Positively	Not at all	Negatively	Not applicable
1. Your possibility to work				
2. Your possibility to lead an active leisure life				
3.Your possibility to go to shopping				
4. Your possibility to socialize				
5. Your mobility				
6. Your ability to participate in sport				

Appendix 2: Questionnaire - Swahili Version

Sehemu A: **Maelezo ya jumla**

Tarehe ya mahojiano_____Alama ya Mtumiaji_____

Mahali pa mahojiano_____ Jina la anayefanya mahojiano_____

1. Jinsia: ☐Mme ☐Mke
2. Umri (miaka) _____
3. Hali ya ndoa: ☐Nimeoa/olewa ☐Nimeachika ☐Tumetengana ☐Mjane ☐Sijaoa/olewa
4. Nini kiwango chako cha juu cha elimu: ☐Elimu ya msingi ☐ Elimu ya sekondari ☐Chuo ☐Chuo Kikuu
5. Unaishi wapi kwa sasa: ☐Kijijini ☐Mjini
   Sehemu nyingine_____ Tafadhali Taja (fafanua)_____
6. Nini asili ya ulemavu wako?
   ☐Kupooza kwa polio ☐ Kuumia uti wa mgongo ☐ Spina bifida
   ☐Kukatwa kiungo ☐matatizo ya kiharusi ☐Kiharusi
   ☐ Mtindio wa ubongo. ☐ Mengine (fafanua)_____
7. Ulipata ulemavu ukiwa na umri gani?..... miaka
8. Ulikuwa unatokaje sehemu moja kwenda nyingine kabla ya kupata kitimwendo?
9. Unatumia kitimwendo cha aina gani?
   ☐matairi manne isiyokunjika ☐matairi manne inayokunjika
   ☐matairi matau
   Nyingine_____Tafadhali fafanua_____
10. Kwa muda gani umekuwa ukitumia kitimwendo? _____ miaka
11. Umetumia vitimwendo vingapi katika maisha yako?
12. Unaridhika na kitimwendo chako cha sasa? ☐ Ndiyo ☐ Hapana
13. Nini asili ya sehemu ya makazi yako
    ☐Tambarare ☐ Mwinuko ☐Milima ☐Mchanga/changarawe ☐Miamba
14. Nini asili ya barabara kwenye makazi yako?
    ☐Mabonde ☐Mabonde kiasi ☐Lami

Section B: Functioning Everyday with a Wheelchair (FEW)- Swahili Version

MAELEKEZO: Tafadhali jibu maswali 10 yafuatayo kwa kuweka alama (√) kwenye kisanduku chini ya jibu (nakubali kabisa, nakubali kiasi, nakubali kidogo, n.k) jinsi ambavyo inaendena vizuri zaidi na uwezo wako wa kutenda ukiwa kwenye kitimwendo.

Weka alama ya √ kwenye kisanduku chini ya kisanduku kama utakavyoona inaendana na wewe. Jibu swali moja mara moja tu.

1. kitimwendo kinachangia uwezo wangu wa kila siku wa kujitegemea, usalama, and uwezo kadri iwezekanavyo: (*mfano, shughuli ninazotaka kuzifanya, nahitaji kufanya, ninazohitajika kufanya wakati na mahali ninapotakiwa*)**.**	**Nakubali kabisa**	**Nakubali zaidi**	**Nakubali kidogo**	***Nakataa kidogo**	***Nakataa zaidi**	***Nakataa kabisa**	**Haihusiki**
Maoni:							
2 kitimwendo changu kinaendana na mahitaji yangu ya kufanya kazi zangu za kila siku (*mfano joto/unyevu, nafai ya kukaa, maumivu, ugumu)*	**Nakubali kabisa**	**Nakubali zaidi**	**Nakubali kidogo**	***Nakataa kidogo**	***Nakataa zaidi**	***Nakataa kabisa**	**Haihusiki**
Maoni							
3. kitimwendo changu kinaendana na mahitaji ya afya yangu *(mfano vidondo, kupumua, kuzuia kuvimba, vifaa vya tiba)*	**Nakubali kabisa**	**Nakubali zaidi**	**Nakubali kidogo**	***Nakataa kidogo**	***Nakataa zaidi**	***Nakataa kabisa**	**Haihusiki**
Maoni							
4. kitimwendo changu kinaruhusu mimi kukitumia mwenyewe, kwa usalama, na usahihi kadri iwezekanavyo (*mfano,*	**Nakubali kabisa**	**Nakubali zaidi**	**Nakubali kidogo**	***Nakataa kidogo**	***Nakataa zaidi**	***Nakataa kabisa**	**Haihusiki**

kufanya ninachotaka wakati na mahali ninapotaka kufanya)							
Maoni:							
5. kitimwendo changu kinaniruhusu kufikia na kufanya shughuli mbali mbali kwenye urefu wa kwenda juu tofauti kwa uhuru, usalama na ufanisi kadri iwezekanavyo: *(mfano, meza, kaunta, skafu, mashelfu)*	**Nakubali kabisa**	**Nakubali zaidi**	**Nakubali kidogo**	***Nakataa kidogo**	***Nakataa zaidi**	***Nakataa kabisa**	**Haihusiki**
Maoni							
6 kitimwendo changu kinaniruhusu kuhama sehemu moja hadi nyingine na kwa kujitegemea, usalama na usahihi kadri iwezekanavyo: *(mfano kitanda, choo, kiti*)	**Nakubali kabisa**	**Nakubali zaidi**	**Nakubali kidogo**	***Nakataa kidogo**	***Nakataa zaidi**	***Nakataa kabisa**	**Haihusiki**
Maoni:							
7. kitimwendo changu kinaniruhusu kutekeleza majukumu binafisi ya uangalizi kwa uhuru zaidi, usalama, na usahihi kadri iwezekanvyo: *(mfano, kuvaa nguo,uangalizi wa mpira wa haja kubwa/ndogo, kula, afya)*	**Nakubali kabisa**	**Nakubali zaidi**	**Nakubali kidogo**	***Nakataa kidogo**	***Nakataa zaidi**	***Nakataa kabisa**	**Haihusiki**
Maoni							
8. kitimwendo changu kinaniruhusu kuzunguka ndani ya nyumba kwa uhuru, usalama na usahihi kadri iwezekanvyo: *(mfano nyumbani, kazini, dukani, migahawa, mwinuko, vizuizi)*	**Nakubali kabisa**	**Nakubali zaidi**	**Nakubali kidogo**	***Nakataa kidogo**	***Nakataa zaidi**	***Nakataa kabisa**	**Haihusiki**
Maoni							

9. kitimwendo changu kinaniruhusu kutoka nje ya nyumba kwa uhuru, usalama na usahihi kadri iwezekanvyo: *(mfano sehemu zisizonyooka, mbaya, majani, mashimo, mwinuko, vizuizi)*	**Nakubali kabisa**	**Nakubali zaidi**	**Nakubali kidogo**	***Nakataa kidogo**	***Nakataa zaidi**	***Nakataa kabisa**	**Haih usiki**
Maoni							
10. kitimwendo changu kinaniruhusu kutumia usafiri wangu au wa jumla kwa uhuru, usalama na usahihi kadri iwekanavyo: *(mfano kutunza, kuhifadhi, kuendesha)*	**Nakubali kabisa**	**Nakubali zaidi**	**Nakubali kidogo**	***Nakataa kidogo**	***Nakataa zaidi**	***Nakataa kabisa**	**Haih usiki**
Maoni							
Kwa swali la 2 hadi la 10: **Kipimo** *(mfano kitimwendo na upana wa fremu ya kukalia, urefu, kimo)* **kutosha** *(mfano: siyo kubwa sana, siyo ndogo sana, inaruhusu unapohitaji kusogea)* **Kusetiri mwili** *(mfano inatoa mhimili, kuzuia, kuthibiti mwili – mifupa, misuli na minofu)* **Kutumika** *(mfano mbio, magurudumu, godoro, kithibiti, egemeo la nyuma, egemeo la miguu, mkanda wa miguu, mfumo wa inamisho, mnyanyuo wa kiti, trey ya pajani, kikapu, kishikio cha mkongojo,honi, taa)*							

Section C: Quest 2.0 instrument – Swahili Version

Jibu kwa kuzungushia duara kwenye namba inayoendana vizuri zaidi na kuridhika kwako na kitimwendo chako. Kila swali jibu mara moja tu.

	1	2	3	4	5
	Siridhiki kabisa	Siridhiki sana	kidogo naridhika	Naridhika sana	Naridhika kabisa
Kitimwendo Umeridhika vipi na;					
1 **Kipimo** (ukubwa, kimo, urefu, upana) Maoni	1	2	3	4	5
2. **Uzito** wa kitimwendo chako Maoni	1	2	3	4	5

3.**Urahisi wa kurekebisha** (kufunga, kukaza) sehemu za kitimwendo chako) Maoni	1 2 3 4 5
4. Usalama na **uimara** wa kitimwendo chako ukoje?. Maoni	1 2 3 4 5
5. U**imara** wa kitimwendo chako? Maoni	1 2 3 4 5
6. **Urahisi** wa kutumia Maoni	1 2 3 4 5
7. Utulivu Maoni	1 2 3 4 5
8. Kinavyosaidia maoni	1 2 3 4 5
Huduma: Unaridhikaje na,	
9. Mpango wa **utoaji huduma** (taratibu, urefu wa muda) ambao unapata kitimwendo chako. Maoni	1 2 3 4 5
10. **Ukarabati** na **marekebisho** na **huduma** inayotolewa kwa kitimwendo chako? Maoni	1 2 3 4 5
11. Huduma za wataalamu (mwenendo, elimu, , kujali mahitaji yako). Maoni	1 2 3 4 5
12. Huduma za ufuatiliaji Maoni	1 2 3 4 5

Additional questions (Samuelsson and Wressle, 2008) - Swahili Version

Mahitaji ya kushiriki

Unawezaje kusema kitimwendo kimechangia yafuatayo? Kata (X) kwenye kisanduku

Tafadhali tunaomba ujibu maswali yafuatayo kuhusiana na kitimwendo chako.

	Hakika	Hakuna kabisa	Haijasaidia	Haihusiki
1. Uwezekano wako wa kufanya kazi				
2.Uwezekano wako kupelekea kuishi maisha huru				
3. Uwezekano wako kufanya manunuzi				
4.Uwezekano wako wa kushiriki katika jamii				
5. Kutembea kwako				
6 Uwezo wako wa kushiriki kwenye michezo				

Appendix 3: Participant information leaflet (English version).

TITLE OF THE RESEARCH PROJECT: Locally manufactured wheelchairs Tanzania: Do they meet the needs of Tanzanian wheelchair users?

REFERENCE NUMBER:……

PRINCIPAL INVESTIGATOR: DR. HELEN BUCHANAN
INVESTIGATOR: ASTON NDOSI

ADDRESS: P.O.BOX 8690, MOSHI, TANZANIA

Email: ndosiaston31@hotmail.com
CONTACT NUMBER: +255 713 58 82 92, +255 27 27 53 986/7

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is entirely voluntary and you are free to refuse to participate. If you say no, this will not affect you negatively in any way at all. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the Health Research Ethics Committee (HREC) of the University of Cape Town as well as the Kilimanjaro Christian Medical College (KCM) Research Ethical Committee of the Tumaini University in Tanzania and will be conducted according to the ethical guidelines and principles of the International Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about?

The study will be conducted in Kilimanjaro, Arusha and Dar es Salaam Regions in Tanzania. There would be no other sites be included in the study. All registered wheelchair users, approximately 250, and those who are not registered but will be available during data collection will form the study population. All wheelchair users will have an equal chance of being selected. The registration records from workshops in each region and KASI will be used to find names.

The research will attempt to determine if the needs of users of locally manufactured wheelchairs in Tanzania are being met. You are requested to provide information about your daily experiences on locally manufactured wheelchairs in Tanzania, to what extent your needs have been met, to assess if the wheelchair has met your functional and participation needs, to determine if the wheelchair has met your environment needs, and if your wheelchair is safe and durable. The study will also be investigating how easy is it to get a wheelchair, repair and maintenance, your daily use of a wheelchair in your surroundings, whether the wheelchair is comfortable, whether it is safe, and whether it has met your general satisfaction. Your response will help the study find ways in which the service can be improved.

All the answers will be confidential. Only the researcher, assistants, supervisors, and statistician will see the information. No names or other identifying particulars will be used on the data collection tools or during data analysis. Numbers will be allocated to each participant and used on the questionnaires. All identifying particulars will be stored in a password protected file on the researcher's personal computer. The researcher will identify a separate storage place like a cupboard which will be locked all times where soft and hard copies of data will be stored. Once the study findings have been finalised all data will be destroyed.

You are free to refuse to participate in the study. Nobody will be forced to participate.

No services will be provided during the study such as treatment or repair of any part of the wheelchair. If any services are required you will be directed to the nearest workshop.

Why have you been invited to participate?

The study on the needs of the users of locally manufactured wheelchairs in Tanzania would like value your opinion on the use of the locally manufactured wheelchairs that to what extent your needs have been met. The information you provide will help to allow the study to make recommendations to the personnel involved in the rehabilitation services (stakeholders) and the government to develop policy guidelines on the production and distribution system for low cost wheelchairs appropriate to Tanzania.

What will your responsibilities be?

You will be requested to give correct and honest information. The interview will take place at a convenient place for you. Answering the questionnaire is expected to take between 30 – 35 minutes.

What will happen if you cannot read or write?

If you cannot read or write, you will be asked to nominate a witness who will make sure that the information you give is written down correctly. The researcher will read questions and optional answers out for you and fill in the questionnaire on your behalf with the witness present. After the completion it will be read back for you to confirm that the information you have given has been recorded correctly. Both you and the witness will be required to sign the consent form. You will use the finger print of your thumb (for finger print) and the witness will sign.

Will you benefit from taking part in this research?

There is no direct benefit for you, but improved services might benefit you and all other wheelchair users in the region since it should lead to improved wheelchair services.

Are there any risks involved in your taking part in this research?

There are no known risks involved in taking part in this study.

If you do not agree to take part, what alternatives do you have?

If you do not wish to participate, you are free to refuse and there would be no consequences for you. Participation is voluntary and refusal will not influence your future access to wheelchair services, rehabilitation services or health care or have any other negative consequences for you.

Who will have access to your medical records?

This study will not need any information from medical records.

What will happen in the unlikely event of some form injury occurring as a direct result of your taking part in this research study?

There is no injury expected since participants will only be answering questions.

Will you be paid to take part in this study and are there any costs involved?

If you do take part you will not be paid although in some occasions refreshments may be provided.

Is there anything else that you should know or do?

Participants' will be requested to inform their family members that he/she is taking part in the study. They should inform them where and when the study is taking place

If there is any further enquiry, need of any clarification, or encounter any problem participants can contact Mr Aston Ndosi at telephone number +255 27 27 53986/7 Ext. 30 or mobile number +255 713 58 82 92.

Participants can contact the following if there are any concerns or complaints that have not been adequately addressed by the researcher:

The Chaiperson of the Human Research Ethics Committee - University of Cape Town, Associate Professor Marc Blockman, Room E52.23, Old Main Building, Groote Schuur Hospital, Observatory, 7925, Cape Town, South Africa; Tel +2721 406 6338, Fax +2721 406 6411

or

The Chairman of Health Research Ethics Committee, Kilimanjaro Christian Medical – College of Tumaini University, Prof. Frank Mosha at P.O.Box 2240 Moshi, Tanzania, Tel: + 255 272753909

All participants will receive a copy of the information form.

Appendix 4: Consent form (English version)

Declaration by participant

By signing below *I,* …….. agree to take part in a research study entitled: **LOCALLY MANUFACTURED WHEELCHAIRS IN TANZANIA: DO THEY MEET THE NEEDS OF TANZANIAN WHEELCHAIR USERS?**

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have allowed the researcher to read questions and optional answers for me and fill in questionnaire because I cannot write or read. I nominated a witness whom I trust to make sure that all information written and my responses are correctly captured by the researcher.
- I fully agree to provide the time allocated for responding to questions as indicated in the information leaflet.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I am aware that there is no remuneration for taking part in this study.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) .....….....on (*date*) ……..……2012/2013.

....
Signature of participant Signature of witness (If applicable)

Declaration by investigator

I , *Aston Ndosi,* declare that;

- I explained the information in this document to ……..
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use a interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*

Signed at (*place*) .....….....on (*date*) ……..…….. 2012/2013.

.....	.....
Signature of investigator	Signature of witness (*If applicable*)

Declaration by interpreter

I *(name)* ……..…… declare that:

- I assisted the investigator (*name*) …….. to explain the information in this document to (*name of participant*) ……..…… using the language medium of ……
- We encouraged him/her to ask questions and took adequate time to answer them.
- I conveyed a factually correct version of what was related to me.
- I am satisfied that the participant fully understands the content of this informed consent document and has had all his/her question satisfactorily answered.

Signed at (*place*) .....…..... on (*date*) ……..……..2012/2013

....

Signature of interpreter Signature of witness (if applicable)

Please contact me or the following persons if you have any question or require any further information at the following number:

Mobile: 0713 58 82 92

…….

Aston Ndosi

Student number: **NDSAST001**

Prof. Dele. S. Amosun & Dr Helen Buchanan.

Phone No. +2721 406 6992 / 406 6383

Department of Health and Rehabilitation Sciences,

University of Cape Town,

Faculty of Health Sciences,

GSH Old Main Building,

Anzio Road, Observatory 7925,

Cape Town, SOUTH AFRICA.

Appendix 5: Participant information leaflet (Swahili version).

FOMU YA MAELEZO NA RUHUSA YA MSHIRIKI

KICHWA CHA HABARI CHA UTAFITI:

UTENGENEZAJI WA VITIMWENDO VILIVYOTENGENEZWA HAPA TANZANIA. JE, VINAKIDHI MAHITAJI YA WATUMIAJI WA TANZANIA?

KUMBUMBU NAMBA:……

MTAFITI MKUU: DR. HELEN BUCHANAN
MTAFITI: ASTON NDOSI
ANUANI: P.O.BOX 8690, MOSHI - TANZANIA
BARUA PEPE: ndosiaston31@hotmail.com

NAMBA ZA SIMU: +255 713 58 82 92, +255 27 27 53 986/7

Umekaribishwa kushiriki kwenye utafiti. Tafadhali tumia muda kusoma maelezo yaliyowasilishwa hapa ambayo yanaelezea undani wa utafiti huu. Tafadhali uliza wataalam wa utafiti huu maswali yoyote juu sehemu yoyote ya utafiti huu ambayo hujaelewa sawasawa. Ni muhimu sana wewe kurithika kabisa kwamba umeelewa kabisa juu ya utafiti huu na jinsi ambavyo wewe utashirikishwa. Pia ushiriki wako ni wa hiyari kabisa na uko huru kuktaa kushiriki. Endapo utakataa kushiriki, hii haitaathiri kwa kutoa mtizamo hasi kwa namna yoyote ile. Uko huru pia kujitoa kutoka kwenye utafiti wakati wowote hata kama ulikubali mwanzoni kushiriki.

Utafiti huu umeidhinishwa na **Kamati ya Afya ya Maadili ya Utafiti katika Chuo Kikuu cha Cape Town na** Kamati ya Maadili ya Utafiti ya Kilimanjaro Christian Medical College (KCM) ambacho ni chuo kikuu kishiriki cha Chuo Kikuu Tumaini,

na utaendeshwa kwa kufuata kanuni za maadili na misingi ya kimataifa ya Tamko la Helsinki, taratibu za Afrika Kusini juu ya “Good Clinical Practice” **na Baraza la Utafiti wa Tiba za Afya na taratibu za Utafiti.**

Utafiti huu unahusu nini?

Utafiti huu utafanyika katika mikoa ya Kilimanjaro, Arusha na Dar es Salaam nchini Tanzania. Mikoa hii mitatu itatumika kama sampuli kuwakilisha mikoa mingine ya Tanzania. Hakutakuwa na sehemu nyingine yoyote itakayojumuishwa kwenye utafiti ingawa kwa siku za baadaye kutegemeana na matokeo ya ya utafiti, utafiti mkubwa utafanyika kuhusisha mikoa yote ya Tanzania..

Uwiano utafanyika kulingana na mkoa. Asilimia kubwa itachukuliwa kulingana na idadi kubwa ya watumiaji wa vitimwendo walio kwenye mikoa. Utafiti huu utafanyika kutokana na orodha ya watumiaji iliyoandikishwa kwa kila karakana ya vitimwendo. Sampuli ya watumiaji wa vitimwendo itapatikana kutokana na watumiaji wote walioandikishwa na wasioandikishwa.

Utafiti unakusudia kupata picha ikiwa mahitaji ya watumiaji wa vitimwendo vilivyotengenezwa Tanzania yamekidhiwa kulingana na taratibu za Shirika la Afya Ulimwebgunu (WHO) kuhusu vitimwendo.Ninakuomba unifahamishe juu ya uzoefu wako juu ya matumizi ya vitimwendo vilivyotengenezwa Tanzania kwa kiasi gani vimekidhi mahitaji yako, kuchunguza kama kitimwendo kimekidhi mahitaji yako ya kushiriki kwenye shughuli mbali mbali,kuthibisha kama kitimwendo kimekidhi mahitaji yako ya mazingira, ikiwa kitimwendo ni salama na imara. Nitakuwa pia ninaangalia urahisi wa kupata, gharama ya kitimwendo, uwezekano wa kurepea na matengenezo, matumizi yako ya kila siku kwenye maeneo yanyokuzunguka, kama kitimwendo kinakupa unafuu/furaha, kama kinakuhakikishia ulinzi, na kama kwa ujumla kimekuridhisha. Majibu yako yatanisaidia mimi kutafuta njia za kupendekeza uboreshaji kwa watu wahusika wanaoshiriki kwenye huduma za tiba ikijuimusha serikali

Kila mshiriki atahojiwa na kujibu maswali. Inapobidi maelezo yatarekodiwa. Maelezo yote yatakayopokelewa kutokana na maswali yakuwa ni siri na hakuna majina yatakoyoandikwa. Maelezo yote yatawekwa kuwa siri. Maafisa wanaohusika na utafiti tu kama wasimamizi, mtakwimu, watapata nafasi ya kuyaona maelezo kwamba watachunguza maelezo yako, kujadiliana na mtafiti na baadae matfiti atachukua hatua ya kuingiza kwenye komputa kwa ajili ya kuchunguza, kutafsiri na kurekodi takwimu. Takwimu zitahifadhiwa kwa njia ya elektroniki kwenye komputa binafsi ya mtafiti na karatasi zitafungiwa na kuhifadhiwa kwa hali ya juu kwenye kabati na funguo kutunzwa na mtafiti. Kuhakikisha siri inatunzwa kwa kiwango cha juu maelezo yatatunzwa kwenye komputa itakayotumia namba au maneno maalumu ili kuweza kuitumia na maelezo yote yatatekezwa kabisa mara baada ya kutumiwa na mtafiti. Mshiriki yuko huru kukataa ombi la kushirikiikiwa wataamua hivyo. Hakuna atakayeshurutishwa kushiriki.

Sampuli ya ya majaribio (pilot) itachaguliwa kwa kubahatisha kutoka kwenye kundi la watumiaji wa viti mwendo vilivyoingizwa hapa Tanzania. Watumiaji viti mwendo vya nje watano watatumika kufanya majaribio ya maswali, lugha kama inaeleweka au inatatanisha, mila na desturi zimezingatiwa. Itaangalia pia endapo kuna swali linalogusa hisia za watu husika.

Hakuna huduma itakayotolewa na mtafiti wakati wa utafiti kama kurepea kitimwendo au matibabu, huduma yoyote itakayohitajika mshiriki ataelekezwa kwenye karakana iliyo karibu.

Kwa nini umechaguliwa kushiriki?

Ninafanya utafiti juu ya mahitaji ya ya watumiaji wa wa vitimwendo vilivyotengenezwa hapa Tanzania. Ningependa kupata maoni yako juu ya utumiaji wa vitimwendo vilivyotengenezwa hapa Tanzania kwamba ni kwa kiwango gani mahitaji yako yamekidhi. Utoaji wa vitimwendo hapa Tanzania lazima uendane na taratibu na misingi ya shirika la afya ulimwenguni (WHO) kwamba vitimwendo vyote lazima view sahihi, kwa hiyo nategemea ushiriki wako

kwenye utafiti huu utasidia kupata vitimwendo vilivyo vinavyofaa. Maelezo yako sahihi yataniongoza kupata mapendekezo kwa watu (washika dau) wanaohusika kwenye huduma za tiba na serikali kutengeneza misingi ya sera ya uzalishaji, na mfumo wa usambazaji wa vitimwendo hapa Tanzania kwa gharama nafuu, ufuatiliaji wa watumiaji, watenengenezaji na wataalamu wa afya.

Majukumu yako yakuwa yapi?

Kama mshiriki, washiriki wote wataombwa kutoa maelezo sahihi kadri iwezekanavyo na kwa ukweli.

Utafaidika kwa kushiriki kwenye utafiti huu?

Hakuna faida ya pesa kwa kushiriki, lakini wakati mwingine kutakuwa na faida kwa kuwa na kutengenezwa sera ya taifa juu ya uzalishaji na mfumo wa usambazaji wa gharama nafuu hapa Tanzania, ufuatiliaji wa watumiaji wa vitimwendo, watenezaji na wataalamu waangalizi wa afya.

Kuna hatari zozote kwa kushiriki kwenye utafiti huu?

Hakuna hatari zozote zinazotarajiwa kwa kushiriki kwenye utafiti.

Kama hutakubali kushiriki, nini pendekezo lingine ulilonalo?

Ikiwa yeyote hataki kushiriki, yuko huru kukataa na hakutakuwa na madhara yoyote kwake kwa kukataa kushiriki. Kushiriki ni hiyari tupu. Hata hivyo itashukuriwa endapo utamjulisha Bwana Aston Ndosi endapo utakuwa umeamua kujitoa kwenye utafiti.

Nani ataruhusiwa kuona taarifa zako (rekodi) za tiba?

Utafiti huu hautahitaji maelezo yoyote ya rekodi zako za matibabu. Maelezo yote yatakusanywa kutokana na mahojiano na ni hiyari.

Kutatokea nini endapo kwa tukio ambalo halikutegemewa kama kuumia ikiwa ni matokeo ya moja kwa moja ya kushiriki kwenye utafiti huu?

*Hakuna kuumia kunakotegemewa kwa vile washiriki watajibu maswali tu**.***

Utalipwa kwa kushiriki kwenye utafiti huu na kuna gharama zozote?

Ikiwa utashiriki hutalipwa ingawa mtafiti anaweza kutoa maji wakati wa mahojiano.

Kuna kitu kingine chochote ungependa kujua au kufanya?

Washiriki wataombwa kuwajulisha familia zao kuwa wanashiriki kwenye utafiti. Atawajulisha utafiti unafanyika wapi na muda unaofanyika.

Ikiwa kuna maswali yoyote au unahitaji ufafanuzi washiriki wanaweza kumpata Bwana Aston Ndosi kwa simu +255 713 58 82 92, S.L.P 8690 Moshi. Ikiwa una maulizo zaidi kuhusu mtafiti au kukumbana na tatizo lolote unaweza kuwasiliana na Mwenyekiti wa Kamati ya Utafiti wa Binadamu, Chuo Kikuu Cape Town, Professor Marc Blockman, Room E52.23, Old Main Building, GSH, Tel 021 406 6338, Fax 021 406 6411 au

Mwenyekiti wa Kamati ya Maadili ya Utafiti wa Afya KCM – College Prof. A. Mosha kwa anuani S.L.P. 2240 Moshi, Tanzania, Simu + 255 27 27 53909 ikiwa una jambo lolote au malalamiko ambayo hayakuwekwa bayana na mwanafunzi mtafiti.

Mshiriki yeyote atapata nakala ya maelezo na ruhusa ikiwa atahitaji.

Appendix 6: Consent form (Swahili version)

Tamko la mshiriki,

Kwa kusaini hapa chini*, mimi* ……..ninakubali kushiriki katika sehemu ya utafiti yenye kichwa cha habari **KUCHUNGUZA KAMA VITIMWENDO VILIVYOTENGENEZWA HAPA TANZANIA VINAKIDHI MAHITAJI YA WATUMIAJI?.**

Ninatamka kwamba:

- Nimesoma au imesomwa mbele yangu taarifa hii pamoja na fomu ya makubaliano na imeandikwa katika lugha ambayo ninaielewa kwa usahihi.
- Nimemruhusu mtafiti kusoma maswali na majibu na kujaza kwa kuwa siwezi kusoma au kuandika. Nilimteua shahidi ambaye namwamini ambaye atahakikisha nilyosema na kuandikwa na mtafiti ni sahihi.
- Ninakubaliana na muda uliotengwa kwa ajili ya mahojiano haya kama iliyoonyeshwa kwenye karatasi ya maelezo
- Nilipata nafasi ya kuuliza maswali na maswali yangu yote yalijibiwa kwa ufasahaI.
- Ninaelewa kwamba kushiriki katika utafiti huu ni hiari na sijashawishiwa au kulazimishwa kushriki..
- Ninafahamu kwamba hakutakuwa na malipo yoyote kwa kushiriki kwenye huu utafiti.
- Ninaweza kuamua kuacha kushiriki katika utafiti huu wakati wowote na sitaadhibiwa au kushutumiwa kwa hali yoyote ile.
- Ninaweza kuamriwa kuachana na utafiti huu kabla haujamalizika kama mtafiti ataona ni bora kwa manufaa yangu au kama sizingatii utaratibu wa utafiti kama nilivyokubali mwanzoni kufanya hivyo.

Sahihi (*mahali*) .....….....(*tarehe*) ……..…… 2012/2013.

..... **.....**

Sahihi ya mshiriki Sahihi ya shahidi (Kama anahitajika)

Tamko la mtafiti

Mimi Aston Ndosi natangaza kwamba :

- Nimetoa maelezo kwenye fomu hii kwa..... Nilimsisitizia kuuliza maswali na alipata muda wa kutosha Nimeridhika kwa ufasaha alielewa vipengele vyote vya utafiti kama ilivyotajwa hapo juu
- Sikutumia/Nilitumia mkalimani. (*Ikiwa mkalimani alitumika lazima atie sahihi tamko hapo chini)..*

Ilisainiwa (mahali).....…..…… (*tarehe*) ……...…… 2012/2013.

…….. …….. ……

Sahihi ya mtafiti sahihi ya shahidi (Kama anahitajika)

Tamko la mkalimani

Mimi I *(jina)* ……..…… natamka kwamba

- Nilimsaidia mtafifitiI (jina) …… Kutoa maelezo kwenye fomu hii kwa (jina) .....kwa kutumia lugha ya.....
- Tulimsisitizia kuuliza maswali na lilpata muda muafaka kujibu Nilifikisha kwa ukweli na usahihi habari ambayo ilinihusu mimi

- Nimeridhika kwamba mshiriki alielewa kabisa maelezo yaliyoko kwenye fomu ya ruhusa na alipata kujibiwa maswali yake yote kwa kuridhika.

Sahihi (mahali) .....….....….(*tarehe*) ……../2013

..... **.....**

Sahihi ya mkalimani Sahihi ya shahidi (kama anahitajika)

Appendix 7: Ethical approval letter

UNIVERSITY OF CAPE TOWN

Faculty of Health Sciences
Human Research Ethics Committee
Room E52-24 Groote Schuur Hospital Old Main Building
Observatory 7925
Telephone [021] 406 6338 • **Facsimile** [021] 406 6411
e-mail: shuretta.thomas@uct.ac.za

13 September 2012

HREC REF: 477/2012

Mr A Ndosi
c/o Dr H Buchanan & Prof SL Amosun
Health & Rehab
F-Floor
OMB

Dear Mr Ndosi

PROJECT TITLE: LOCALLY MANUFACTURED WHEELCHAIRS IN TANZANIA: DO THEY MEET THE NEEDS OF TANZANIAN WHEELCHAIR USERS?

Thank you for submitting your request to the Faculty of Health Sciences Human Research Ethics Committee for review.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

Approval is granted for one year till the 30th September 2013

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/research/humanethics/forms)

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please quote the HREC. REF in all your correspondence.

Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN ETHICS
Federal Wide Assurance Number: FWA00001637.

Institutional Review Board (IRB) number: IRB00001938
This serves to confirm that the University of Cape Town Human Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Convention on Harmonisation Good Clinical Practice (ICH GCP) and Declaration of Helsinki guidelines.

The Human Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 312.

s.thomas