CHAPTER TWO

Conceptual Framework and Literature Review

2.1 Introduction

This chapter presents the conceptual framework of the study and the literature review, focusing on four areas, namely, policy, products, personnel, and provision. It highlights some details that are known in the four focus areas, and touches on the existing gaps The available literature was sourced and organised within the analytical framework. The review focussed on literature relevant to the purpose of the study. The following databases were searched: Google Scholar, Stellenbosch University library, Scopus and PubMed. Key words related to prosthetics, assistive technology products, rehabilitation, policies, and health services were utilized to find suitable literature. No articles that presented research on prosthetics from Namibia could be identified. Similarly, no articles could be found that explored and compared the prosthetics service delivery system of a country to the WHO global standards for orthotics and prosthetics. The bulk of research referred to in this review were conducted in various other African countries. The steps for the literature review process are depicted in figure 2.1 below.

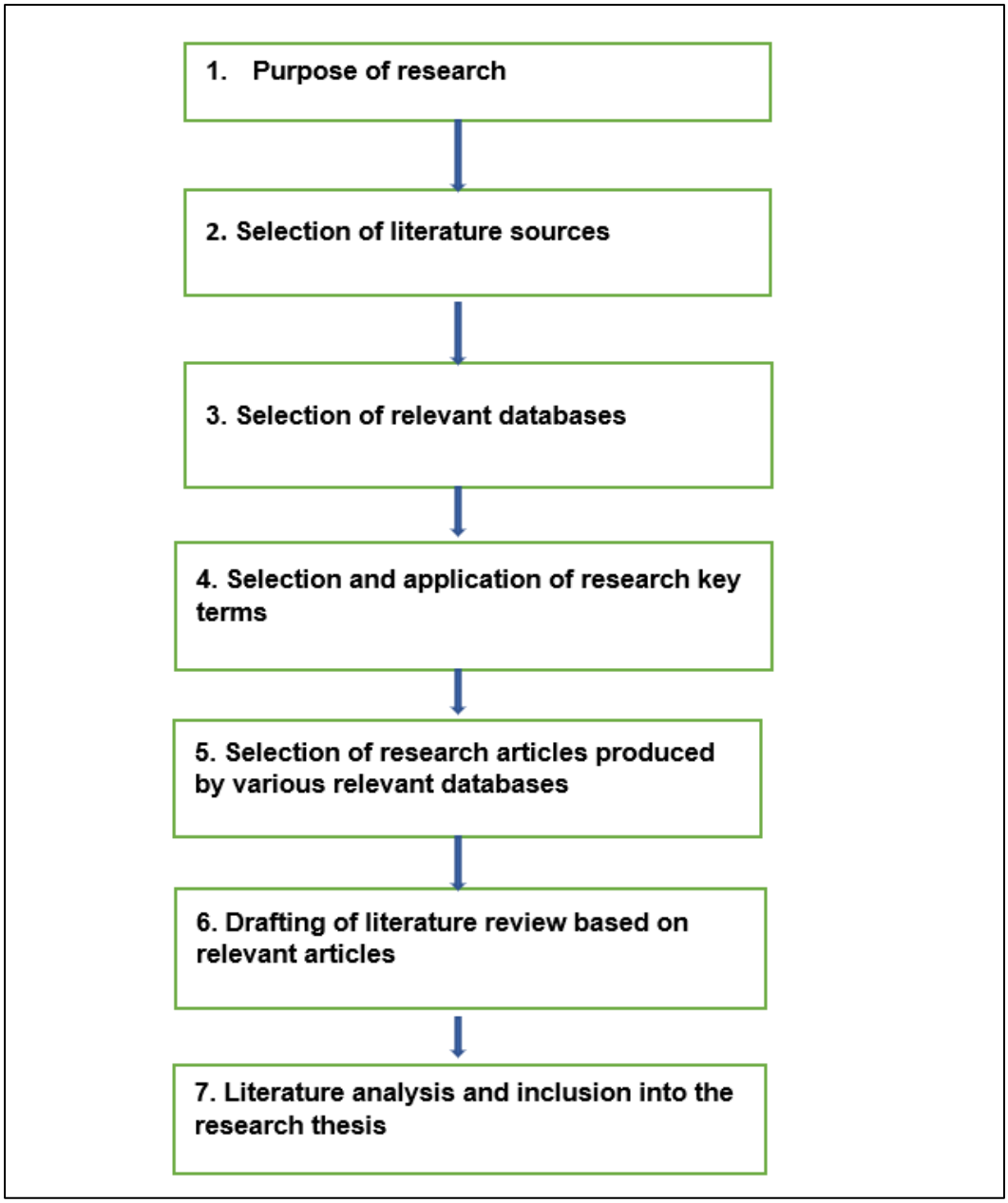


Figure 2.1: Literature review process (Source: Author)

2.2. Conceptual framework

The 60 WHO standards for orthotics and prosthetics are divided into four focus areas, that are referred to as the four “Ps”. These are **Policy, Products, Personnel** and **Provision.** These areas provided a conceptual framework for this study as presented in Figure 2.2. Fifteen of the standards focus on policy, nine (9) are related to products, 12 deal with personnel and 23 with service provision as per Appendix one.

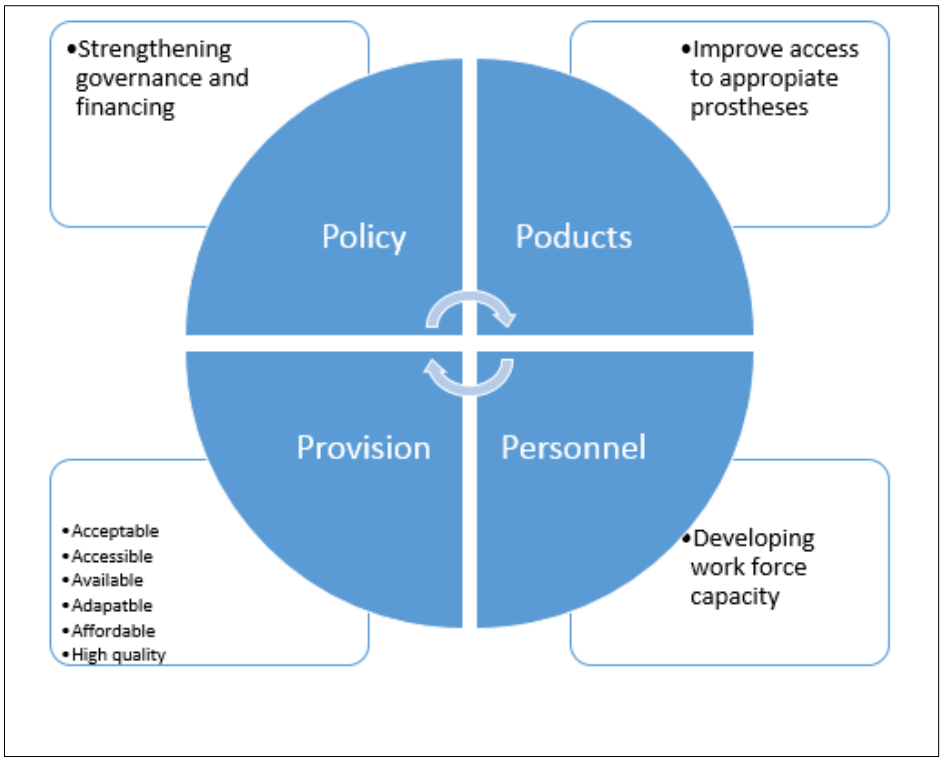


Figure 2.2: The four focus areas of WHO standards for orthotics and prosthetics and framework of the current study (Source: Adapted from WHO, 2017: xviii)

Policy standards were formulated to focus on governance, financing, and information. The WHO (2017) global policy standards state in broad that governments must initiate the development of policies that include planning, implementation, monitoring, and a national committee for prosthetics and orthotics. The document argues that a wide range of stakeholders must contribute to policy processes as the understanding and knowledge of issues differ between stakeholder groups and collaboration can assist to develop the most appropriate policy. The global standards further expect states to consider prosthetics and orthotics like any other health intervention and attain appropriate funding for these services. International support must comply with national polices and guidelines and help to establish these services where necessary (WHO, 2017).

The WHO (2017) global product standards focus on the availability of a range of products, particularly materials and components in the local region. The WHO further states that there is a need to develop affordable prosthetics products that are cost effective, of good quality, and are appropriate for the user (WHO, 2017).

The next “P” refers to personnel and it emphasises the need for an adequate number of service providers who have sufficient training to meet the demand of the country. It also emphasises the importance of mentoring, supervision, continued professional development, and career pathways (WHO, 2017).

Finally, the WHO standards for prosthetics and orthotics focus on service provision and they prefer that prosthetic services should be integrated into the healthcare systems of countries and these should be provided at the primary, secondary and tertiary levels of care. Prosthetics services must respond to the needs of the users and these have to address their dignity, choices, and rights. Services must be comprehensive, user centred, accessible, acceptable, and affordable. Users must be active participants in service delivery rather than passive recipients (WHO, 2017).

2.2.1 Policy

Policies are important tools that are required for service provision as they provide guidance, a sense of responsibility, uniformity, and clarity on how a service should operate. For prosthetic service users to fully benefit from assistive technology services and become meaningful participants in society, regional, national, and subnational prosthetic policies should be developed (Maclachlan et al., 2018).

Policies also provide guidance for the funding of health services (Johnston et al., 2021). They assist service managers to allocate funds according to priorities and needs. In less resourced settings such as in many African settings, the lack of appropriate policies was identified to be among factors that led to the poor provision of assistive devices (Khasnabis et al., 2015; Visagie et al., 2017).

Prosthetics span the life stages and roles of users, thus, policies and services to meet users’ needs must do the same (MacLachlan et al., 2018; Baudin et al., 2020). This implies that policies are not the responsibility of health and social services only, but they should include areas like education, labour, and transport to name a few (MacLachlan et al., 2018).

Smit et al. (2022) found that with regards to Malawi, no government department or other single organisation were central in the provision of assistive technology. Their

results showed complex connections between and within different ministries, NGOs, DPOs, and service delivery organisations (e.g., hospitals and schools), thereby necessitating the policy to accommodate and include the roles of various entities. For the national policy to be successful, it must allow operational flexibility to accommodate services that are delivered through different entities, different ways and in different subnational contexts (Baudin et al., 2020).

Because multiple government departments and other stakeholders such as NGOs, and users are responsible for policy development and implementation, the processes are inherently complex. Not having a specific ministry responsible for leadership, policy development, implementation and review is unconventional and challenging (Smit et al., 2022). However, it provides opportunities for collective leadership with ministries sharing the responsibility amongst them (Smit et al., 2022).

De Brun et al., (2019) reported that positive outcomes can be expected from collective leadership in health care interventions based on a systematic review. But they caution that further research is needed. Baudin et al., (2020) concluded from a review of the existing literature that globally, AT provision is a complex area with little policy guidance. Similarly, the WHO standards document pointed out that the leadership and governance to manage prosthetics services are lacking in many countries (WHO, 2017).

In the absence of a national policy, decision making is inconsistent and often protracted with negative consequences for service delivery. As such, loss of time and inappropriate products might result (Baudin et al., 2020). Currently, an absence of policies or where polices are available, poor implementation hampers prosthetic services in countries around the globe, but more so in middle- and low-income countries (WHO, 2017; Tangcharoensathien et al., 2018) and in Africa (Allen et al., 2020).

Governments are expected to take a lead in policy development and the coordination of prosthetics services as indicated by the WHO (2017), prosthetics standards and literature (MacLachlan et al. 2018). To start the process of policy development, governments must develop a working platform that allows the involvement of and sharing between all stakeholders especially the users during the development of the

policy and a national guiding framework as well as the implementation and monitoring of the policy and framework (Lemaire et al., 2018). The committee should include AT users and their representatives, members of marginalised groups and persons living in rural areas (Maclachlan et al., 2018; Smit et al., 2022).

Lang et al. (2019) proffer that the involvement of persons with disabilities in policy development and implementation was largely missing in nine important African Union policies. A review on the inclusion of persons with disabilities in health care policy development in Ghana concurs with this finding (Seidu et al., 2021). Lang et al. (2017) further found that while policies acknowledged the right of persons with disabilities to be included, inclusion on a practical level was lacking due to a shortage of integrated implementation plans, insufficient financial provision, and poor monitoring and enforcement strategies.

Smit et al. (2022) recommends that policy development and implementation in countries should start with the exploration of existing networks and organisations involved in service provision. The information gained will assist to identify organisations that are optimally suited to assist with the monitoring and implementation of policies. Furthermore, Smit et al. (2022) described stakeholder-led policy development and implementation processes in AT services in Malawi.

A policy should provide guidance on who should receive AP such as prosthetic devices (Baudin et al., 2020) and on what the decision to provide a device or not is based, e.g., whether only the person's medical condition is taken into consideration or whether life roles, and the physical and social environment are also considered (Baudin et al., 2020). Furthermore, a policy should include guidance to ensure suitable infrastructure and resources for service delivery as well as integrated, inclusive, equitable and accessible services (Baudin et al., 2020). It should guide transitions between life stages and meeting users' needs seamlessly through various life stages (Baudin et al., 2020).

A number of policies guiding the provision of services for PWDs in Namibia has not been reviewed (Chichaya, 2020). A revision of policies is important because an outdated policy can have a serious and negative impact on service delivery, as this may not be in line with current trends and is not responsive to the current needs of

service users and providers, thereby leading to services in the country to lag behind global developments (www.powerdms.com; MOHSS, 2014).

2.2.2 Products

It is important to select appropriate lower limb prosthetic components based on the individual needs of users and the environment they live in (Kam et al., 2015). Reliability, safety, and cost must also be considered when selecting prosthetic components (Baudin et al., 2020). Prosthetic function is greatly impacted by the prosthesis and more especially the socket design and fit, the suspension system, prosthetic alignment, knee, and foot components (Paternò et al., 2018). There are numerous lower limb prosthetics components that are available on the market, and these are produced by several different manufacturers around the world. The various components available have different abilities, safety features and dimensions (Asif et al., 2022) to meet various needs and realities of service users based on the level and cause of amputation, physical abilities, and functional requirements as well as the environment where service users live, as outlined by WHO (2017) and Kam et al., (2015).

Prosthetic components that are expensive and of higher quality allow greater functional ability (Windricht et al., 2016; Fanciullacci et al., 2021). These are often not available in African countries. In many African settings, polypropylene technology, a low-cost technology developed by the International Committee of the Red Cross (ICRC) is still commonly used in the production of prosthetic devices (Magnusson & Ahlström, 2017).

Based on engineering principles, lower limb prostheses are categorised into three categories. The first category pertains to passive prostheses. These prostheses do not provide any power to the system and they require the user to move the prosthesis with his/her residual muscles. Passive prostheses offer basic functions. Secondly, semi-active prostheses can change their behaviour and react to external input through microprocessor technology. Greater functional abilities and flexibility can be achieved through semi-active prostheses. The third category, active prostheses, are powered by an external source such as a motor. Performance and function are enhanced, but these systems are highly complex (Windricht et al., 2016; Asif et al., 2022). Worth

noting is that the components used in Namibia and Africa are mainly from the first category.

To select appropriate prosthetic components for a user, it is ideal to examine the user's functional abilities to determine his/her rehabilitation potential. One of the methods commonly used is determining the K-level of the user. The prosthetist uses outcome measures such as the Amputee Mobility Predictor (AMP), or Patient Assessment Validation Evaluation Test (PAVET), to determine a K-level rating between K-0 to K-4. K-0 is a rating for users with the lowest mobility potential and K-4 is a rating for most active users such as athletes. The K-level is then used to prescribe appropriate prosthetic components based on the user's functional ability and the expected functional outcomes, which range roughly from limited household ambulator to athlete as mentioned earlier (www.ipsprosthetics.com; Roffman et al., 2016; Orendurff et al., 2016). However, K-levels do not consider the environment in which the user has to function (Orendurff et al., 2016).

Prosthetics service users in various African settings reported high use and mobility with their prosthetic devices, despite the pain and difficulties when walking on uneven ground, but they could not use their devices for long hours and distances, and some were not pleased with the cosmetic appearance of their devices (Magnusson and Ahlström, 2017; Ennion et al., 2017; Pienaar & Visagie, 2019).

To ensure optimal function and safety, it is essential that appropriate prosthetic components are available and prescribed (Sheehan et al., 2021). In the prosthetics field, the definition of appropriate technology is adopted from the International Society for Prosthetics and Orthotics (ISPO) as follows: "Appropriate technology is a system of providing fit and alignment which suits the needs of the individual and can be sustained by the country at the most economical and affordable price". This definition has however, caused a conundrum as it requires that the final product addresses the needs of users and supports their day-to-day activities (Sheehan et al., 2021).

However, the cost of prosthetic components in conjunction with a shortage of financial resources means that in many low-and middle-income countries (LMIC), appropriate prosthetic products are not adequately available. The very product that is appropriate based on the needs of the user might not be appropriate based on the country's ability

to fund it in a sustainable manner. The average cost for a lower limb prosthesis is estimated to be between US$5,000 to US$50,000 (www.disabled-world.com; aabme.asme.org), ranging from basic to advanced prostheses. Therefore, there is confusion on whether to consider the function, durability, or cost of the product when appropriateness is considered, and trade-offs must be made (Wyss et al., 2015).

However, the durability of prosthetics products may be enhanced by maintenance and repair. Regular maintenance and repair have been found to increase the lifespan of prosthetic devices (Magnusson & Ahlström, 2017). Therefore, it is important to ensure that for facilities to have appropriate products, regular maintenance and repair of products should be available.

An additional aspect that has received little attention in African settings is that the initial high financial output to procure components that allow higher levels of functionality can be offset by cost savings over time. Studies have shown that more expensive components such as microprocessor knees come with free of charge service plans and they have a longer lifespan than other knee components. More advanced componentry also reduces the number of serious falls and with that, this indirectly saves money on health care costs (Chen et al., 2018; Kuhlman et al., 2020). The financial advantages of a person being economically active must also be added to this argument.

WHO Global Cooperation on Assistive Technology (GATE) developed a priority assistive product list (WHO 2016). One of the products on the list is lower limb prostheses. However, the list does not provide any information on the components that should be available for manufacturing lower limb prostheses. Countries are also expected to develop their own national priority assistive product lists. The GATE list can provide a guideline, but country specific needs must also be considered (Visagie et al., 2020).

Available figures show that 39% of member states in the WHO Africa region have developed national priority lists of assistive products (WHO 2021). The lists developed by some of the African countries such as Nigeria and Sierra Leone were found to contain prosthetic products (Federal Ministry of Health, 2022; Ministry of Health and Sanitation, 2022). However, Namibia has not yet developed its own national assistive products list, but efforts are being made to follow suit.

A national priority list may help service managers to mobilise appropriate financial resources and provide guidance on important products that must be procured or made available, and finally influence competition among suppliers to ensure that products are procured at an affordable cost (WHO 2017). Efforts must be aimed at addressing the mentioned aspects and to respect the needs and rights of persons with disabilities.

2.2.3 Personnel

A prosthetic service of high quality is dependent on competent providers that can assess, prescribe, manufacture, fit and train service users (Baudin et al., 2020). Their role includes the clinical reasoning, responsibility, and accountability as well as ongoing follow up to assist users to achieve their maximal potential when using the prosthesis (Highsmith, 2015). Competence is dependent on current skills and education as well as access to further education (Baudin et al., 2020).

Countries are expected to carry out the training of prosthetics and orthotics professionals as part of comprehensive human resource development for healthcare service provision. Prosthetics training courses should be available at local training institutions or they have to be introduced if they are not available so as to ensure that the required professionals are trained locally. Many LMIC, especially in Africa, have been neglecting rehabilitation services in terms of the training and development of rehabilitation professionals (Gupta et al., 2011; Morris et al., 2021) which includes prosthetics professionals. It has been reported that most prosthetics professionals employed in Sub-Saharan African countries were trained at the prosthetics training institution in Tanzania through international scholarships (Sexton, 2010; Sexton 2016). Thus, donors appear to have been leading the race instead of government funding in terms of prosthetics human resource development.

Among the African institutions offering training programmes in prosthetics and orthotics, only five are accredited by the International Society for Prosthetics and Orthotics (ISPO). ISPO Accredited institutions are the Tanzania Training Centre for Orthopaedic Technologists; the Ecole Nationale des Auxiliaires Médicaux (ENAM) in Togo; the Sudanese Diploma in Prosthetics and Orthotics; the Orthopaedic Technique Vocational and Educational Training Programme in Ethiopia and the University of Rwanda (Aduayom-Ahego et al., 2017). There are only three levels of qualifications

that are available in Africa at all African training institutions offering prosthetics and orthotics programmes, that is, those both accredited by ISPO and those that are not accredited. The three levels of qualifications are the certificate, diploma and bachelor's degree in prosthetics and orthotics, and there are no training programmes that are available at Master's degree or PhD level (Aduayom-Ahego et al., 2017; Boshof, 2021).

These training challenges make it difficult for prosthetics professionals in Africa to progress further in their careers to levels where they can contribute to research and the advancement of the profession. Institutions that are not accredited by ISPO are regarded as offering programmes that are not at par with international standards (Boshof, 2021) and professionals trained at unaccredited institutions are likely to face difficulties in pursuing further education in prosthetics and orthotics at universities that are outside Africa, and sometimes the situation forces them to pursue further studies in generic courses.

Prosthetics personnel are expected to enrol and engage themselves in continuous professional development and research to ensure that they are up to date with current professional practices as well as improved knowledge and skills during their years of working. In low-income African countries, there is a shortage of continuous professional development programmes and research (Magnusson et al., 2016; McDonald et al., 2020).

To meet service demands of the country, prosthetics personnel are expected to be available in all parts of the country. Meanwhile, in Africa, prosthetics professionals have been found to work mostly in urban areas (Magnusson et al., 2016; Mduzana et al., 2020).

To ensure that prosthetics service delivery remains continuous and sustainable in the country, professionals offering these services should be employed in well-structured employment systems with appropriate career progression, incentives, and safe work environments. Risk or unsafe work environments for prosthetics professionals were found to still exist in both high and low-income countries including African countries (Anderson et al., 2016; Marino et al., 2015), whereas lack of proper career progression was found to exist in Africa and other low-income countries (Marino et al., 2015).

Furthermore, to ensure that prosthetics services being rendered in the country are provided by competent professionals and are safe for service users, prosthetics professionals must perform their duties based on healthcare service ethics and regulations, thus they should be licenced and professionally registered. Some degree of regulation of the prosthetics workforce was found to be available in 15% of the world's 197 countries and countries of higher economic status were found to be well regulated compared to countries of lower economic status (Clarke et al., 2021).

Meanwhile, there is also an emphasis on the importance of a multidisciplinary team approach in rehabilitation service delivery to persons with complex physical impairments (WHO, 2017; Utiyama et al., 2022). The inadequate number of prosthetists and other service providers such as physiotherapists are a common challenge that hampers teamwork in Africa (Marino et al., 2015; Ennion & Johannesson, 2018; Aenishänslin et al., 2022). The trauma associated with limb loss requires the intervention of a multidisciplinary team for a successful rehabilitation. The team ensures the appropriate reintegration of the service user into the community by providing the therapy, prosthetic devices and psychosocial support. However, in most developing countries, multi-disciplinary teams are not available due to challenges such as the serious shortage of professionals (Ennion & Rhoda, 2016; Ennion & Johannesson, 2018).

2.2.4 Provision

Provision or service delivery can be defined as "everything that is needed to assure that a person with a disability who might benefit from AT (in this instance a lower limb prothesis) actually obtains it and obtains the most appropriate AT solution" (De Witte et al., 2018:468). Service provision must be guided by five principles (De Witte et al., 2018), namely:

- Person centredness
- Participation focussed
- Evidence based
- Ethical
- Sustainable

According to De Witte et al. (2018), the provision process includes seven service delivery steps: (1) initiative/first contact and referral if needed, (2) assessment, (3) typology of the AT solution, determine the appropriate product, (4) selection, (5) authorise funding, (6) production, fitting, and delivery, (7) follow up, maintenance, and repair.

All these steps are dependent on service access. Since the first health care access model by Penchansky and Thomas (1981) in the 1980s, many others have looked at the development and refinement of health care access frameworks (Ricketts & Goldsmith, 2005; Gilson & Schneider, 2008; Obrist et al., 2008; Peters et al., 2008; Levesque et al., 2013). Based on the components commonly used in health care access frameworks, prosthetic service provision must be acceptable, accessible, affordable, available, and of high quality (Obrist et al., 2006; Levesque et al., 2013). Van Rooy et al. (2012) and Eide et al. (2015) highlight the factors that hinder health care service provision such as long travelling distance, the unavailability of services, inadequate hospital products, lack of toilet facilities, lack of money to pay for treatment and lack of transport in African countries including Namibia.

An acceptable service is one that provides devices that suit the user's needs and is culturally appropriate. On a service level, users must feel welcome and cared for. They must be treated with dignity, respect, and privacy. There must be no discrimination on the grounds of gender, age, ethnicity, or any other demographic characteristic (Obrist et al., 2006; Levesque et al., 2013). The prosthetic devices provided must allow users to participate in cultural and lifestyle activities which may include aspects such as walking bare-foot, squatting and sitting cross-legged. The device should also suit the climate (by being resistant to extreme heat, dust, and wet conditions), suit the local terrain, and suit working conditions of the user. Prosthetic components such as the Jaipur foot were developed to allow natural movement such as squatting, that is culturally practiced in some Asian and African countries (Meanly, 1995; Andrysek, 2010). Such designs allow prosthetics service provision to be more culturally inclusive.

An acceptable lower limb prosthesis allows the user optimal function and comfort. The user feels confident in using it. The features of the prosthesis should be checked thoroughly by the service provider before issuing the device to the user. Finally, the service user and the caregiver should have the last say on the choice of components,

fit, function and appearance of the device (WHO, 2017). Discomfort resulting from a poor fitting prosthetic limb and poor mobility were found to be the most common reasons that cause service users to abandon their prosthetic devices (Lee & Veneri 2018; Petrini et al., 2019). Devices causing pain or discomfort is a common occurrence in Africa which points to unacceptability (Magnusson et al., 2013 & 2014; Marino et al., 2015; Pienaar, 2018; Ghoseiri & Bahramian, 2012).

Accessibility means prosthetics services should be physically within reach of users and provided in a barrier-free environment, that ensure access of users (Obrist et al., 2006; Levesque et al., 2013; WHO, 2017). In Africa prosthetics services are mostly available in urban areas (Mduzana et al., 2020). In addition, transport is in poor supply and often expensive (Ennion & Manig, 2019). Travelling might require covering uneven often harsh terrain on foot. This results in decreased accessibility of services (Magnusson et al., 2013 & 2014; Wyss et al., 2015; Visagie et al., 2017; Allen et al., 2020).

Affordability means that prosthetic services and products are affordable (easy to pay) to the user (Levesque et al., 2013; Obrist et al., 2006). The type of technology being used in the country should be cost-effective by being clinically effective, not requiring manufacturing equipment that are technologically too advanced and expensive because products require low service maintenance, produce minimum waste, and should be made of components and materials readily available on the local market.

The type of technology being used have the capacity to promote sustainable development by supporting local entrepreneurship and making use of local markets (WHO, 2017). High costs of services were earlier mentioned to be among factors that hampers prosthetics service provision (Wyss et al., 2015; Allen et al., 2020). In order to meet the Sustainable Development Goals (SDGs), the Universal Health Coverage (UHC) approach if introduced in the country, should be emphasised that services for persons with disabilities including prosthetics services are included (Hashemi et al 2017), so that persons with disabilities do not experience any financial burden for services they need.

In LMIC and Africa, high service fees, lack of government support, and funding shortages were found to be among the leading barriers for accessing prosthetics

services (Wyss et al., 2015; Allen et al., 2020). In many LMIC, lower limb prosthetics services are provided by donors. Donated products might be of poor quality and unsuitable to the environmental requirements of the country it is being donated to (Marino et al., 2015; Dobson et al., 2016; Sheehan et al., 2021).

Availability for lower limb prosthetics products means that, lower limb prosthetics products, components and materials of good quality should be made available (easy to obtain or acquire) in the country and import tax should be renounced on all products that are not available locally (Ennion & Rhoda ,2016; WHO, 2017). It also means the number, knowledge and skills of service providers are adequate to address the users' needs, and finally, that equipment, consumables, and supplies are available (Obrist et al., 2006; Levesque et al., 2013; WHO, 2017; Ennion & Johannesson, 2018).

Rehabilitation services including prosthetics, should be available at the three levels of healthcare, primary, secondary and tertiary (WHO, 2017). In some African settings, these services have been found available at only two levels, tertiary and secondary, while at primary level they are only provided through outreach visits or not available at all, due to lack of professionals at that level (Ennion & Johannesson, 2018; Magaqa et al., 2021). Access to rehabilitation services at the primary healthcare level is key to universal health access, and constitutes several benefits for the user, ranging from cost saving and unnecessary referral, as services are provided either closer to home, school or work (Ned et al., 2017; WHO, 2018).

The UNCRPD recommends that services for persons with disabilities must be locally available, including assistive technology products such as prostheses (UN, 2006). Literature also reiterates the importance of assistive technology service availability and provision (Borg et al., 2009; de Witte et al., 2018). Several authors highlighted long waiting hours, shortage of professionals, and unavailability of quality components due to high costs in less resourced settings in African countries (Ghoseiri & Bahramian, 2012; Magnusson et al., 2013 & 2014; Marino et al., 2015; Pienaar, 2018). Both Ennion & Manig (2019) and Naidoo and Ennion (2019) found a shortage of materials and consumables to manufacture new protheses and maintain, or repair existing prothesis in South African settings.

Furthermore, quality entails the understanding that prosthetic components and materials must be durable, so that sudden or unexpected failure of a device does not

occur and end up injuring the service user. Furthermore, there should be a standard that ensure that, structural and clinical tests are carried out to determine the strength, durability, lifespan and biocompatibility of components and products. It should be ensured that, the prosthetics products to be utilised meet the ISO (International Standards Organization) standards (WHO, 2017).

More research in low-income countries in collaboration with high income countries are still needed for the purpose of investigating the quality of prosthetics components and materials required for low-income countries and to inform optimal matching of components to users (Andrysek, 2010; Balk et al., 2018). A review of literature from 1994 to 2010 showed that, there is still a need to improve quality of prosthetics products used in low-income countries by improving the durability of prosthetic feet, develop more functional prosthetic knee joints, and to simplify the techniques required in manufacturing prosthetic sockets and improve the outcomes, socket fit and prosthetic alignment (Andrysek, 2010).

2.3. Functional limitations of persons with lower limb amputations

In addition to the formulation of appropriate policies and ensuring that service providers and products are available and that the expected prosthetics services are provided, it is also important to remember that service users experience personal factors that hinder them from fully benefitting from prosthetics services. Pain and discomfort have been reported as being among such factors in African settings (Magnusson et al., 2013 & 2014; Marino et al., 2015; Pienaar, 2018; Ghoseiri & Bahramian, 2012). Transfemoral level of amputation has also been found to cause functional limitations for users with such type of amputation level, due to the knee joint and thigh musculature that are missing (Ofiaeli, 2001; Umaru et al., 2015; Rathore et al, 2016). Other personal factors include old age and the presence of underlying comorbidities that have been found to hinder users from performing vigorous activities such as lifting heavy loads and activities such as running (Burkett et al., 2013; Langford et al., 2019; Hadj-Moussa et al., 2021; Diment et al., 2022).

Furthermore, lower limb prosthetics service users in LMIC as well as high-income countries were found to be functioning moderately well with their prosthetic limbs, with

not much restriction on activities of daily living such as walking, and participating in social activities, except for employment and athletic activities (Sinha et al., 2014; Magnusson & Ahlström, 2017; Pienaar & Visagie, 2019; Diment et al., 2022). Most persons using prosthetic limbs in various settings, were found to be able to rise independently from a chair, but many users faced decreased independence in other forms of rising, such as rising from the floor, especially older persons and women (de Laat et al., 2014).

Users who had access to high-tech components such as running blades were able to perform vigorous activities such as running, climbing stairs, and jumping, even to levels that were better than abled bodied individuals (Gutfleisch, 2003; Burkett et al., 2013; Hadj-Moussa et al., 2021).

2.4. Conclusion

The review of literature in this chapter, showed that, there are still gaps that still exist in Namibia and Africa at large, in terms of policy implementation, training of personnel for prosthetics service provision, availability and affordability of prosthetics products as well as access to appropriate prosthetics service provision. Appropriate policies still need to be developed to improve prosthetics service provision, involvement of persons with disabilities in policy matters, and more efforts still needed to improve the adherence of WHO member states to the convention on the rights of persons with disabilities. The literature review also additionally highlights the existence of service user personal functional limitations that can influence the outcomes of using lower limb prosthetic devices. Efforts are being made by WHO member states to develop national assistive product lists. The next chapter focuses on the study methodology.

CHAPTER THREE

Study Methodology

3.1 Introduction

This chapter motivates for the choice of a mixed methods design. It describes the study settings, study populations, sampling techniques, data collection tools and methods, piloting process, and data analysis. It ends by addressing issues of rigor, and describing the steps followed to ensure the research adhere to ethical requirements.

3.2 Research design

A sequential, mixed methods, exploratory design, with a qualitative phase followed by a quantitative phase was used in the study as presented in figure 3.1 (O` Leary 2017). Kroll et al. (2005) indicated that the sequential mixed methods exploratory approach is suitable in areas where there is insufficient knowledge, such as in the case of this study where no previous research on prosthetic service delivery in Namibia could be found. Kroll et al. (2005), highlighted that rehabilitation has been observed to be increasingly linked to the outpatient area, therefore research related to this field needs to be sensitive to the living environments of individuals with disabilities, therefore more holistic approaches such as mixed method approaches should be used.

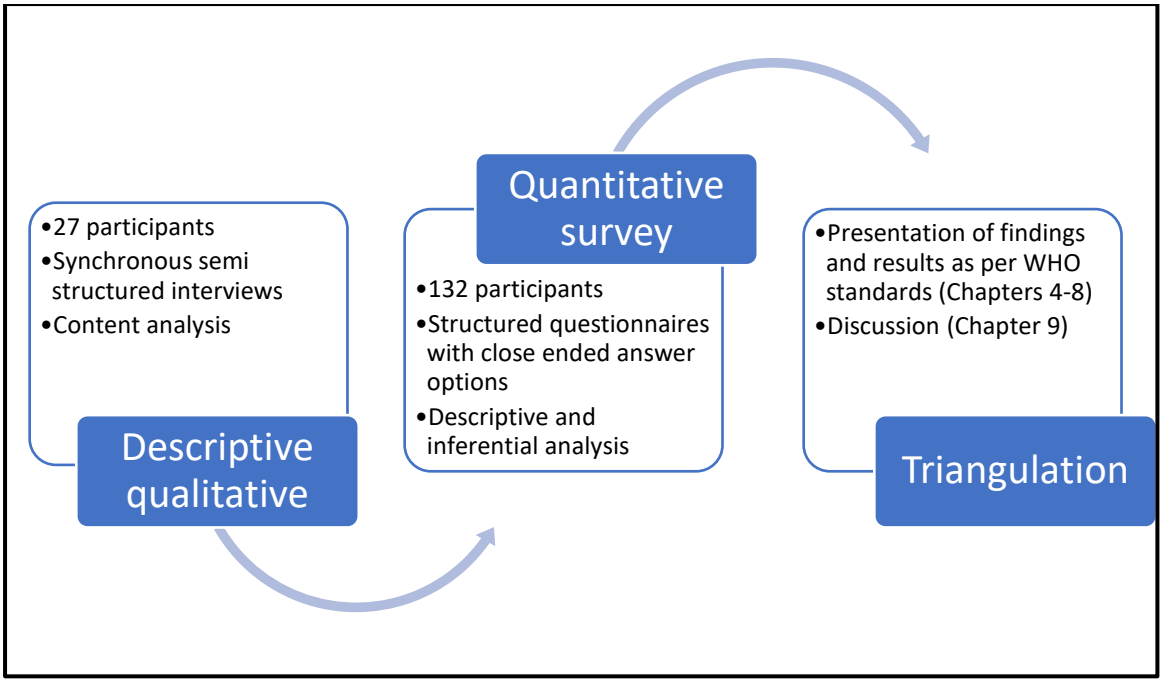


Figure 3.1: Diagrammatic presentation of the phases of the study (Source: author)

Qualitative and quantitative data was collected and analysed sequentially to explore the delivery of lower limb prosthetics services in Namibia, based on experiences of service managers, service providers and service users. The study began with the qualitative phase (phase 1), where a descriptive qualitative design was employed (Bradshaw et al., 2017) to gain an in-depth understanding of prosthetics service delivery. This design is suitable in research studies where information is needed directly from those experiencing the challenge under investigation especially in cases where time and resources are limited such as in the case of this study. Findings from the qualitative phase informed the content and choice of data collection tools for the quantitative phase.

The quantitative phase consisted of a cross sectional survey. The Revised Trinity Amputation and Prosthesis Experience Scales (TAPES-R) survey tool was used to collect data from users (Gallagher & MacLachlan, 2000). A service manager/provider quantitative questionnaire was developed for the purpose of capturing quantitative data.

The website of the MOHSS (mhss.gov.na), the Policy on Orthopaedic Technical Services (MOHSS, 2001), the National Policy on Disability (Ministry of Lands,

Resettlement and Rehabilitation, 1997), the National Disability Council Act (OPM, 2004), and the MOHSS annual report (MOHSS, 2018) were also perused.

Not each of the 60 standards were explored separately with every participant group. Doing that would have made interviews long and tedious and wasted participants' time on questions that could be answered through documents or were not relevant to them. For example, only providers and managers were asked directly about Standard seven (Governments and national stakeholders should collaborate internationally and share experience, data, and research on prosthetics service provision) and Standard 48 (Prosthetics service providers should define and adhere to a plan for equipment maintenance and replacement). On the other hand, only, users were asked about Standard 38 (Service users and their representatives should be involved in policy-making, planning, implementing, monitoring and evaluating prosthetics and orthotics services, take part in decision-making at all levels and be represented on relevant committees). Some standards could be dealt with through consulting documents as described above. Standard 3 (A national prosthetics and orthotics committee or similar entity, with a wide range of stakeholders, should be in place for the coordination and development of national prosthetics service provision) and Standard 14 (A national prosthetics database should be established to identify total need, types of need and unmet need) are examples. See appendix two for further information on which participant group and data collection method was used for each standard. Furthermore, it was strategized that, some of the questions could only be included in one of the two study phases.

After data from the two phases, different tools, and participant groups were analysed separately, triangulated and presented in an integrated manner as described by O`Leary (2017) and Heale and Forbes (2013) to provide a holistic picture. Thus, triangulation also enhanced the rigor of the study.

3.3. Study settings

As described in chapter one, lower limb prosthetics services in the public sector of Namibia are provided by three Orthopaedic Technical Service (OTS) facilities, situated at Windhoek Central Hospital (the only tertiary level, national referral hospital),

Oshakati Intermediate Hospital in Oshana region and Rundu Intermediate Hospital in the Kavango east region, both at secondary level. Out of these three public facilities in the country, two served as the main study settings (Windhoek Central Hospital and Oshakati Intermediate Hospital). Meanwhile the facility in Kavango east region (Rundu Intermediate Hospital) was utilised for piloting purposes.

At the time of the study, the facility at Windhoek Central Hospital was headed by a senior orthotist/prosthetist, and employed one orthotist/prosthetist, nine orthopaedic technologists, five orthopaedic assistants and three support employees. The facility at Oshakati was also headed by a senior orthotist/prosthetist, and employed five orthopaedic technologists, two orthopaedic assistants and three support employees, while the facility at Rundu was headed by a senior orthotist/prosthetist, and employed two orthopaedic technologists, two orthopaedic assistants and two support employees. The Windhoek facility manufactured an average of 200 lower limb prostheses annually. The facility in Oshakati manufactured an average of 120 lower limb prostheses annually, while the one in Rundu manufactured an average of 70 lower limb prostheses annually.

The facility at Windhoek Central Hospital provided lower limb prosthetics services to service users in the Khomas region and additionally served five (5) other regions through outreach services which included Otjozondjupa, Erongo, Omaheke, Hardap and //Kharas. Meanwhile, the facility at Oshakati Intermediate Hospital provided lower limb prosthetics services to service users in Oshana region and also additionally served four (4) other regions through outreach services which includes Ohangwena, Omusati, Oshikoto and Kunene. Participants from the indicated regions under each of the two study settings were included in the data collection process for both phases (Qualitative and Quantitative).

3.4. Study population

This study had three distinct study populations:

- Facility managers
- Prosthetics service providers
- Prosthetics service users

3.4.1 Prosthetics service users

The prosthetic user study population consisted of 691 lower limb prosthetics service users with transtibial and/or transfemoral amputations, who had received prosthetics services from Windhoek Central Hospital including its earmarked outreach points or the Oshakati Intermediate Hospital with also its earmarked outreach points. The total population of service users was obtained from records of patients who attended services at these facilities and outreach points during a five (5) year period between 2013 and 2018.

Inclusion criteria:

- Lower limb prosthetics service users older than 18 years of age were included, as this is the age of majority in Namibia (Parliament of the Republic of Namibia, 2015). Lower limb prosthetics users who are minors under the age of 18, were not included in this study, due to the complex process of obtaining consent from them.

Exclusion criteria:

- Lower limb prosthetics service users with additional impairments caused by conditions such as spinal cord injuries, stroke, traumatic brain injury that might impact prosthetic functioning were excluded.

3.4.2. Facility managers

The orthopaedic facility manager at the Oshana Multi-Regional Orthopaedic Technical Services (OMROTS) was formally requested to participate in the study. He consented to participation. In the case of Windhoek Central Hospital – Orthopaedic Technical Services (WCH-OTS) where the principal investigator was the service manager at the beginning of this study, the assistant manager was requested to participate and he also agreed. A total of two (2) service managers participated in the study and they both signed the informed consent forms.

3.4.3 Prosthetic service providers

The total population of service providers was twenty-two (22) for the two respective facilities.

3.5. Qualitative phase

3.5.1 Overall sample size

It was ensured that the sample size is reasonable, as too small sample sizes can result in superficial data that does not allow the capturing of actual experiences of participants and contextual influences. Conversely, it is also known that unnecessary large sample sizes lead to repetitiveness, wastage of resources and most importantly it would be unethical as more participants than needed will be burdened with participating in the research (Guetterman, 2015). Qualitative research requires rich and nuanced data from participants based on the experiences and opinions that are very clear and thoughtful (Palinkas et al., 2016) rather than a representative sample. I therefore ensured that, there was data saturation, i.e., data sufficiently rich enough to ensure a good understanding of the situation and to capture the comprehensive experiences of participants (Morse, 2015). Qualitative data was collected until no new information, or codes appeared. The total number of participants for this phase of the study was twenty-seven (27), which included two (2) service managers, nine (9) service provides and sixteen (16) lower limb prosthetics service users.

3.5.1.1 Prosthetics service users: Sampling, and recruitment

I purposively sampled ten (10) lower limb prosthetics service users in Windhoek, from the list of lower limb prosthetic users who were attended to between 2013 and 2018**.** Out of the ten (10) service users, four (4) were transfemoral prosthetics users while six (6) were transtibial prosthetics users. In Oshakati, the same strategy was employed, where a total of six (6) service users were purposively sampled, five (5) transtibial lower limb prosthetics users and one (1) transfemoral prosthesis user. During sampling it was ensured that both men and women, individuals younger and older than 60 years of age, and those living closer to and further than 50km from the points of service provision were included in the sample as their experiences of the service might differ. Furthermore, I purposefully tried to identify persons who were regarded as able and willing to provide rich and nuanced information (Palinkas et al 2016). The final total sample size of prosthetic service users was 16. All 16 participated in the study.

Most prosthetic service users that were attended to at the Windhoek Central Hospital, Orthopaedic Technical Services (WCH-OTS) had contact details captured. Thus, I contacted potential participants telephonically, and explained the details of the study to them and asked for provisional consent from them. Appointments were arranged between those who provided provisional telephonic consent and myself. We met either at the healthcare facility or at residential areas, whichever was comfortable and easy for participants to access. Upon meeting with the potential participants, I once again explained the study to them and their role in it in detail. An interpreter was utilised wherever there was a language barrier. Once potential participants agreed to participate in the study, the informed consent forms were signed prior to commencement of data collection.

During the drafting of the study protocol, it was observed that the contact details of service users who received services at the Oshana Multi-Regional Orthopaedic Technical Services (OMROTS) were poorly captured and recorded, as telephone numbers and physical addresses were not available for many service users. Fortunately, at the start of the actual study, the contact details of some of the service users at OMROTS were found to have been captured and updated accordingly. Thus, the approach of contacting service users that assisted at WCH-OTS was as well adopted for some service users at OMROTS. Meanwhile, where it was difficult to contact the remainder of the service users, snowball sampling was employed, where the contact details of potential service users were obtained from other service users who had participated in the study.

It should be noted that all participants in this study were requested to participate on a voluntary basis. Refusal to participate or withdrawal from the study would not have had any negative consequences whatsoever.

3.5.1.2. Prosthetic service providers: Sampling and recruitment

Purposive sampling was once again utilised in recruiting service provider participants who had at least five (5) years or more of work experience in the prosthetics industry. I used personal knowledge of service providers to sample those who were regarded as able to voice their experiences and opinions clearly and with thoughtfulness (Palinkas et al., 2016). One (1) Orthotist/Prosthetist and eight (8) Orthopaedic

Technologists were sampled at the two sites and they were approached in person. I was fully aware that being a manager for some of the service providers came in with some power imbalance, but in order to offset such a situation I assured and emphasized to the service providers that participation in the study was an independent activity from their official duties and would not influence our professional/work relationship in any way, neither will any answer they give or any opinion they share. Finally, a total of nine (9) service providers were sampled and agreed to participate in the study through provision of written informed consent. Table 3.1 provides a summary of the participants (data sources), sample sizes and data collection tools used for the two phases of the study.

Table 3.1: Data collection sources and tools

Data Source	Sample size/tool	Phase 1	Phase 2
		Qualitative	**Quantitative**
Prosthetics service users	Sample size	16	120
	Tool	Interview schedule	Trinity Amputation & Prosthesis Experience Scales-Revised (TAPES-R)
Facility managers	Sample size	2	2
	Tool	Interview schedule	Service Manager/Provider Quantitative Questionnaire
Prosthetics Service providers	Sample size	9	10
	Tool	Interview schedule	Service Manager/Provider Quantitative Questionnaire
Ministry of Health and Social Services		Website, policy documents, legislation, and reports	

3.5.2 Qualitative data collection and tools

I personally developed the data collection tools (with support from my supervisors) and personally collected, transcribed, and analysed the data. The sample size was small and that enabled me to manage the data. I managed to capture the actual

experiences of participants ranging from service managers, service providers and service users (Morse, 2015).

The developed study tools that were used for data collection included interview schedules for service managers (appendix 3), service providers (appendix 4), and prosthetics service users (appendix 5) as summarised earlier in table 3.1. These interview schedules were developed based on the conceptual framework of the study with the aim to address the study objectives. Questions were based on the standards that are stipulated in the “WHO standards for prosthetics and orthotics” (WHO, 2017).

Interviews were mostly conducted at healthcare facilities as they were regarded to be very convenient venues by the participants. Interviews lasted between 30 and 60 minutes per participant. They were carried out in person as one on one interviews. All interviews were audio recorded with permission from participants. Interviews were mostly conducted in English as it is the official medium of instruction in Namibia, but in instances where there was a language barrier, an interpreter was requested to assist. Among the various spoken languages in Namibia, I am only able to fluently communicate in English and two other indigenous languages from the Zambezi region, and I can as well communicate fairly in Afrikaans. Therefore, where service users were unable to express themselves in English, an interpreter was able to assist. In 10 out of 16 of the user’s interviews, interpreters were utilised as the participants preferred to converse in languages that were not familiar to me. Confidentiality contracts were signed by the interpreters. Interpreters were prosthetics and orthotics professionals. They were preferred instead of professional interpreters, because of the technical focus of the study and prosthetics related terminology that is often used in prosthetics service provision. Interpreters were trained for at least one (1) hour before the interviews. Training of interpreters mainly involved an in depth understanding of the questions in the study tool and how the questions can be simplified for participants to understand. Interpreters were reimbursed an amount of “N$70” per interview.

3.5.3 Piloting process

The study tools, both qualitative and quantitative, were piloted in the Kavango east region which is about 715 kilometres from the capital city Windhoek. Kavango east region is a more rural setting similar to the Oshana region where part of the actual

study was conducted, and there are also similarities in the geographical environment and some cultural practices of people living there. Therefore, the shared experiences of prosthetics service users in Kavango east region are much similar to those of Oshana, consequently making the results of the piloted study to be more feasible. Purposive sampling was employed in selecting the participants. The service manager, one (1) service provider, and four (4) service users participated in the piloting process. Of the four (4) service users, one (1) participated in the piloting of the qualitative tools, while three (3) participated in piloting the quantitative tools. It was ensured that pilot study participants adhered to the same criteria as those for the main study. For both study phases, informed consent forms were signed prior to commencing. Piloting assisted in identifying any kind of weaknesses that were associated with all study tools for both phases. Identified challenges were rectified accordingly before commencing with the actual study. These included the removal or modification of questions that were not well understood by participants during piloting, while in some instances there was a need to add additional questions to ensure the study objectives were achieved.

3.5.4 Qualitative data analysis

I personally transcribed and analysed the data. ATLAS.ti software was employed to support data analysis. A deductive analysis process was followed where the standards served as themes and content analysis was done to determine the extent to which each standard was implemented in Namibia (Vaismoradi et al., 2016). Content analysis was chosen as data analysis method because it allows some quantification of data. The disadvantage of quantifying and in the process identifying themes based on the number of times it was mentioned in the data set was negated since themes were determined in a deductive manner using the 60 standards rather than inductively from the data (Vaismoradi et al., 2016). I could determine and indicate the number of participants that agreed or disagreed about whether a standard was implemented, as well as contextualise their opinions with the information they provided in the interviews. All codes and code groups were revised repeatedly and compared with each other to check for inconsistencies, by me and my supervisors to enhance credibility. Any discrepancies were resolved amicably. Figure 3.2 illustrates an example of codes that were generated for the qualitative analysis of this study, using ATLAS.ti software.

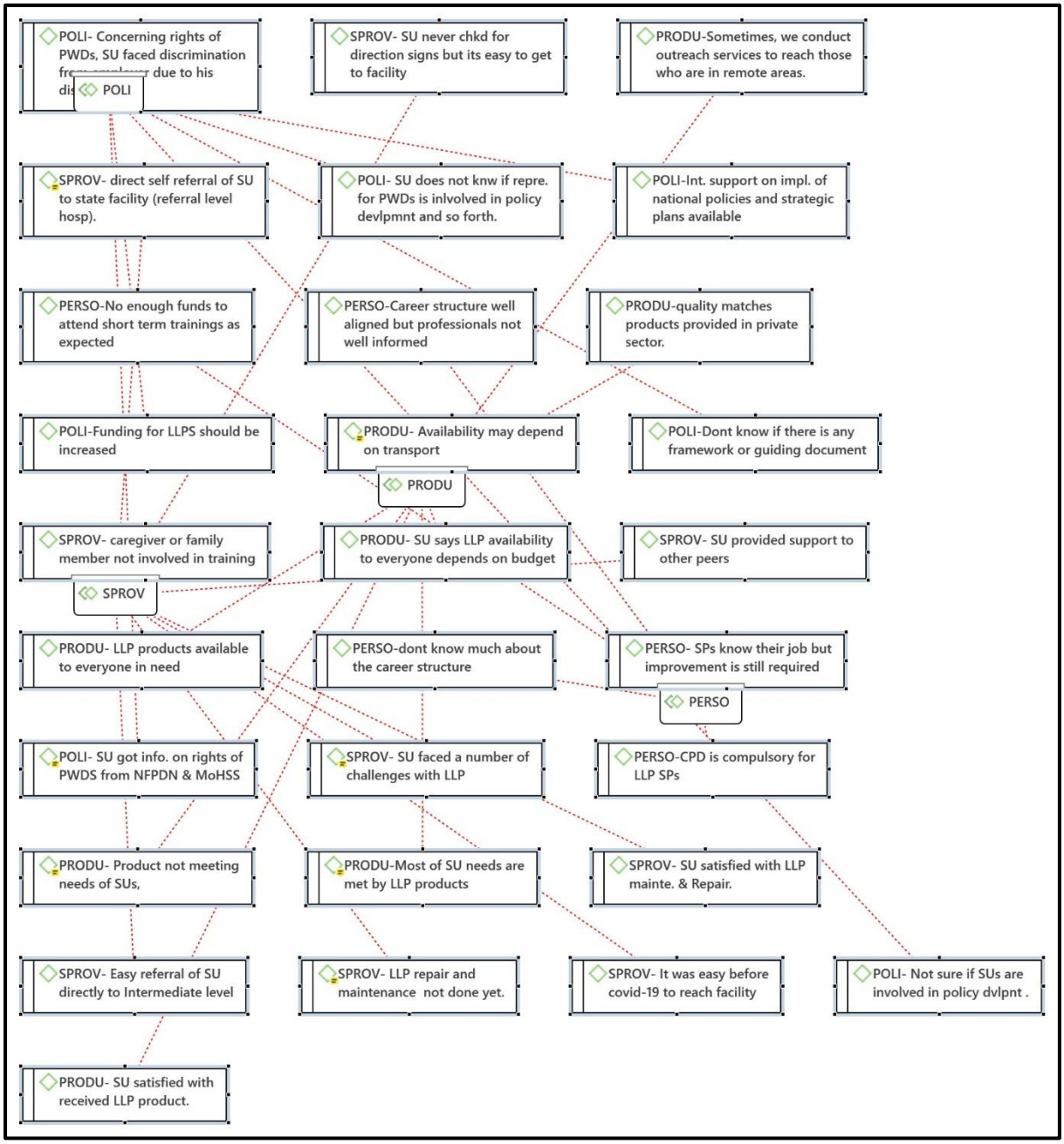


Figure 3.2: ATLAS.ti coding tree example (Source: Author)

3.5.5. Trustworthiness

Triangulation of methods, sources, and tools enhanced the rigor (trustworthiness, reliability and validity) of the findings and recommendations made from the study (Moon, 2019). Trustworthiness of the qualitative phase was ensured by using strategies to enhance credibility, transferability, dependability and confirmability as outlined by Mabuza et al. (2014). Credibility was enhanced through purposive sampling, prolonged engagement with the participants up until there was data

saturated and using well known strategies for data collection and analysis. Peer debriefing was ensured through engagements with supervisors and through presentations at university seminars with peers and mentors in attendance. Data saturation was ensured during data collection and analysis by ensuring all codes were outlined and no new information emerged. Dependability was ensured by outlining the study limitations and clearly defining the methods used. Transferability can be decided on because the methods and setting have been clearly described. Confirmability was ensured through the reflexivity of the first author as indicated by Domholdt (2005) and Patton, (1999) and conducting an audit trail by providing details of data collection, data analysis and interpretation of the data.

3.5.5.1 Reflection

I hereby present this brief background to indicate that I could not completely free myself from how my personal and professional identity could possibly influence data collection, findings, and explanations. My professional practice as well as my attitudes and perceptions on prosthetic devices could have influenced the questions asked and interpretation of the study findings (Domholdt, 2005; Patton, 1999).

I am a medical orthotist and prosthetist registered with the Allied Health Professions Council of Namibia and employed by the Ministry of Health and Social Services as a Deputy Director for Disability Prevention and Rehabilitation as from July 2021. I was formerly employed as the Head of Orthopaedic Technical Services at Windhoek Central Hospital from 2013 to June 2021. My professional background assisted me in the selection of some of the study participants, especially in the Khomas region where I am stationed, as I am familiar with some of them. I used to interact with some of the participants of this study such as lower limb prosthetics service providers as well as service users.

I was fully aware of this and tried to keep my mind free from predefined thoughts and opinions, but it was difficult to do so. I believe, as argued by Patton (1999), that the study investigator cannot completely free themselves from the research study process. Therefore, the activities that were selected and acted upon during this study were influenced by who I am as a person and my professional line of duty.

3.6. Quantitative Phase

3.6.1 Sampling

3.6.1.1 Prosthetic service users: population, sampling, and recruitment

The study population of prosthetic service users included all 691 persons with transtibial and/or transfemoral amputations who received prosthetic devices from the two state orthopaedic facilities (Windhoek and Oshakati) within a period of five years, from 2013 to 2018 as depicted by table 3.2. The inclusion and exclusion criteria applied was the same as in the qualitative phase.

Table 3.2: Sample sizes of both transfemoral (TF) and transtibial (TT) prosthetics service users at the two study sites.

Windhoek Central Hospital **Orthopaedic Technical Services (WCH-OTS)**			**Oshana Multi-Regional** **Orthopaedic Technical Services (OMROTS)**		**TOTAL**		
	TF	*TT*	*TF*	*TT*	***TF***	***TT***	***Overall***
Total population	147	208	42	112	**189**	**320**	**509**
Targeted Sample size determined in study protocol	107	136	34	90	**141**	**226**	**367**
Actual quantitative sample size	39	39	9	33	**48**	**72**	**120**

During the compilation of the study protocol, quantitative sample sizes for the two study sites (WCH-OTS & OMROTS) for transfemoral and transtibial prosthetics users were determined using a sample size calculator. To ensure a confidence level of 95% and a confidence interval of 5%, with a population proportion of 50% required a sample of 367 lower limb prosthetics service users (see Table 3.2 for details).

It was observed during the compilation of the study protocol that patient records that were obtained from the prosthetics and orthotics facilities in the country, showed that only WCH-OTS had managed to capture contact telephone numbers and physical addresses of service users. This led to participants for WCH-OTS to be initially sampled randomly through computer generated numbers in Excel, while those for the OMROTS were sampled using convenience and snowball sampling techniques as service user contact details were not available.

However, during the actual data collection process, it proved very difficult and challenging to physically collect data as per the figures that were determined earlier on in the study protocol for WCH-OTS and OMROTS. This happened because many service users were found to have either relocated, changed telephone contact details, passed on, did not meet study criteria due to age or additional health conditions. Therefore, convenience and snowball sampling were finally used at both WCH-OTS and OMROTS.

Convenience and snowball sampling are known to affect the generalisability of the results as the participants may not be representative of the larger study population. In quantitative research, a sample size of 40 participants may be considered sufficient for total populations of over 500, while some other quantitative studies were found to have not indicated how sample size was determined (nngroup.com, 2022; Delice, 2010). The actual total sample size of service user participants in phase 2 stood at 120, with 72 of the users being transtibial and 48 transfemoral prosthetics service users as shown in table 3.2.

3.6.1.2 Prosthetic service managers and service providers

The same approach used in phase one to sample service managers and service providers was employed for phase two, where service managers remained two and service providers were ten as depicted in table 3.1 above. The 10 service providers were sampled out of 22, based on job experience. Service providers who did not participate had less than 5 years of work experience, therefore were regarded as not having sufficient information about the study.

3.6.2 Method of contacting participants and obtaining consent

The same process as in phase one was followed. It should also be noted that , similarly for phase two, participants participated on a voluntary basis and refusal to participate did not have any negative consequences.

3.6.3 Quantitative data collection methods and tools

The surveys were developed by considering the gaps in the qualitative data. Meaning quantitative questions were formulated to address aspects that the qualitative phase did not explore such as the economic benefits of the prosthesis (5.11). Quantitative questions also sought further quantification of aspects described in the qualitative phase. EG the range of available prosthetic products (6.2) and the satisfaction (4.7) and functional abilities (4.6) of users were quantified to further understanding as to what extent the prostheses met the needs of users.

Piloting of study tools was carried out in the Kavango east region prior to the actual use of the tools as described under 3.5.5. Two (2) research assistants assisted in the data collection process as well as interpretation wherever necessary. A one-day preparatory training session for the assistants was carried out before commencement of the actual study, this was meant for them to familiarise themselves with the research tools and procedures. All participants were also given time (up to 1 hour) to familiarise themselves with the questions and to ask any questions they needed clarity on. The principal investigator and the research assistants supervised the process of participants answering the questionnaires and providing clarification where necessary.

The two tools that were used for data collection, were the Trinity Amputation and Prosthesis Experience Scales (TAPES-R) (appendix 6) for prosthetic users and the Service Manager/Provider Phase two Quantitative Questionnaire (appendix 7). The TAPES-R was further revised for the current study as there was some additional questions added for the purpose of meeting the study aim and objectives.

The TAPES-R is a clinical and research tool that was developed to investigate the experiences of amputation patients and adjustment to a lower limb prosthesis (Gallagher & MacLachlan, 2000). It is a self-administered questionnaire consisting

of psychosocial adjustment, activity restriction, and prosthetic satisfaction domains, each with three subscales. It also includes questions on stump pain, phantom limb pain and other medical problems and ultimately collects data on both physical and psychosocial aspects after amputation and prosthesis fitting (Gallagher et al., 2010). The tool was tested and found to be valid and reliable in Global North settings (Gallagher & MacLachlan, 2000). It was chosen as a tool for this study because it is freely accessible to use and reliable for capturing comprehensive experiences of lower limb prosthetics service users.

The survey for Service Managers/Providers was developed by the researcher based on provisional qualitative findings and the WHO standards.

3.6.4 Quantitative data analysis

Quantitative data was analysed using the IBM Statistical Package for Social Sciences (SPSS) version 28.0. Raw data, collected from service managers and providers using the quantitative survey tool was captured and entered into Microsoft excel and eventually imported into SPSS. Similarly, raw data collected from service users using the TAPES–R quantitative tool, was captured and entered into Microsoft excel and also imported into SPSS. Before exporting from Excel to SPSS, data was screened, verified, and cleared from errors (O'Leary, 2008).

Thereafter, data for service managers and providers was organized in the spreadsheets and sub-grouped into various categories that included demographic data, prosthetics products, multi-disciplinary team approach, device lifespan, availability of professionals, additional information and ratings (O'Leary, 2008). A similar approach was employed on the data from service users where categories such as demographic data, experience with prosthesis, participation and function, satisfaction with prosthesis, wellbeing, and additional information were developed.

Finalised raw data were systematically arranged into categories and then exported step by step from Excel to SPSS for analysis (O'Leary, 2008), where obtained results were pasted into Microsoft word and presented accordingly. SPSS is an easy to operate software that computes complex figures and presents them in a matter that is

easy to interpret and visualize ('IBM SPSS Statistics for Windows, version 28.0; IBM Corp., Armonk, N.Y., USA).

Continuous data were analysed into descriptive statistics to depict the mean, standard deviation, minimum and maximum. Whereas, categorical data were presented as frequencies and percentages from which graphical results were obtained and presented in tables and charts/graphs. The standard deviation is meant to show how the group values of the data are spread around the mean. Finally, inferential analysis was carried out, where some demographic data sets such as age, and gender were compared with levels of amputation, participation in vigorous activities and adjusting to using of prosthesis. Inferential comparisons were carried out by using the chi-square test with a decision rule for assessing if the test is significant for *p*-value less than 0.05.

3.6.5 Validity and reliability

The TAPES-R is a valid and reliable tool as tested in European settings and Turkey (Topuz et al., 2011; Luthi et al., 2020). Having added questions for the current study could have influenced the validity and reliability. It was also not tested for validity and reliability in the current or a similar setting. Research assistants were trained before data collection. The service manager and provider survey were newly developed tools which were not tested for criterion validity and reliability, but it was shared with prosthetics professionals who participated as research assistants for their inputs as well as the research supervisors, that ultimately enhanced content validity and supported face validity (Mokkink et al., 2010; Patrick et al., 2011).

3.7. Ethical considerations

Ethical approval was obtained from the Health Research Ethics Committee of the University of Stellenbosch (Ref No. S20/04/090), and approval to collect data was obtained from the Research Committee of the Ministry of Health and Social Services in Namibia (Ref No. 17/3/3 CML).

Potential study participants were all requested to participate on a voluntary basis. No data were collected from participants without obtaining written informed consent (appendix 8, 9, 10, 11 & 12). Permission to audio record interviews was also part of

the informed consent. Refusal to participate in the study did not cause any negative consequences for participants in any way. Participant information and identities were handled with strictest confidence. Numbers were used during data analysis and dissemination of results, to protect the identity of participants. Presentation of data is conducted in a manner that would not be hurtful to any of the participants. For confidentiality purposes, I continuously ensured that the collected data in either written or electronic form were and will be stored in a manner that prevents access of unauthorised persons. Data will be used for the purpose of this study and will be kept for five years after completion of the study.

Although the topic and questions are not of a sensitive nature, some of the study participants could have experienced negative emotions associated with the impact of using prostheses, or the challenges in providing or obtaining prosthetic devices or services. This occurred in a few instances during qualitative phase one. It was dealt with through taking breaks during interviews and addressing the emotions. In instances where participants needed further support, they were referred to the appropriate government service provider/healthcare setting. In instances where participants required prosthetic services, some were assisted immediately after the interviews, while others were referred to a relevant prosthetic service provider/facility.

The study did not involve the use of children as indicated in the inclusion criteria and there were no biological samples collected from any of the participants and those that were found to have additional complex disabilities did not participate.

A small token of appreciation equivalent to an amount of “N$50” was paid to each of the participants for their time and inconvenience at the end of each individual data collection interval. Participants were not informed of this, prior to the interviews. In case of snowball sampling, I ensured that, participants were asked to identify the next potential participant before talking about the token of appreciation, so that the token could not influence the selection of the next participant.

3.8. Conclusion

The study employed a sequential mixed method exploratory approach to explore the delivery of lower limb prosthetics services in Namibia, in comparison to the WHO

prosthetics and orthotics standards. Data was collected through semi structured interviews and surveys from service managers, service providers and service users. For users purposive and snowball sampling was used since contact details were not known. Qualitative data was analysed using ATLAS.ti and following a content analyses strategy. Quantitative data was analysed with SPSS. This chapter also looked at rigor and ethical aspects that were considered during the study process. The next five (5) chapters focus on presenting the results and findings of this study.

CHAPTER FOUR

Results: Participants Demographic and Medical information

4.1. Introduction

This chapter depicts the demographic features of the service managers, providers and users that participated in the study exploring and comparing the four areas (policy, products, personnel and service provision) of the WHO prosthetics standards to services delivered in Namibia. The chapter starts by providing an overview of the demographics of the 27 people who participated in the qualitative interviews. This is followed by the demographic information of the 12 managers and providers who completed the quantitative survey and the 120 users who completed the TAPES-R. The depicted data includes sample sizes, age, gender, place of residence or occupation and years of experience. Regarding service users` additional information related to the amputation, prosthesis, and residual limb as well as their functional and psychosocial status are presented.

4.2. Demographic information of participants in the qualitative phase

Twenty-seven people participated in the semi structured interviews. As per table 4.1, two of the participants were service managers, nine were service providers and 16 were service users. The ages of service providers and managers ranged between 38 and 45 with approximate mean ages of 40 (sd. 2.46), 45 (sd. 0) and 54 (sd. 14.49) respectively. They had work experience of between 11 to 20 years. Service users had a minimum age of 31 and maximum of 81 years, and experience in using prosthesis ranging from 4 to 48 years.

Table 4.1: Qualitative phase participants' demographic information

	Manager	**Provider**	**User**
Gender	*M=2* *F=0*	*M=7* *F=2*	*M=7* *F=9*
Age range	*Khomas=45yrs* *Oshana=45yrs* *Mean = 45* *Sd = 0*	*Khomas= 38 - 43* *Oshana= 38 – 44* *Mean =40.56* *Sd = 2.46*	*Khomas= 34 - 81* *Oshana= 31 – 71* *Mean = 53.69* *Sd = 14.49*
Setting	*Khomas = 1* *Oshana = 1*	*Khomas = 5* *Oshana = 4*	*Khomas = 10* *Oshana = 6*

Years of experience/using prosthesis	*Khomas =19yrs* *Oshana =20yrs*	*Khomas = 11 - 19* *Oshana = 12 - 19*	*Khomas = 4 - 48* *Oshana = 4 – 41*
Level of amputation			TF = 5 TT = 11

Key: TF = Transfemoral

TT = Transtibial

Table 4.2 contains additional demographic information to assist the reader with personalising speakers where narrative examples are provided.

Table 4.2: Additional participant information in the qualitative phase 1

	Gender	**Age**	**Region**	**Years of work experience / using prostheses**	**Professional Category (SM&SP)**	**Level of amputation (for users)**	**Distance from P&O facility (SU)**
Manager 01	M	45	Khomas	19	O/Prosthetist		
Manager 02	M	45	Oshana	20	O/Prosthetist		
Provider 01	M	43	Khomas	19	O/Prosthetist		
Provider 02	M	40	Khomas	18	Ortho/Techno		
Provider 03	F	38	Khomas	18	Ortho/Techno		
Provider 04	M	38	Khomas	11	Ortho/Techno		
Provider 05	M	39	Khomas	11	Ortho/Techno		
Provider 06	M	38	Oshana	12	Ortho/Techno		
Provider 07	F	43	Oshana	19	Ortho/Techno		
Provider 08	M	42	Oshana	18	Ortho/Techno		
Provider 09	M	44	Oshana	19	Ortho/Techno		
User 01	M	81	Khomas	41		TT	5km
User 02	F	36	Khomas	15		TT	4km
User 03	M	38	Khomas	31		TT	498km
User 04	F	60	Khomas	18		TT	498km
User 05	M	58	Khomas	5		TF	268km
User 06	F	52	Khomas	4		TF	268km
User 07	F	64	Khomas	48		TT	268km
User 08	F	63	Khomas	11		TT	361km
User 09	F	37	Khomas	30		TF	338km
User10	F	34	Khomas	24		TF	317km

User 11	M	55	Oshana	4		TF	3km
User 12	M	31	Oshana	28		TT	4km
User 13	F	71	Oshana	41		TT	92km
User 14	F	60	Oshana	28		TT	92km
User 15	M	60	Oshana	36		TT	205km
User 16	M	59	Oshana	32		TT	205km

Key: Ortho/Techno = Orthopaedic Technologist,

O/Prosthetist = Orthotist/Prosthetist

4.3. Demographic information of service managers and providers participating in the quantitative phase

Two managers, and ten providers completed the quantitative survey. As per table 4.3 their mean age was 42.33 (sd. 2.708) with the minimum age 39 years and the maximum of 46 (range 7). They had between 11 and 21 years of work experience, with a mean of 17.67 (sd. 3.257).

Table 4.3: Service Manager's and Provider's age and work experience (N=12)

	Age (years)	Experience (years)
Mean	42.33	17.67
Std. Deviation	2.708	3.257
Range	7	10
Minimum	39	11
Maximum	46	21

More male (n=10) than female (n=2) of service managers and providers participated in the survey. Eight of the participants worked in the Khomas region and four in Oshana.

4.4. Demographic information of service users participating in the quantitative phase

The mean age of the 120 service users who completed the TAPES-R was 48.72 (sd. 15.965) with a minimum age of 19 and a maximum of 88 years (range 69). Most user participants were males 74.2% (n=89) from the Khomas region 65% (n=78).

4.5. Medical information related to the amputation, prosthesis, and residual limb

Table 4.4 shows that other causes of amputation such as congenital amputation, traumatic injuries, and other illnesses/diseases contributed the highest figure of 30% (36) to the causes of amputation of service users. This was followed by landmine injuries 19.2% (n=23), suspected to result from the past colonial war (1966 to 1989) and its aftermath, followed by motor vehicle accidents 17.5% (n=21).

Table 4.4: Cause of amputation (N=120)

Cause of amputation	N	%
PVD	14	11.7%
Diabetes	19	15.8%
Cancer	7	5.8%
MVA	21	17.5%
Landmine	23	19.2%
Trauma, congenital, disease	36	30.0%

PVD = peripheral vascular disease

MVA = Motor vehicle accident

Table 4.5 shows service users who completed the TAPES-R who had been living with amputation for a mean of 18.65 years (sd. 12.965). Users had three to 44 years of experience in using lower limb prostheses, with a mean of 16.30 years (sd. 12.246). The mean age of the prostheses they were using at the time of data collection was five years (sd. 6.073).

Table 4.5: Years of living with an amputation and using a prosthesis (n=120)

	Time since Amputation	Total years using prosthesis	Age of current prosthesis
Mean	18.65	16.30	5.31
Std. Deviation	12.965	12.246	6.073
Range	46	41	35
Minimum	4	3	1
Maximum	50	44	36

Findings also showed that among service users, 16.7% (n=20) experienced stump pain and 15.9% (n=18) experienced phantom limb pain. While 80% (n=96) did not experience any kind of pain. Figure 4.1 shows that among those who experience stump pain, the experience was mild 5.8% (n=7), distressing 5% (n=6) or discomfiting 4.2% (n=5) for approximately equal numbers of user participants.

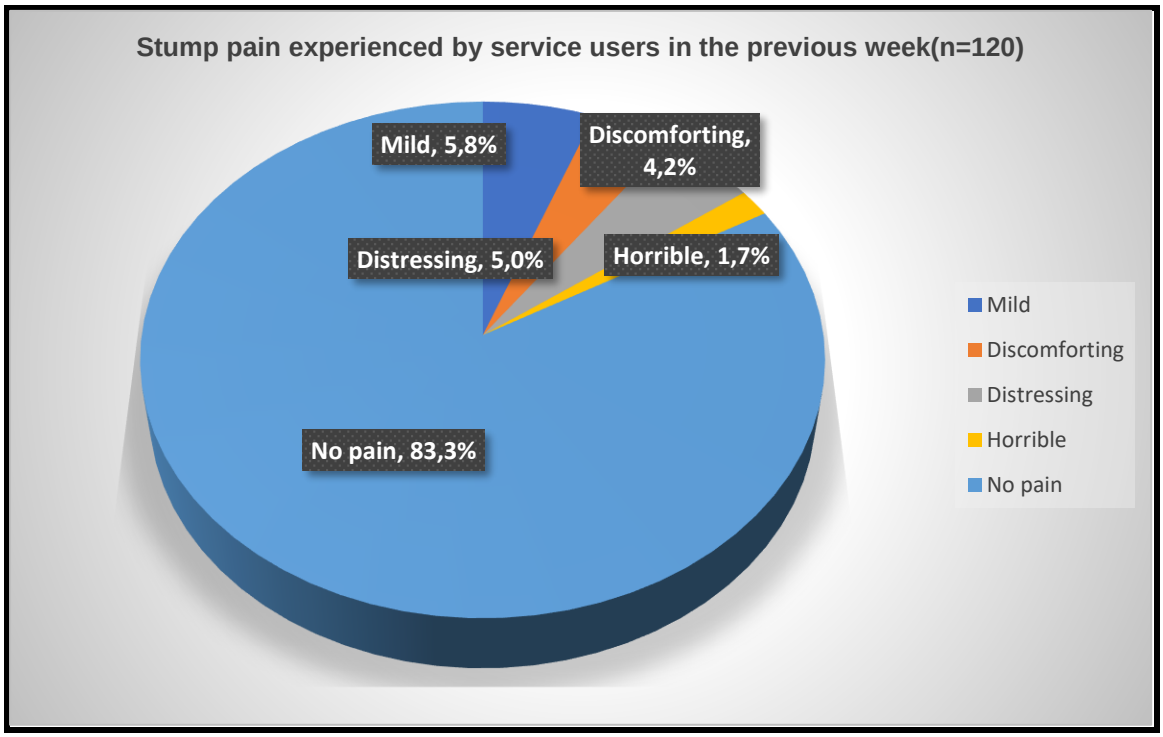


Figure 4.1: Level of stump pain experienced by LLP users in previous week (N=120)

The interference of stump pain with the normal lifestyle was very minimum as depicted by table 4.6.

Table 4.6 Stump pain interference with normal lifestyle (N=120)

Stump pain interfering with lifestyle	N	%
Not at all	5	4.2%
A little bit	6	5.0%
Moderately	4	3.3%
Quite a bit	3	2.5%

A lot	2	1.7%
No pain	100	83.3%

4.6. Service user general health and physical capabilities

Findings showed that the majority of users experienced good or very good general health 79.1% (n=95). Most users 70% (n=84) also indicated good or very good physical capabilities.

Table 4.7 shows that 63.3% (n=76) of service users indicated that they were limited a lot when it came to carrying out vigorous activities such as running, lifting heavy objects, and participating in strenuous sports. Walking 100 meters was found to be the activity where most of users 82.5% (n=99) were not limited at all. Seventy-five percent (n=90) of users indicated that they were not limited in going back to work.

Table 4.7: Physical capabilities of prosthetic users (n=120)

	Not limited at all	**A little limited**	**Limited a lot**
Vigorous activity	11(9.2%)	33(27.5%)	76(63.3%)
Climbing flights of stairs	38(31.7%)	42(35.0%)	40(33.3%)
Running for a taxi	23(19.2%)	29(24.2%)	68(56.7%)
Sport and recreation	15(12.5%)	30(25.0%)	75(62.5%)
Climbing one flight of stairs	80(66.7%)	36(30.0%)	4(3.3%)
Walking more than 1 km	74(61.7%)	19(15.8%)	27(22.5%)
Walking more than ½ km	88(73.3%)	14(11.7%)	18(15.0%)
Walking 100m	99(82.5%)	13(10.8%)	8(6.7%)

Working on hobbies	48(40.0%)	53(44.2%)	19(15.8%)
Going to work	90(75.0%)	16(13.3%)	14(11.7%)

4.7 Service user satisfaction with the prosthesis

Most users were satisfied with their prostheses where 82.6% (n=100) selected a score of seven or higher on a scale out of ten (with 10 indicating complete satisfaction) when asked about overall satisfaction with the prothesis (Figure 4.2).

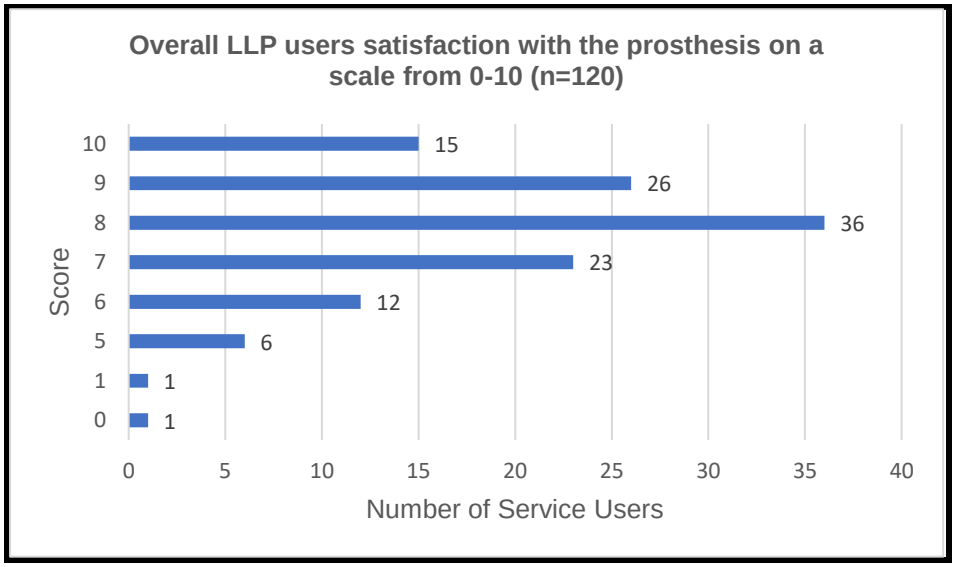


Figure 4.2: Overall LLP users' satisfaction with the prosthesis on a scale from 0-10 (N=120)

Most service users were very satisfied with individual features of the prosthesis as shown in Table 4.8. More than 75% of the users were satisfied with the usefulness 75.2% (n=91) and reliability 76% (n=92) of their prostheses. The aspect which showed some degree of dissatisfaction was the weight of the prostheses 16.5% (n=20).

Table 4.8: Satisfaction with the features of the prosthesis (N=119) (No feedback=1)

	Not satisfied	Satisfied	Very satisfied	No feedback
Colour	12(9.9%)	43(35.5%)	65(53.7%)	1
Shape	7(5.8%)	44(36.4%)	69(57.0%)	1
Appearance	9(7.4%)	42(34.7%)	69(57%)	1

Weight	20(16.5%)	27(22.3%)	73(60.3%)	1
Usefulness	2(1.7%)	27(22.3%)	91(75.2%)	1
Reliability	2(1.7%)	26(21.5%)	92(76.0%)	1
Fit	5(4.1%)	51(42.1%)	64(52.9%)	1
Comfort	7(5.8%)	46(38.0%)	67(55.4%)	1

4.8 Psycho-social adjustment

Table 4.9 shows that most service users in this study, with a combined figure of 95.8% (n=115) indicated that they have gotten used to wearing a prosthesis and as time goes by, they accept it more 97.5% (n=117). The only aspects were more than 70% or participants did not indicate strong agreement were the last three statements which relates to the ability to do all types of work and being able to do all things they want to.

Table 4.9: Psychosocial adjustment to prosthesis (N=120)

	Strongly disagree	Disagree	Agree	Strongly agree
I have adjusted to having a prosthesis	-	2(1.7%)	42(35%)	76(63.3%)
As time goes by, I accept my prosthesis more.	-	3(2.5%)	29(24.2%)	88(73.3%)
I feel that I have dealt successfully with this trauma in my life	3(2.5%)	10(8.3%)	32(26.7%)	75(62.5%)
Although I have a prosthesis my life is full	5(4.2%)	9(7.5%)	35(29.2%)	71(59.2%)
I have gotten used to wearing a prosthesis	2(1.7%)	3(2.5%)	24(20%)	91(75.8%)
I don't care if somebody looks at my prosthesis	5(4.2%	7(5.8%)	28(23.3%)	80(66.7%)
I find it easy to talk about my prosthesis	4(3.3%	9(7.5%)	35(29.2%)	72(60%)
I don't mind if people are asking about my prosthesis	8(6.7%)	7(5.8%)	31(25.8%)	74(61.7%)
I find it easy to talk about limb loss in a conversation	5(4.2%)	13(10.8%)	33(27.5%)	69(57.5%)
I don't care if somebody notices that I am limping	6(5.0%)	6(5.0%)	24 (20%)	84 (70%)
A prosthesis interferes in the ability to do my work	8(6.7%)	18(15.0%)	45(37.5%)	49(40.8%)
Having a prosthesis make me dependent on others than I would like to be	2(1.7%)	21(17.5%)	36(30.0%)	61(50.8%)

Having a prosthesis limit me in the kind of work I would like to do	10(8.3%)	41(34.2%)	34(28.3%)	35(29.2%)
Being an amputee means I can't do what I want to do	3(2.5%)	17(14.2%)	51(42.5%)	49(40.8%)
Having a prosthesis limit the kind of work that I can do	11(9.2%)	24(20%)	49(40.8%)	36(30.0%)

4.9. Inferential analysis

No demographic variables were linked directly to the study aim, but certain relationships between variables that are associated with lower limb prosthetics service delivery, were tested by subjecting some of the data sets to the chi-square tests with a decision rule for assessing if the test is significant for *p*-value less than 0.05. Service user age ($p \leq 0.152$) and gender ($p \leq 0.285$) were both statistically not significant when tested against the participation of service users in vigorous activities such as running, lifting heavy objects, and participating in strenuous sports. Again, service user age ($p \leq 0.989$) and gender ($p \leq 0.559$) were as well insignificant when tested against the psychosocial aspect of service users having adjusted to having a lower limb prosthesis. Finally, service user satisfaction ($p \leq 0.086$) was found to be insignificant, whereas function (usefulness) with the prosthesis ($p \geq 0.029$) was found to be statistically significant when tested against the amputation levels of service users. Those with transtibial amputations were functioning significantly better than those with transfemoral amputations.

4.10 Conclusion

The demographics in this chapter showed that there were more male service managers and providers 83% (n=19) than females, and similarly more male service users 72% (n=98) than females who participated in both phases of the study. There were also more participants from the Khomas region. Service manager and providers ages ranged from 39 to 46 years (mean 42) and service user ages ranged from 19 to 88 years (mean 48.7). Most service users who participated in both phases of the study were transtibial prostheses users. The commonest single cause of amputation was

landmines followed by motor vehicle accidents. Most service users were in good general health, were found capable of performing physical activities and did not experience any stump pain and or phantom pain. However, most users indicated that they were unable to participate in vigorous activities such as running, lifting heavy objects, and participating in strenuous sports. Most users were generally satisfied with their prostheses except for the weight of their devices.

Most demographic variables did not have significant statistical impact on the service user participation in vigorous activities and on the level of amputation, as well as no impact on having adjusted to having a lower limb prosthesis, except for function with prosthesis that was found to have statistical significance when tested against the amputation level.

CHAPTER FIVE

Results: Policy

5.1 Introduction

Chapter five is the first of four chapters to present results on the 60 WHO standards. These chapters are organised as per the study framework presented in Chapter two and figure 5.1 below. Chapter five focuses on the first study objective and the 15 policy standards as shown in figure 5.1.

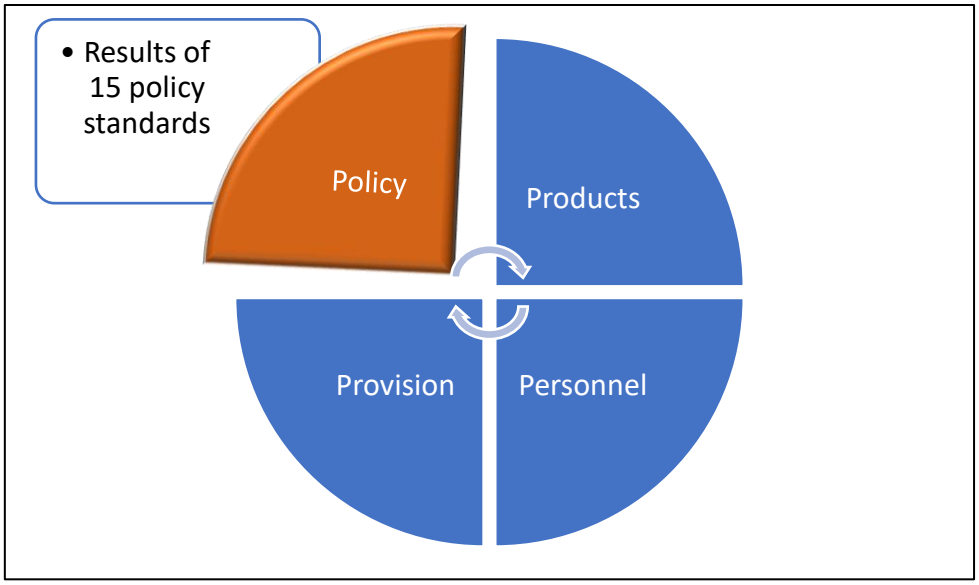


Figure 5.1: Study framework (source: author)

Policy standards are aimed at strengthening governance, financing, and information systems for prosthetics services. Data regarding the availability of policies and implementation of the 15 policy standards in Namibia was obtained from documents published by the Ministry of Health and Social Services (Namibia), service managers, providers, and users. Qualitative and quantitative data are presented concurrently to provide an integrated overview of results for each standard.

Structuring the presentation of findings were challenging. Traditionally the findings from the qualitative and quantitative phases would be presented in separate chapters and then triangulated. Another option would be to present them according to the standards but keeping qualitative and quantitative data separately. Both these options

were tried and they led to repetition. Thus, I decided to integrate the data and already do some triangulation in the results chapters. Qualitative and quantitative data as they pertain to a specific standard were presented together.

A further aspect that might be confusing was that due to the content analysis of qualitative findings, some attention was given to the frequency with which the same opinion occurred. These numbers are presented with the narrative examples as part of the qualitative findings. Thus, qualitative data is presented for two managers, nine providers and 12 users. And it is common in text to find a statement like X/12 number of users indicated something, while Z/12 thought something else.

5.2. Standard one

Governments should assume a leading role in the development and coordination of national prosthetics service provision.

The national leadership, management, coordination, and development of prosthetics services is vested in the Ministry of Health and Social Services, under the Primary Health Care Directorate where the Division Disability Prevention and Rehabilitation and the subdivision Orthopaedic Technical Services falls (MOHSS, 2001; MOHSS, 2014). The subdivision Orthopaedic Technical Services plays a leading role in policy development and coordination of national prosthetics services. The team is currently working towards reviewing the policy for orthopaedic technical services of 2001.

Qualitative findings showed that the government provides leadership.

> *"When it comes to long-term operational plans and performance indicators, we do not work on our own, we are part of the Ministry and we contribute to the objectives of the Ministry, so with are using the annual plans for the Ministry and we are also using the strategic plan, which is a long-term plan of the Ministry, and then we have the performance agreements that is where we do the performance indicators through the system that is compulsory for everyone."* (Service Manager 02)

Appreciation for the role that the government has played was shown by managers and providers.

> *"…and I think it [government] has taken the service to a great height" (*Service Manager 01*),*

> *"…the fact that the country is able to provide these prosthetics services almost free of charge in the state, it's an indication of good support from the government."* (Service Provider 09).

However, challenges were also highlighted.

> *"…due to the delayed process of completing tender contracts, we usually find that our money ends up being used by other departments because the tenders are always late."* (Service Provider 07).

5.3 Standard two

The government should involve all relevant stakeholders including service users, caregivers and user groups in policy development, planning, implementation, monitoring and evaluating prosthetics services.

Qualitative data showed that one service manager felt that relevant stakeholders such as service users were involved in these processes.

> *"Yes, we can say in general the government does involve all relevant stakeholders, but not specific individuals as mentioned but representatives such as the disability council and so on those are the ones who do partake in the planning, implementation, and monitoring process."* (Service Manager *02)*

The other manager indicated that stakeholders were involved in policy development but not implementation, monitoring, and evaluation.

> *"…on the policy development, these groups are actually involved because it is done at the national level where all stakeholders are invited most of the time when policies are being developed…The planning of services, which is usually conducted at the centre (prosthetics facility). They are not involved at all. The implementation of plans and policies is quite a wide thing to consider, so at one point one would agree that, yes, they are involved at a certain stage there is end-users, so in the process of the implementation of treatment procedures*

> *they become part and parcel of it…that area [monitoring and evaluation] is conducted at the national level but with the best knowledge that I know, I am not very sure if they are involved at all.* (Service Manager 01)

Service providers were also divided with regards to their opinion on the involvement of all stakeholders in policy development, planning, implementation, monitoring and evaluating. Four out of nine felt that all stakeholders were not involved. Another four were unsure whether all stakeholders were involved.

> "*I think it does not involve them [all relevant stakeholders] in the process, I think it involves mainly service providers".* (Service Provider 06)

One provider pointed out the involvement of disabled persons organisations.

> *"I believe so because when you look at the document for prosthetics and orthotics when it is being worked on, I have seen that, there are some representatives from the national disability council and the disability affairs department under the Vice President's Office, then there are also representatives from the national level for the orthopaedic technical services and the staff from the established orthotics and prosthetics centres, they are present when that document is being drafted. So, I would say there is enough representation from all stakeholders"* (Service Provider 05)

According to user interviews 14/16, they were not involved in these processes.

> *"He is saying he does not know anybody [anyone who represents persons with disabilities involved in these processes] like that".* (Service user 11; Through interpreter)

Information pertaining to user involvement in these processes are presented in further detail under standard 39 (Chapter 8).

5.4. Standard three

A national prosthetics and orthotics committee or similar entity, with a wide range of stakeholders, should be in place for the coordination and development of national prosthetics service provision.

At the time of the study, there was no prosthetics committee or similar entity in Namibia. This standard was not explored during data collection as it was already known that no such entity existed. Document search yielded no results as well regarding the existence of such a committee in Namibia.

5.5 Standard four

There should be a national guiding framework for prosthetics service provision.

Both managers responded that there was a national guiding framework for prosthetics service provision: The Policy on Orthopaedic Technical Services of 2001 and the Guidelines for mobile orthopaedic technical services. Thus, it can be deduced that a policy was available.

> *Yes, currently we have two documents, which we can say play a role of a framework, one is a policy for orthopaedic technical services that contributes to the establishment and implementation of services and also, we have the guidelines for mobile orthopaedic technical services which guides the operations when it comes to orthopaedic outreach services (Service Manager 02)*

All service providers concurred with this opinion and mentioned the same policies. However, they felt that The Policy on Orthopaedic Technical Services of 2001 was outdated,

> "*Eh, yes there is [a guiding framework], but they are outdated as they were formulated more than ten years ago. So, they have not been updated…They are not really useful because things have changed as there is a change in technology and new international policies even at WHO that came up, so the one we have here may not be useful at the moment as it is outdated…. we don't use them as the technology has changed so much. For example, in the past,*

people were using a mobile truck for outreach services, but we don't use it now." (Service Provider 01)

While this document exists, 12/16 of service users were not aware of it.

"*He is saying he does not know of any government document; is it important if there was a document that he could at least read, that talks about the provision of artificial legs*" (Service user 11; Through interpreter).

Both of these documents could be sourced from the MOHSS.

5.6 Standard five

Prosthetics service provision should be regulated by the State.

The MOHSS is mandated to oversee and regulate public, private, and non-governmental sectors in the provision of health and social services including prosthetics services (MOHSS, 2016). All healthcare service provision including prosthetics services and service providers are regulated through the Health Professions Council of Namibia (hpcna.com). The standard was not further explored with the participant groups as the available documents and website of the MOHSS provided the necessary information.

5.7 Standard six

Prosthetics service should be monitored nationally and regionally.

Based on document review, the monitoring of prosthetics services was carried out by service managers employed at the National level of the MOHSS. This was usually done once every year using the MOHSS National Supportive Supervisory Guidelines for Health Care Services in Namibia developed by the Primary Health Care Directorate in 2012 (MOHSS, 2012). The reports are available to the public upon official request to the Ministry. The last official annual report published was for the 2017/2018 financial year and it shows that 1939 patients/users in need of orthotics and prosthetics assistive devices were provided with such devices at Windhoek Central Hospital, out of a total of 2112 of those who needed the devices (MOHSS, 2019:35). The reported figures were only for Windhoek Central Hospital, while figures for other hospitals offering prosthetics services in the country were not reported.

Service managers concurred that prosthetic services were monitored by the government.

> *"…that area [monitoring and evaluation] is conducted at the national level*" (Service Manager 01).

5.8 Standard seven

Governments and national stakeholders should collaborate internationally and share experience, data, and research on prosthetics service provision.

Data shows that such collaboration would be difficult since very little information was documented and even less research done.

> *"…more studies should be invited to this area, so that we may develop, because it has been like 20 years and this is my first-time, I 'am seeing a study and interview in 20 years…so I am just recommending that we need more of this kind of studies to develop the services.*" (Service Manager 02)

> *"Normally we do not document, we just discuss among ourselves as professionals that this patient for example I gave him a trans-femoral prosthesis last week, the patient came back and testified to say the services are good and at least I am satisfied but we do not really document such kind of information."* (Service Provider 05)

As per the quantitative findings, 5/12 of service managers and service providers indicated that, experience in lower limb prosthetics was not usually shared with anyone. Nine out of twelve indicated that data and research were not shared. Where sharing of experience or data did occur, it happened occasionally rather than according to a fixed strategy.

5.9 Standard eight

International support, when provided, should contribute to the establishment and implementation of national prosthetics policies and strategic plans, and be aligned with the provision system of the national health and welfare services.

This standard was only raised with managers. Both responded that there was international support through activities such as long-term training of professionals.

> *"…the implementation, still have a lot to consider, as there were areas where we had international organizations that funded some professionals and provide services…International Society for Prosthetics and Orthotics and the was also NIDA, I can't actually fully explain what NIDA stands for, but they have also been participating through the European Union in training some professionals in the local institution (National Health Training Centre) on prosthetics and orthotics*." (Service Manager 01)

They were uncertain about any other support.

> *"…somewhere, somehow…there should be some high-level meeting that is not at our level that involves international support from outside*" (Service Manager 02).

5.10 Standard nine

The cost of providing prosthetics services should be assessed periodically.

Government provided funding for prosthetics services. It was not clear whether the costs of prosthetics services were assessed periodically. However, the concern about providing a free service shows a need for such assessments and possible mediating strategies to ensure long term sustainability.

> *"…in the long run, it is not actually sustainable [providing prosthetic service free of charge] because as the number of cases keeps on increasing then the demand will also increase, and that means that we will end up having patients on the waiting list or patients waiting for a long time to receive their devices. So,*

> *there is a need to put in place suitable measures so that at least those that can afford can be billed for their products"* (Service Manager 01)

Service providers concurred and indicated that the cost of providing the service was either not assessed regularly or if assessed the findings were not heeded to ensure funding of ongoing services of high quality.

> "*We have patients that are coming in with broken prostheses and we still send them back home because we do not have the materials…some of them their prostheses are in very bad shape and they are in dire need of these services but at the moment we are not able to provide anything because there are no materials…We have a challenge with the issue of equipment maintenance and replacement because of the funds, sometimes there is no budget at some point to replace certain equipment*." (Service Provider 04)

Users also commented on a shortage of materials and consumables.

> *"The biggest challenge so far, is when he is told that there are no materials such as stump socks or crutches…"* (Service User 15; Through interpreter)

Concerns about the sufficiency of funds were shared by managers and providers. Most providers (6/9) also indicated that funding for lower limb prosthetics services was not sufficient. Additional information showed further budget challenges:

> *"…you might budget a certain amount and at times you might get what you budgeted for but many at times we do get less or not getting anything at all, and sometimes the money is only made available towards the end of the year."* (Service Provider 08)

Budgets were not ring fenced.

> *"…when there is crisis or other needs of the ministry these services usually take a back sit because there is a narrating that prosthetics patients "don't die", therefore some of the priorities of these services ends up being overlooked."* (Service Provider 02)

Survey information showed that the P&O budget allocated for Oshana region was three million Namibian dollars per year. While Khomas had a budget of four million Namibian

dollars per year. The difference is due to the number of patients managed at each of the facilities. All (12/12) service managers and providers indicated in the survey that, the allocated budget for the provision of prosthetics services at their facilities was not sufficient. They suggested a budget increase ranging from four to ten million Namibian dollars per facility, with a mean of 6.25 million Namibian dollars (sd. 2.006).

5.11 Standard ten

The direct and indirect economic benefits of prosthetics services should be analysed at individual, family, community, society, health sector and national levels.

Survey data provided information of the perceived economic benefits of a protheses. But not on whether these benefits were analysed. Most managers and providers rated the economic benefits of using a lower limb prosthesis between 6 to10 out of a total score of 10, with 5 managers and providers having scored 10/10 (Table 5.1).

Table 5.1: The economic benefits of the prothesis for the user as rated by providers on a scale from 0-10 (N=12; 2 mangers and 10 providers)

Score out of 10	N
3	1
6	1
7	2
9	3
10	5

Most users 78.3% (n=94) indicated that their lower limb prostheses were suitable for carrying out work activities, either in formal employment settings or at home. It assisted 89.5% (n=105) of users to earn the money necessary to feed themselves and their families (Table 5.2).

Table 5.2: Economic benefits of the protheses (N = 120)

	Working		Running a business		Feeding self and family		Economically beneficial	
	N	%	N	%	N	%	N	%
Yes, prostheses suitable for/benefitting	94	78.3%	33	27.5%	105	89.5%	116	96.7%

5.12 Standard 11

Prosthetics services should be an integral part of universal health coverage (UHC).

Both Service Managers responded that prosthetics services were part of Universal Health Coverage (UHC) although the UHC strategy was not fully implemented in Namibia.

> *"Yes, I can say so and agree, but it is not yet implemented properly, it needs to be well defined on what needs to be done, I think it is happening but at random and not really specific*." (Service Manager 02)

5.13 Standard 12

Prosthetics services should be included in national health and social insurance systems, like other health interventions.

There was no national health insurance or Universal Health Coverage in Namibia. But there was progress being made towards developing UHC insurance package by the MOHSS. Interview data from all three participant groups showed that prosthetic services, while expensive, were covered by government and delivered free of charge to users.

> *"Um, not really that they [prosthetic components] are cheap but I think considering the economic status of people with disabilities in the country I think that is why the government took a step that, they will take up that responsibility that nobody is denied services because of economic struggles or status. Therefore, all costs are catered for by the government. The users at our centre, get these products for free. Government buys and us as the service providers, we manufacture, and we assemble, and we do the fitting and everything and we give a complete prosthesis to the patient without any cost attached to it…The Ministry of Health and Social Services usually allocates a budget for these services…we do not rely on any donors or any other organization but the government budget…one cannot say it [funding] is sufficient but, we get quite a good support from the government because it is able to allocate on an annual basis a budget for all the centres" (Service Manager 01).*

"…it is funded and as it is now, it's actually on the shoulders of the government we don't have anything like donors or something it is only the government that what I know (Service Provider 08)

*"In terms of payment, he says they usually get a referral letter from the doctor which allows them not to be charged anything, therefore they get it free of charge, and even when its broken or needs repair, they will just go to the facility to get it replaced free of charge" (*Service User 13; Through interpreter*)*

5.14 Standard 13

Data on prosthetics service provision should be collected periodically, analysed at service level, and shared at national level.

Qualitative data showed that information was collected on an ad hoc basis, and not always analysed or shared.

"You can do M&E, monitoring, and evaluation and once you do the M&E, you will learn where you are doing good and wherever you are not doing good, but by doing so with no plan does not really take us anywhere and we learn nothing." (Service Manager 01)

"Normally we do not document, we just discuss among ourselves as professionals that this patient for example I gave him a trans-femoral prosthesis last week, the patient came back and testified to say the services are good and at least I am satisfied but we do not really document such kind of information." (Service Provider 05)

Staff performance was monitored in a structured manner.

"Yes, we do have annual plans, and on continuous sustainability of the service there is always a quarterly performance assessment done by individual staff members, and these, ensure that the service will continue, and it is very much necessary. Because if there is any discrepancy in service provision then the management can take up the necessary steps to ensure that, services can be improved. Therefore, the government has a tool that is used to assess staff

members on their performance that indicates the necessity or importance of the service." (Service Manager 01)

According to survey results, some data collection, analysis and reporting were done. Five managers and providers indicated that data was usually collected monthly. While four indicated that collected data were analysed and eight felt that it was shared at a national level.

5.15 Standard 14

A national prosthetics database should be established to identify total need, types of need and unmet need.

Based on the document review it was concluded that, there was no existing database for prosthetics services in the Namibian public healthcare system. No further exploration was carried out on this standard.

5.16 Standard 15

Strategies for raising awareness about prosthetics services should be established, including rights-based, social and economic arguments.

Both managers felt that awareness of prosthetics services might be lacking in communities.

"…in the community out there, I do know that there are people probably who are not aware as of where to go for these services. Therefore, it will not even surprise me that, you will find someone out there who has been amputated for some years and did not receive a prosthesis because the information did not reach them." (Service Manager 01)

Providers also indicated a lack of awareness that could constitute a lack of awareness raising stragies. Or if there are stategies, a lack of effectiveness of these strategies.

"…*there is not much awareness about these services that we offer, very few people are aware of these services, even some private companies are not aware of our services…not all patients are aware of these services. That means not everyone who is amputated will come to the facility, so only part of them are*

getting the service and some are not aware of this facility or the services that we provide." (Service Provider 01)

Users concurred.

"*some people maybe they don't have the information on where to get them* [prostheses]. (Service User 09)

It seems awareness raising was done at facility level.

"…we do participate in career fair events, like for students, that is where we promote the services and educate the youth how our devices operate, and those who are present they go and convey the information to their family members and that how some people get to know about our facility, so, through that, we have made our center to be more accessible to more persons with disabilities" (Service Provider 01)

"She has only seen something at the orthopaedic facility that is at Oshakati, there is some posters that shows that there are artificial legs being issued there." (Service User 13;Through interpreter)

But it needs to be more visible and in different formats.

"She says it can be very helpful for the government to make pamphlets available or any other reading material whereby they could read by themselves and also see how artificial legs looks like and where to get them and the type of service they can get and what to be done in order to get a new leg. She says she is sure that there are people who do not know anything about artificial legs, they are there in need of one but since they might not have the information, they remain not knowing anything. She met a lot of people asking her where she got her artificial leg, so it shows they don't have information that is why they don't know, and some people did not receive proper training ever since they received their legs, the legs have just been kept at their homes without being used. Some people don't even know where to go for maintenance and repair, so when their prosthetic legs are broken, they remain just at home. (Service User 06;Through interpreter)

Awareness raising suggestions were made.

> *"This is where decentralization of services to some regions comes in so that more people could have access and to increase awareness. So, if we take our services out there and make them known through the media, through that then we can reach even more people staying in farms or hard to reach areas."* (Service Provider 01)

Based on qualitative data only one user got information on prosthetic services and rights of PWD through official channels, two got it from other users. Others got information on rights through the media (1) and at disability groups (3). One thought there might be official information but was unsure as to where to source it. Eight were not aware of any information on disability rights and 12 asked that such information should be made available at health care facilities. Fifty percent (8) were also not aware of any information regarding the rights of persons with disabilities. Users indicated that awareness raising was important.

> "*Yes, it is very important because when people get amputated they tend to develop fear and do not even want to approach other people for help and tend to become isolated from everyone in the community. So, it can be good if there can be something like that, so they get helped in developing confidence and stable psychological wellbeing."* (Service User 11)

According to survey information, eight managers and providers indicated that there was awareness raising strategies in place at their facilities. Figure 5.2 shows that the aspect that awareness was most raised on was service provision at eight, with social and economic aspects lagging at three each.

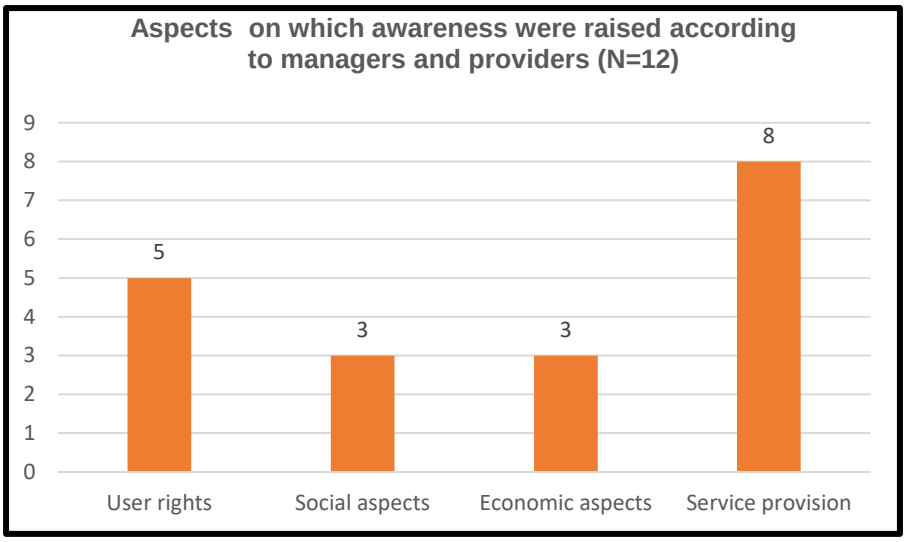


Figure 5.2: Aspects on which awareness were raised according to managers and providers (N=12)

5.17 Conclusion

The results of this chapter address objective one and showed that while available policies were dated, and the provision of funds were insufficient or irregular at times. It also shows that there were gaps in Namibia in terms of adherence to WHO policy standards. Standards 5 and 6 were adhered to, while standards 1, 4, 7, 8, 9, 10 and13 were partially adhered to and standards 2, 3, 11, 12, 14 and 15 were not adhered to. Findings showed that managers and providers indicated that service users were not usually involved in policy development, planning, implementation, monitoring and evaluation of services, and service users shared these same sentiments. There were no national prosthetic committee or data base. There was a national guiding framework but it was found to be outdated. Budgets existed, but were not ring fenced and concerns were raised about financial sustainability of prosthetic services. Data collection on services and sharing with national level seems to be haphazard with little sharing of the evidence. The government funded the services without international support, even if Universal Health Coverage (UHC) was not yet implemented. In the next chapter we look at the results in the implementation of Area two, prosthetics products of the WHO global standards.

CHAPTER SIX

Results: Area Two, Products

6.1 Introduction

This chapter pays attention to objective number two and the nine product standards. This is the second of the four chapters to present the results of the 60 WHO standards that were explored in this study as per the framework in figure 6.1 below. Products standards are aimed at ensuring that appropriate and affordable prosthetics products are made available to all those in need.

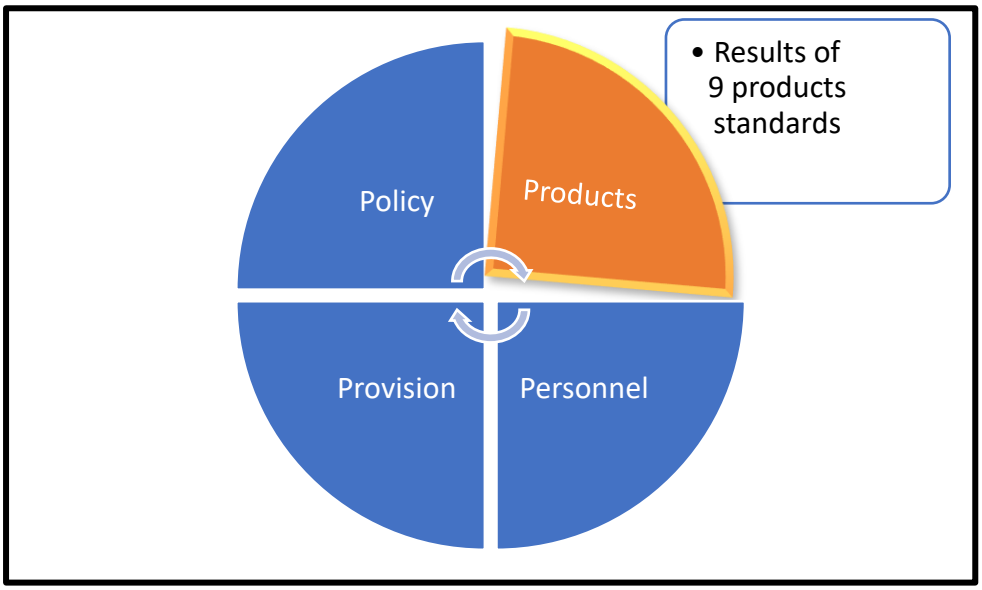


Figure 6.1: Study framework (source: author)

Data regarding the implementation of products standards were acquired from available policy documents, legislation and website information from the Ministry of Health and Social Services as well as managers, providers, and users. The methods followed were introduced in chapter three. The demographic details of the participants were presented in chapter four. The results from the two phases (qualitative descriptive and quantitative survey) and three participant groups are presented in an integrated manner for each standard.

6.2 Standard 16

An appropriate range of prosthetic products to suit local needs and realities should be available in countries.

Qualitative data showed that both service managers indicated that an appropriate range of lower limb prosthetics products was available in Namibia. Seven out of the nine service providers concurred with this opinion during interviews. However, both groups indicated that monetary constraints sometimes hampered the provision of appropriate products even while the range was available.

> *"Eh, to some extent I will say yes, considering the level of activities of most of our patients. We have quite a reasonable range of products in prosthetics that can enable individual patients to carry out their activities without limitation, although there are also those that require high-performance products…but most of them are covered by the range of products that we have at our centre".* (Service Manager 01)

Service manager two and provider four expanded on these high-performance products.

> "*…there are some high-tech products which are really not part of what we provide here…myoelectric devices are not part of what we provide here…we wish we could be more comprehensive…The budget is not really a problem because we never requested the government to fund such high-tech devices. I think if we could have the necessary skills and enough equipment, we could be able to come up with a plan and submit it to the government because our management has never said no to what we requested.* (Service Manager 02)

> "*Uh, I will say what we are providing meets the needs of the patients but at a certain level, you always have one or two who goes an extra mile with their needs, like the blades and other things that we are not yet able to give in the state but generally speaking we are able to meet the needs of the patients… Yes, our prosthetics products are able to ferry our patients to where they are working and where they are staying…For example, if you look at the types of mechanical knee joints that we provide to our patients, we have got the manual locks, we have the four-bar linkage, we have the pneumatic knee joint of which*

> *if you look into the private sector, these are the same components being used in the private on transfemoral prostheses which don't come cheap and we also have the shuttle lock suspension system which comes with silicone liners of which the services in government if they have reached this level, it means they are very good quality. So, definitely, we cannot satisfy everyone but if you can find that you are satisfying 95 to 98% of the clients, it means our services are comparatively very good*." (Service Provider 04)

Users had contradictory opinions on whether their needs were met. With 7/16 feeling that the facilities where they received their prostheses had an appropriate range of lower limb prosthetics products, which met their needs.

> *She says the products that she received here are of good quality because she used them without any fear and she is using them without crutches….She says this prosthesis is very effective, she is having a printing shop and she works there alone and she is able to do everything there alone, and she does washing and cooking at home and everything else*. (Service User 02)

While 6/16 users indicated that not all their needs were met by the prostheses.

> "*The leg was too heavy for me and it cut me inside, it [the prosthesis] is not good; it is not up to standard" (Service* User 05).

> *"She is somehow happy with the prosthesis but not so much because she wants a leg which can allow her to walk without crutches, at the moment she does not know what is wrong with her prosthesis as she feels as if its short or there is no balance that why she has to use crutches, but she wants to walk without crutches"*. (Service User 06)

Product availability was further clarified through survey results obtained from managers and providers on the components that were available in Namibia. Table 6.1 shows that pin and lock suspension (n=11), self-suspending socket suspension systems (n=10) and cuffs, straps, and belts (n=10) were among the suspension systems that were commonly available.

Table 6.1: Suspension systems availability (N=12)

	Cuffs, Straps & Belts suspension	Pin & lock suspension	Suction without liner suspension	Suction with liner suspension	Vacuum assisted suspension	Self-suspending socket
No	2	1	7	4	5	2
Yes	10	11	5	8	7	10

Weight activated (n=10) and polycentric (n=11) prosthetic knees were most commonly available. Microprocessor knees were not available (Table 6.2).

Table 6.2: Availability of prosthetic knee components (N=12)

	Manual locking knee	Single axis knee	Weight activated knee	Polycentric knee	Hydraulic knee	Pneumatic knee	Micro-processor knee
No	3	3	2	1	10	4	12
Yes	9	9	10	11	2	8	0

All managers and providers (n=12) indicated that SACH and Dynamic feet were available. They also concurred that microprocessor feet were not available (Table 6.3).

Table 6.3: Availability of prosthetic feet (N=12)

	SACH foot	Dynamic foot	Multi-axis foot	Flexible Keel foot	Microprocessor foot
No	0	0	11	8	12
Yes	12	12	1	4	0

Table 6.4 shows that 85.9% (n=103) of users rated the prosthetic components suitable to address their functional needs.

Table 6.4: Suitability of the prosthetic components to meet user functional needs (N=120)

	N	%
Poor	2	1.7%
Fair	15	12.5%
Good	35	29.2%
Very good	68	56.7%

However, Table 6.5 shows that 40.8% (n=49) of users strongly agreed that the prosthetic limb interfered with the ability to work, and 50.8% (n=61) strongly agreed that having a prosthesis made them depend on others more than they would like to.

Table 6.5: Influence of prosthesis on ability to work and assistance needed (N=120)

	The prothesis interferes with my ability to do my work	**Having a prosthesis limit me in the kind of work I would like to do**	**Having a prosthesis makes me more dependent on others than what I would like to be**
Strongly disagree	8 (6.7%)	10 (8.3%)	2 (1.7%)
Disagree	18 (15.0%)	41 (34.2%)	21 (17.5%)
Agree	45 (37.5%)	34 (28.3%)	36 (30.0%)
Strongly agree	49 (40.8%)	35 (29.2%)	61 (50.8%)

Other information on user functionality and satisfaction with the prosthesis was provided under figure 4.2 and table 4.5 in chapter 4.

6.3 Standard 17

A national list of priority prosthetic products should be drawn up, respected, and updated regularly.

One manager indicated that there was no national list of priority prosthetics products while the other felt that the prosthetics tender document can serve as a national priority list. Tender contracts usually last for a period of two years and they get updated whenever the contract is renewed.

> *"Yes, I would say we have because we acquire our components.... [through a tender document] …it is used in the whole country, although it is also organized in different groups or lots. It is a national document that is used for acquiring the products on a two-year basis".* (Service Manager 01)

The document search provided no national list of priority prosthetic products for Namibia.

6.4 Standard 18

International standards should be used for national classification of prosthetic products.

Data on this standard were collected using the quantitative survey for managers and providers. Ten out of twelve (n=10) of managers and providers indicated that international standards were usually followed in classifying lower limb prosthetic products at facilities.

6.5 Standard 19

Prosthetics products that are not available in the country are exempted from import duty.

Eight out of twelve (n=8) of managers and providers indicated that imported prosthetic products were not exempted from import duty. The other four were either not sure (n=1) or did not know (n=3).

The document search provided no official public statement in Namibia, regarding the exemption of import duty on prosthetic components, materials, consumables, tools, machines, and other equipment used for the fabrication of prostheses.

6.6 Standard 20

Regulation, quality control and documentation of reuse of prosthetics components by an authority or group with no conflict of interest.

All manager and provider participants (n=12) indicated that lower limb prosthetic components were normally reused. Eleven out of twelve (n=11) indicated that there

was no body that regulated and controlled the quality of reused prosthetic components (Table 6.6).

The document search also provided no details or regulations to guide the reuse of prosthetic components.

Table 6.6: Reuse of prosthetics components (N=12)

LLP components re-used			Quality control of re-used components	
	N	%	N	%
Yes	12	100.0%	1	8.3%
No	0	0%	11	91.7%

6.7 Standard 21

National regulation of prosthetic components and materials must be an integral part of the national health care regulatory system.

Most managers and providers (n=8/12) indicated that there was no national regulatory body that regulates prosthetics products, components, and materials.

The document search did not deliver official regulations or regulatory systems on prosthetic products, components, and materials in the country.

6.8 Standard 22

Prosthetic products should be tested structurally for compliance with ISO or equivalent standards before being sold on the market

In Namibia, there is no tools or laboratories that can test prosthetics components and materials for structural compliance with ISO or equivalent standards before being bought or used. Prosthetics devices produced locally are usually produced or assembled from imported components and materials and all are not structurally tested.

> *"These are European based/manufactured products, so these are high quality and we do not have anything that is coming from local suppliers, these are all international suppliers" (Service Manager 02).*

6.9 Standard 23

Clinical and technical research should be conducted in prosthetics, and the results should be shared nationally and globally.

Quantitative findings showed that all managers and providers (12/12) indicated that no clinical and technical research was done in Namibia. Neither did the literature search uncover any publications on such research.

6.10 Standard 24

Affordable prosthetic products that are cost-effective, of good quality and context-appropriate should be developed and made widely available.

Prosthetic components that are used in assembling the devices were not manufactured in Namibia. Participants from all three groups agreed during the interviews that prosthetics products produced at facilities through the use of imported components were affordable to users, as the government of Namibia provided these devices to service users free of charge. No opinion was provided on the cost effectiveness of the products.

> *"The users at our centre, get these products for free. Government buys and us as the service providers, we manufacture, we assemble, and we do the fitting and everything, and we give a complete prosthesis to the patient without any cost attached to it?"* (Service Manager 01)

> *"Yes, I think, they are affordable, simply because the government offers them for free to our people, so I think affordability is not a question because they are not spending any money on them, they are getting them free, because these items are funded by the government, so they are affordable."* (Service Provider 02)

> *"I never paid for it".* (Service User 03)

Both service managers felt that the products provided at their facilities were of good quality and suitable to use and contextually appropriate. Service providers concurred with this opinion.

> *"…here in the northern regions, we do know that most people here are farmers they do depend on what they cultivate in their fields so I will say our products are provided by considering all such factors".* (Service Provider 08)

The users did not unanimously agree with this opinion. Eleven out of sixteen responded that their prostheses were of good quality and suitable to use.

> *"…the quality is good and the legs are suitable for the users and she feels that for anyone that needs the artificial legs, they are available because they are given for free and the legs are made to suit everyone's needs". (Service User 04*; Through interpreter*)*

> *The one that I have got right now, it meets my needs 100%. (Service User 12)*

> *He is saying, he is very much happy, especially with the new system that he is using now, the one with a silicone liner and shuttle lock suspension system. The new system is very much helpful compared to the old system they used to receive. He is saying the prosthetic leg is helping him a lot, and even if we were in a jungle and probably the lion is approaching us, he might even run faster than any of us and he might leave us behind with the lion…the biggest challenge so far, is when he is told that there are no materials such as stump socks or crutches because sometimes, he needs crutches to walk and at times he needs new stump socks as the one he was given can get old or they are already old and worn out and they result in discomfort, so those are the only challenges that disturbs him.(Service User 15)*

However, others pointed out some challenges often related to the weight of the prothesis or the waiting times.

> "*It is heavy, I need something lighter*. (Service User 08)

> *"They usually don't have materials, every time she goes there, they tell her the same story of no materials, but then after something like three years she was called to come and get the new appropriate type of leg that suits her needs. in the past they also used to be given free shoes to use with their prosthetic legs*

but as of now they have to buy their own shoes." (Service User 07; Through interpreter)

Survey data on the lifespan of prosthesis might also be indicative of good quality. Findings showed that in the opinion of managers and providers the lifespan of a transtibial prosthesis was between two to 11 years with a mean of 5.38 years (sd. 2.67). That of a transfemoral prosthesis was between three to nine years with a mean of 4.88 (sd. 1.81).

Meanwhile LLP users indicated that they had their current prostheses for between 1 to 36 years with a mean of 6.01 (sd. 7.082) for transtibial prosthesis and mean of 4.25 (sd. 3.965) for transfemoral prosthesis.

6.11 Conclusion

The results of this chapter showed that there was a wide range of lower limb prosthetics products such as suspension systems, knee units and prosthetic feet available at facilities in Namibia. However, products at the high end of the spectrum were not provided due to budgetary constraints, therefore the needs of all users were not fully met. Prosthetic limbs were found to be affordable as they were provided free of charge to the users. A national priority assistive products list was not available. There was no regulation of prosthetic components and materials, and there was also no quality control on the reuse of components. The country had no equipment to test quality of devices, thus, the quality of prosthetic products was usually measured against the number of years that the prosthetic limbs last, the longer the lifespan of the limb, the better the quality. Of the nine product standards, two (16 & 18) were adhered to. Standard 24 was partially adhered to and standards 17 and 19 - 23 were not adhered to. In the next chapter, we look at the results regarding the implementation of area three, availability of prosthetics personnel.

CHAPTER SEVEN

Results: Area Three, Personnel

7.1 Introduction

This chapter is the third chapter to present the results on the 60 WHO standards as per the study framework in chapter two and recapped in figure 7.1. The chapter concentrates on the 12 personnel standards and objective number three. Personnel standards focus on the need for an adequate number of service providers with sufficient training to meet the demand of the country and pay attention to the importance of supervision and career pathways (WHO, 2018).

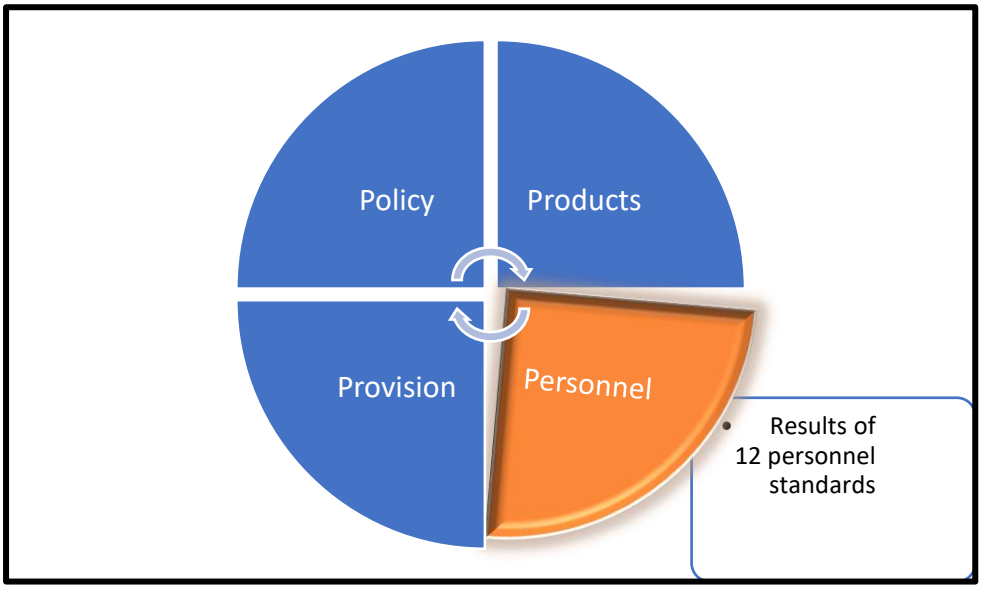


Figure 7.1: Study framework (source: author)

The study population and sample sizes as well as data collection methods, tools and analysis strategies were presented in chapter three. The demographic details of participants were presented in chapter four. As in previous chapters, the results from the qualitative descriptive and quantitative survey emanating from the three groups of participants are presented in an integrated manner for each standard.

7.2. Standard 25

Prosthetics services should be provided by competent and adequately trained professionals.

Qualitative data showed that both service managers indicated that service providers were competent and adequately trained. They also said that ongoing training was offered at the facilities.

> "*I think they are all competent and adequately trained, simply because they all obtained academic qualifications which are coming from internationally and nationally recognized institutions. So, they are very competent and when they start working for government, they are required to spend one year of probation to prove what they have what is required and at the same time they get to be mentored.* (Service Manager 02)

Eight of the nine service providers concurred that service providers were well trained and competent.

> *I can say we are competent enough…Yeah, by looking at the products that we are giving out to the patients and also looking at the complaints of patients when they come back, so we really don't have a nation that is complaining too much that we are not doing something or either we are not doing something good for them. The compliments that we get from them (patients) is also a measure that we are doing quite fine.* (Service Provider 07)

The majority (13/16) of service users concurred with this opinion and felt that the service providers who assisted them seemed to be well trained.

> *"I never had any problem with them, and even the way they conduct themselves with the patients, they were never unprofessional with me or the way they conduct their job you see…and the end product is always on point."* (Service User 03)

One user switch from private to government services since she felt the service from government providers was superior.

> ""*She says in her own view, the professionals in the state hospitals are highly qualified there is no doubt about it. The first time she came to a state hospital, her visit was initially to come and get only some stump socks because the one*

she had received from private were now old, so she was not initially coming for a prosthetic leg, but then the clinician at the state facility realized that her prosthetic leg from private was not looking good and then decided to make a new one for her" (Service User 02)

However, rival opinions were offered as well.

He is saying, he is not so sure whether those people are new recruits or maybe the job first requires one to get more experience because he does not know what is really the problem. He says sometimes he get measured nicely, but when the leg is ready for fitting it turns out to be either too long or short, and sometimes they even put a foot that is bigger than his sound limb, so instead of size 6 they put size 7 there and then it does not fit in into his shoe, then he ends up being forced to use one shoe being bigger than the other one, yes, such kind of things. …but he is saying the last one that he got, it was just done once and it was good without any complaints or problems. (Service User 16)

And some users mentioned that their prostheses did not fit well.

"…*the leg did cut me here (proximal aspect of the thigh on the residual limb), that is why I did not continue to use it*." (Service User 05)

7.3 Standard 26

Complicated prosthetics treatment and care of complex cases should be provided by a multidisciplinary team of professionals with complementary skills.

Both service managers indicated that they worked closely with other professionals such as orthopaedic surgeons, physiotherapists, occupational therapists, nurses, and social workers. Most of the service providers (7/9) also indicated that they worked closely with other professionals.

"…from the time when the amputation is done, from that time everyone is involved, us as the professionals together with the caregivers and the patient, sometimes we call in the doctors to join us if necessary…and we sometimes

engage with the physiotherapists and the occupational therapists… So, it is not a one-man show but a team effort". (Service Provider 04)

User narratives did not speak about teamwork and consultation.

Quantitative findings showed that consultations with other healthcare professionals were infrequent. Table 7.1 shows that occasionally or rarely were the options more commonly selected than daily or more than once a week.

Table 7.1: Frequency of consultations with other healthcare professionals (N=12)

Profession	Daily	2-3 times a week	Once a week	Once a month	Occasionally	Rarely
Physiotherapists	1	1	2	1	5	2
Occupational Therapists	1	1	4	-	2	4
Social Workers	1	1	-	-	3	7
Nurses	1	4	-	-	2	5
Medical Doctors	1	1	5	-	2	3
Orthopaedic Surgeons	1	2	2	-	4	3

7.4 Standard 27 & 28

Training in prosthetics should be aligned with national and international educational standards.

Training in prosthetics should be available at various levels to fully meet national needs.

There were no training institutions in Namibia offering prosthetics related courses.

We are actually relying on foreign training". (Service Manager 01).

7.5 Standard 29

Health care professionals, especially rehabilitation professionals, who provide treatment relevant to prosthetics services should have adequate knowledge about prosthetics.

This standard was explored only through the quantitative survey with service managers and providers. Table 7.2 shows the rating by managers and providers regarding the knowledge of other rehabilitation professionals on prosthetics, the rating ranged between two and ten out of a total score of ten, mean score 6.08 (sd. 2.712).

Table 7.2: Rating of other rehabilitation professionals on knowledge related to prosthetics (N=12)

	Prosthetics knowledge of other rehabilitation professionals (rated out of 10)
Mean	6.08
Std. Deviation	2.712
Range	8
Minimum	2
Maximum	10

7.6 Standard 30

Continuing professional development should be compulsory in prosthetics professional practice

Qualitative data showed that both service managers indicated that Continuous Professional Development (CPD) is compulsory for prosthetics professional practice in Namibia.

> *Yes, there is a law at the Health Professions Council of Namibia, that requires us to partake or continue with professional development but when it comes to the ministry level, that is where we have a bit of relaxation that I would say we need to work on, but we do partake or participate. Like here at Oshakati Hospital, we have a medical seminar every last Friday of every month and these are some of the Health Professions Council's recognized trainings where we get some of our CPD points"* (Service Manager 02).

Six out of nine service providers also indicated that CPD was compulsory in Namibia.

> *"Yes, it is compulsory. There are some points we are expected to accumulate on a yearly circle, therefore if you are randomly selected you will be required to submit the proof of points accumulated, to the health professions council".* (Service Provider 05)

However, it seems like CPD were not reinforced or emphasised.

> "*Well, I cannot really say it's compulsory, because you hear about it but not everyone is participating in it…some people you hear they are going for some training, we ask but we don't get all the information, so if we have to say compulsory, no I don't really think so…I don`t recall ever participating in any training*." (Service Provider 08)

> "*I have seen a document that talks about this CPD, but the reality is that it's not reinforced to a point where one is required to submit the points accumulated… I would want to believe that, maybe the ministry does not take such a document seriously because the training was supposed to be conducted through the ministry. I believe the ministry was supposed to be the facilitator of such activities as an employer of professionals…The last training I had in 2016".* (Service Provider 09).

It seems funding and availability of training caused challenges to CPD.

> *But now we are facing challenges caused by lack of funds or insufficient budget allocation for training. Once when people graduate and start working few short courses are available for them, so, due to that they end up only with the knowledge that they gained only from school, therefore their knowledge ends up being not up to date, so, that is a challenge…First of all, the government usually tried to bring up a program where they try to train for a certain period of time like a five-year where they were training some people, but due to financial constraints they stopped and they are no longer training and no continuous training is happening.* (Service Provider 01)

COVID-19 created further barriers to training.

> *"…currently due to COVID-19, and travel restrictions, I would say since our training is usually conducted by foreign expertise and because of the existing restrictions, we have not seen them around for some time now, but otherwise we should attend trainings from time to time and I believe that after this pandemic is over, we are going to continue doing the same thing.* (Service Provider 02)

Fifteen of the 16 service users indicated that lower limb prosthetics service providers should keep on learning and acquire new skills that could be of benefit to service users.

> *"She says, in any career, people need to develop themselves, and due to change in technology people need to update themselves so that they can catch up with the new practices or means of production".* (Service User 14).

7.7 Standard 31

Workforce planning should take into account all the disciplines required in prosthetics services at all levels.

This standard was explored using only the quantitative survey, where managers and providers were the only participants involved. Figure 7.2 shows that five of the managers and providers indicated that whenever planning occurs all prosthetics and orthotics disciplines required for service provision at all levels are usually taken into account.

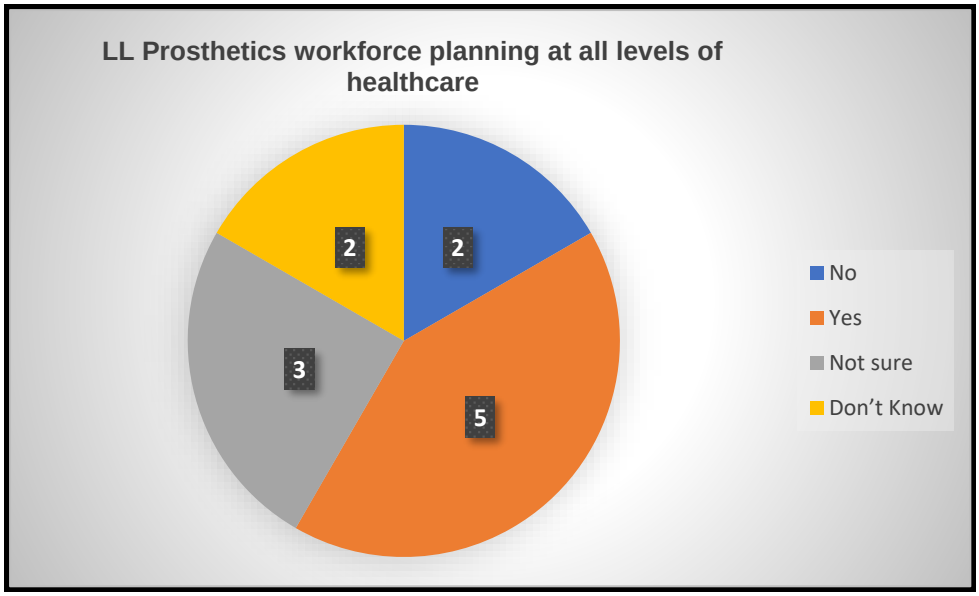


Figure 7.2: Workforce planning consider all disciplines required for prosthetics at all levels of healthcare (N=12)

7.8 Standard 32

Prosthetics units should have at least one prosthetist to supervise and guide clinical and technical work.

Qualitative findings showed that both service managers indicated that there was at least one prosthetist and orthotist who supervises and guide clinical and technical work. They also indicated that the number of these professionals was not enough and should be increased.

> *"I think this is where we have a problem because currently on the structure of our Ministry of Health and Social Services there is only one position for prosthetist and orthotist at this facility. And this person is expected to supervise and guide all the clinical and technical duties, it's a situation that stretches someone to an extent that sometimes quantity outweighs the quality and then the professional guidance is a bit compromised, so, it is really a problem".* (Service Manager 02).

All nine service providers concurred that there was a prosthetist that guided their work and provided supervision.

> *"At our facility, we have a medical orthotist and prosthetist who is our supervisor, so when you do gait training and fitting you have to involve your supervisor for him to come and help in checking out of the device and if I am happy and he is happy or probably there is still some adjustments that need to be done".* (Service Provider 06)

They further concurred that only one per facility, while adhering to WHO standards, were not enough for the workload.

> *"…that person is not directly involved with the production facility, so we find ourselves sometimes looking for him and he is always not available and then we end up doing whatever is possible on our own in order to satisfy the patients*". (Service Provider 07)

At the time of the study, there was a total of three orthotist/prosthetist, 14 orthopaedic technologists (diploma holders), and seven orthopaedic assistants (certificate holders) employed at the two study sites. Table 7.3 shows the proposed required number of prosthetics professionals according to managers and providers. Proposed orthotist/prosthetists required per facility, ranged between three to ten, mean 4.92 (sd.2.02), orthopaedic technologists between two to ten, mean 8 (sd. 2.37) and orthopaedic assistants between 0 to 10, mean 4.75 (sd. 2.563).

Table 7.3: Proposed required number of professionals per facility (N=12)

	Required Orthotist/Prosthetist	**Required Orthopaedic technologists**	**Required Orthopaedic Assist**
Mean	4.92	8.00	4.75
Std. Deviation	2.021	2.374	2.563
Range	7	8	10
Minimum	3	2	0
Maximum	10	10	10

7.9 Standard 33

A strategy to retain prosthetics personnel should be in place.

Qualitative findings showed that, both service managers indicated that, the salaries for prosthetics professionals were good, although improvement was still required for some of the prosthetics professional cadres. Five of the nine service providers also concurred that salaries and other incentives were good.

> *"There are areas, where one would say yes there is a good remuneration. But somehow since this profession is considered to be among the scarce professions in the public sector, so there are some salary grades that are not in order especially for the degree holders. The salary entry level for the degree holders in comparison to the diploma holders are somehow overlapping and I hope such a thing will be addressed soon".* (Service Manager 01)

> *"Yes, in terms of salary I am satisfied with the way the salary is because in other professions somebody with a three-year diploma will not get the salary that we get here in prosthetics".* (Service Provider 07)

One service provider felt that they should be compensated for working in an environment where there are toxic chemicals.

> ***"****I think the order of incentives, is something that needs to be looked at because of the chemical elements that we are exposed to. I think people who are in this profession should be compensated for being exposed to such elements and the fumes they get exposed to on a daily basis*. (Service Provider 09)

7.10 Standard 34

Prosthetics and orthotics clinicians should be regulated by the state within regulations for health professionals.

All, but one (who was not sure) managers and providers indicted in the survey that prosthetics and orthotics clinicians were regulated by the state within regulations for health professionals as conducted through the health professions council of Namibia.

7.11 Standard 35

Prosthetists and orthotists should assume responsibility for services provided by associate and non-clinical personnel under their supervision.

Quantitative findings showed that 9/12 of managers and providers indicated that prosthetics professionals usually assume responsibility for services provided by associate and non-clinical personnel under their supervision.

7.12 Standard 36

Prosthetic personnel should have a clear career structure and employment conditions that are aligned with those of other healthcare professionals, associates and technical personnel.

Service managers indicated that the following prosthetics professional disciplines were available in Namibia; Medical orthotist and prosthetist (degree holders), Orthopaedic Technologists (Diploma in prosthetics and orthotics) and Orthopaedic Assistants (certificate in prosthetics and orthotics) were employed in Namibia.

> *"At the moment we only have three disciplines, one is the medical orthotist and prosthetist and such a person must have a degree and above the second one is the medical orthotics and prosthetics technologist (orthopaedic technologist) this person has a diploma which is a three years diploma and we also have the medical orthotics and prosthetics assistant (orthopaedic assistant) and that person should have a certificate of not less than two years of training, these are the three disciplines".* (Service Manager 02)

One service manager felt that their career structure was well aligned while the other felt that it was not well aligned. Most service providers were not so pleased with the career structure with 4/9 of them indicating that the career structure was well aligned.

> *"Uh, I believe it is but because it is a government driven service, so it is more of service delivery than career development, So I will not say that it has a clear career path, but in terms of service delivery to the patients, we are doing what we supposed to do, therefore as the profession develops, we need to align*

ourselves with required developments of the profession and we might take it from there." (Service Provider 02)

Users concurred on a need for career development and growth for service providers.

"…he is saying it is very important if in case there is another level for them to go more up with training, then they can go for further studies and upgrade themselves to that level". (Service User 11)

7.13 Conclusion

Findings of this chapter showed that there was an availability of adequately qualified professionals at facilities, but the number was not sufficient and professionals rarely attended refresher courses. There were no regular consultative meetings between prosthetics professionals and other rehabilitation professionals, resulting in a lack of multi-disciplinary approach which is much needed when treating complicated cases. Other rehabilitation professionals were regarded as having above average knowledge related to prosthetics but improvement was still required. Strategies for staff retention seemed to exist but not to a level that was highly satisfactory. Prosthetics professionals were regulated by the state, through the existing health professions council but there was insufficient emphasis on CPD. Standards 34 and 35 were adhered to while standard 26 was not adhered to. Most of the personnel standards (25, 27-33 and 36) were partially adhered to. The next chapter investigates the implementation of global standards on the provision of services.

CHAPTER EIGHT

Results: Area Four, Provision of Services

8.1 Introduction

Chapter eight is the last of the four chapters to present results on the 60 WHO standards. It focuses on objective four and the 23 provision of services standards as depicted in figure 8.1. Prosthetics services should be user-centred and respond to the needs of service users in a manner that protects their rights, dignity, and autonomy. In addition, prosthetics services must be integrated into the healthcare systems of countries and provided in a continuum at all levels of care (WHO, 2018).

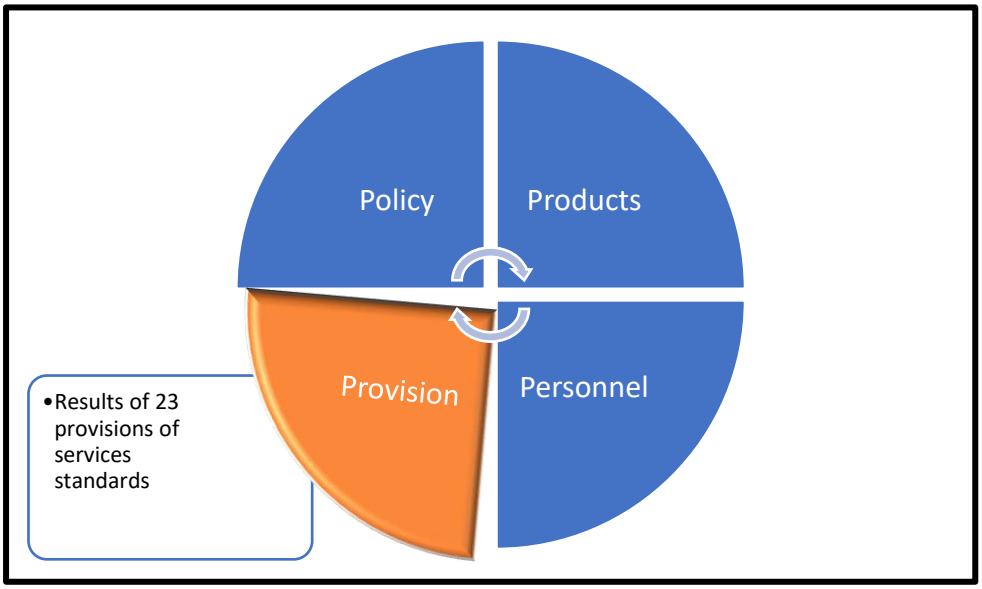


Figure 8.1: Study framework (source: author)

Data on the implementation of service provision standards were collected from the three groups of participants as described in chapter three and four. The findings for the two phases (qualitative descriptive and quantitative survey) obtained from the managers, providers and users are presented in an integrated manner for each of the service provision standards.

8.2 Standard 37

A documented policy to safeguard the rights of users of prosthetics services should be in place and in effect, outlining the features of user-centred services.

The document search did not deliver a policy to safeguard the rights of prosthetics service users in Namibia. Qualitative data showed that none of the 16 users interviewed were aware of such a policy.

> *"She says, she has never heard or seen any document that talks about artificial legs, she only heard about other disabilities such as those who are mute and deaf talking (in sign language) about what they need but nothing was seen in regard to artificial limbs*." (Service User 06)

Users thought that having a policy is important. They indicated it should be available on social and other media and at service delivery points.

> "*She says it would be helpful if there could be pamphlets at the clinics the same way they made the information for Covid-19 and TB available and all other conditions, because with pamphlets there is pictures, therefore it will be helpful to see what you are reading and the information could also be made known on radios and televisions, it could be quite helpful*." (Service User 04; Through interpreter)

Survey data concurred with qualitative findings with 95% (n=114) of users indicating that there was no such a policy. Table 8.1 further shows that 7/12 of service managers and providers indicated either no, not sure or don't know regarding the existence of a policy that is meant to safeguard the rights of service users and outline the features of user-centred services.

Table 8.1: Existence of policy to safeguard the rights of service users (N=120)

	Managers & Providers		Users	
	N	%	N	%
No	2	16.7%	114	95.0%
Yes	5	41.7%	1	0.8%
Not sure	4	33.3%	4	3.3%
Don't Know	1	8.3%	1	0.8%

Findings show that there is no policy available in Namibia to safeguard the rights of service users.

8.3 Standard 38

Service users and their representatives should be involved in policy-making, planning, implementing, monitoring and evaluating prosthetics and orthotics services, take part in decision-making at all levels and be represented on relevant committees.

Standard 38 is similar to policy standard two which reads; *Government should involve all relevant stakeholders including service users, caregivers and user groups in policy development, planning, implementation, monitoring and evaluating prosthetics services* and was presented under 5.3. Qualitative data collected from users agreed with the information presented from managers and providers under standard 2, that users were hardly ever involved.

> "*She says, the government does not involve them, and she has never heard of someone representing persons with disabilities"* (Service User 06)

Three users did have some recollection of persons/groups representing them.

> *"She is saying she knows somebody who represents' persons with disabilities but she just forgot his name and he normally makes announcements on the radio that all persons with disabilities in this region should meet here in Outapi so that, that gentleman could brief them if he had attended to any workshop or a meeting somewhere and then he shares the information with them especially*

> *activities such as setting up community projects and so forth."* (Service User 14)

One user was a member of a disability forum.

> *"I am a representative for persons with disabilities who lives here in the Oshana regional education forum. So mostly with the government involving persons with disabilities getting involved into activities, I am usually involved in sports and rural development committees. So mostly in the town council committee, they have the mandate that, they should have at least three or four persons with disabilities in the committee, so that they could have a say when it comes to development*." (Service User 12)

There is no assurance to what extent the above examples would include user centred prosthetic service delivery.

Users felt that it was important for them to be participating in developing policies and planning for services that impact their lives.

> *"She says it is important for the government to involve them whenever they want to upgrade the services and for persons using artificial legs to give their opinions and to agree on what is needed, so that government is not one sided or could end up providing what they do not need. It could be good for them as users to give feedback and it would be helpful for them to know what the government is planning to provide*." (Service User 04)

8.4 Standard 39

Service users should be given the opportunity to choose their service provider and technology, including components and materials, according to their need, among the options available in the country and the limits set for financing or reimbursement.

Overall, the qualitative findings showed that first time users did not have a choice of either provider or products. On return visits, users were often given the opportunity to consult with a service provider of their choice. While some providers felt that users

were asked for input into components others felt that users do not have the knowledge to make these choices or might choose components that were not available at the point of service provision.

> *"The more experienced users can do that [choose a provider] because they can come in and they may have somebody that they got used to, who they prefer to provide service to them. But for the new users, they can be allocated to anyone who is available…There is quite very little chance for the service users to select the materials or components that they need to use. Number one is that, let me say a high percentage of prosthetics users are not educated on the type of materials and components and all that. So that will require a good experiment and education to the end-users on the options that are available. So, currently, they get to be served with what is available"*. (Service Manager 01)

Seven out of nine service providers indicated that users familiar with the service had the opportunity to ask for a specific provider.

> *"…for the first time they do not have any choice. But for the second time, they can always select, that I want to be assisted by the person who assisted me last time I was here".* (Service Provider 03)

Regarding the selection of components and materials 5/9 service providers indicated that service users are usually provided with components and materials selected for them by service providers, while 4/9 indicated that service users were allowed to choose the type of materials and components that they wanted.

> *Clients do not have a choice on what is to be used on their prostheses, it is us professionals who choose what we are going to provide to them because if we allow them to choose then it can happen that what they are choosing we don't have it in stock. So, it is us to decide because we know what we have…we are the ones who do the assessment, and we know what is right for the patients because some may opt to go for expensive items, but such a person may end up not using it and just keep it under the bed and since it is expensive somebody else may be in need of it."* (Service Provider 03)

In keeping with the above implication that users might not have the knowledge or understanding to select the components most suitable to them, provider seven indicated as such.

> *"Um, they don't have much choice because most of them are not literate enough, so it is up to the service provider to explain to that person or decide on behalf of that person that is after examining the person and knowing where they stay including the age, so the service provider has to decide*." (Service Provider 07)

However, provider eight indicated that with explanation and teaching users about the options and components they could make choices of components.

> *"…most of the time they don't really question anything…that is why most of the time we try to explain to them because I don't know why they don't have an interest in choosing maybe it's a habit from colonial times or what because they don't really complain much, they just take whatever is there, whatever is available, so, I think it is important to educate them and introduce to them the varieties that are there."* (Service Provider 08)

Provider five concurred with this opinion and explained how s/he saw the process of empowering users to choose components.

> *"We always discuss with the patients, we give them options and we show them some pictures and samples that we have, then they are allowed to choose depending on the environment where they are coming from, but at the end of the day we still have to consider the type of components available, then they could choose from those".* (Service Provider 05)

Eleven out of 16 of service users indicated that they could not ask for a specific service provider. Regarding selection of components and materials, 13/16 users indicated that they were usually provided with materials and components that were selected for them by service providers.

> *"When he normally comes here, he is usually just allocated to someone, he is usually not given the opportunity to choose a service provider or the components and materials he wants"*. (Service User 01; Through interpreter)

Users also indicated that a lack of knowledge hampered their ability to choose components.

> *He says there is no specific person who usually attends to him, he says whenever he goes there, whoever is on duty can always help him, and that is how the service has been provided to him. He says when it comes to material selection, he does not know the different types of materials that are normally used in the fabrication of a prosthetic leg, therefore he cannot ask or do anything in that regard*. (Service User 15)

However, as providers also indicated, with experience, users took a more active role in the process and they were included in the decision on which components to use.

> *The very first prosthesis that she got, she was not given an opportunity to choose the type of leg that she wanted or materials that were used, she was just informed on the type of leg that she was going to get then they made it for her. But then the last one that she got, she chose the type of leg and materials that she wanted, the one she is using now is her third prosthesis and she got the opportunity to choose the type of leg and the materials also.* (Service User 04)

8.5 Standard 40

Prosthetics services should be accessible to all the people who need them: Girls, boys, women, men and older adults.

There was agreement among the three participant groups in the qualitative findings that there was no discrimination based on gender or age in the provision of lower limb prosthetics services.

> *"I think the services are accessible regardless of how old you are, everyone is having the privilege of getting the service…There is no discrimination, it does*

> *not matter whether you are young or old as long as the examination is done, and you are seen as fit to receive a prosthesis then the service will be provided to you. (*Service Provider 06)

> *Yes, anyone can receive it as long as you go there, you will be assessed and then they make you the leg*. (Service User 13)

Service managers and providers pointed out that long distances and a shortage of services in rural areas might hamper access to services. It seems that some discrimination did occur as prosthetic users were left stranded in what could be called an informal triage process.

> *"The services are accessible for those who are residing closer to the established facilities they just go to the state hospital, but for those who are far from the facilities, they can be transported from where they are to the nearest health facility where they can get the services, or a clinical team can be sent out for outreach clinic to where they are in order to provide the services…Just from the complaints that we receive from the patients for them to be transported to the facility, they do complain that they are always the last group when it comes to boarding the hospital official bus because they are seen that their cases (for persons with disabilities) are not considered as an emergency, therefore, they can wait, so other groups of patients are the ones prioritized first".* (Service Provider 05)

Users (8/16) also pointed out that distances and transport challenges created access barriers.

> *"She is saying it is not easy to go to Oshakati because of the distance as sometimes there is no money to go to Oshakati, so if the service could be available here at Outapi then it can be much easier for people around here to reach the hospital and get the service".* (Service User 14; Through interpreter)

But they acknowledged that transport is provided for free.

> *It is easy because transport is provided by the government, one can just go to the district hospital and transport will be provided to go to the place (Windhoek),*

> *the other thing is that outreach services made it easy especially for the old persons when the Windhoek team used to come to the regions and provide services. She even got another second prosthetic leg from Rundu orthopaedic facility, and the transport she used to get to Rundu was provided free of charge by government.* (Service User 07).

Since transport costs and distance travelled created barriers to service access, the survey gathered more data on these aspects. Findings show that the distance travelled by service users to prosthetics service facilities ranged between 1 to 1229 kilometres, mean 258.38 (sd. 265.61).

Figure 8.2 show that the type of transport used by service users when travelling to prosthetics service facilities. Free government transport was used by 32.5% (n=39). Half of the service users 50% (n=60) indicated that they either travelled by taxi, or public buses to prosthetics service facilities.

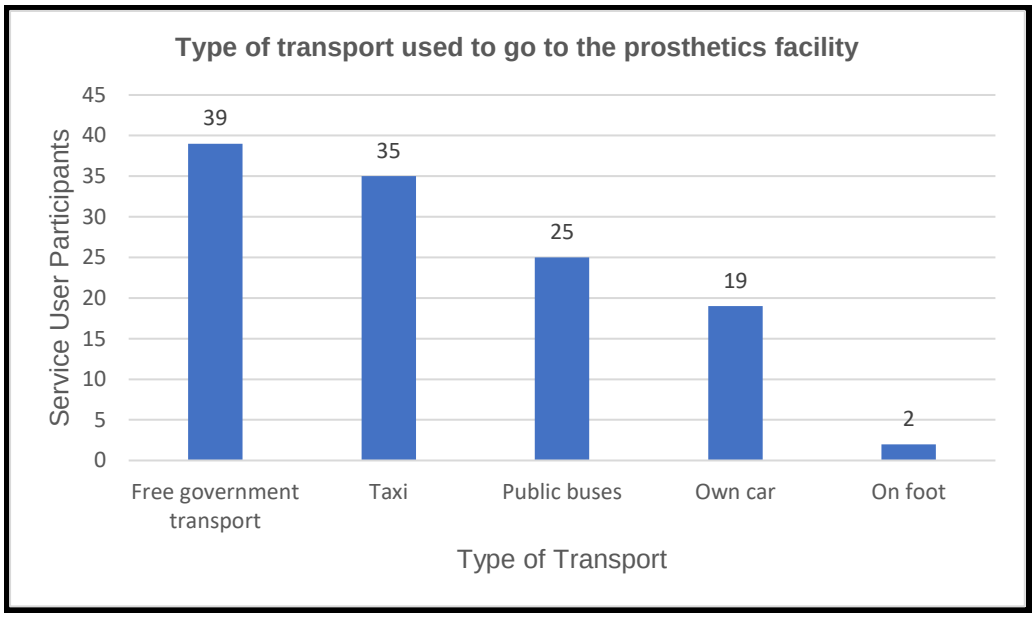


Figure 8.2: Type of transport used to go to the prosthetics facility (N=120)

Figure 8.3 shows that a combined total of 53.3% (n=64) of service users indicated that transport to service facilities was either expensive or very expensive.

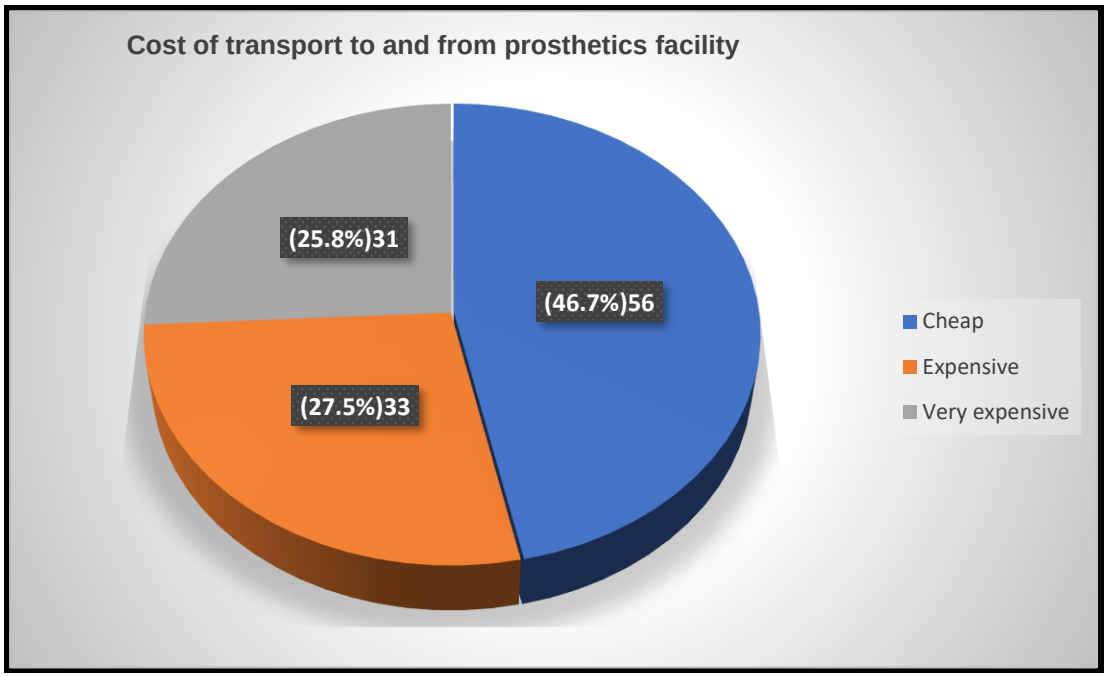


Figure 8.3: Cost of transport to and from prosthetics facility (N=120)

8.6 Standard 41

Prosthetics services should be part of the health sector or be closely linked to it.

Participants concurred that lower limb prosthetics services were part of the health sector. However, manager two thought that prosthetics services were not a government priority because the services were not available in rural areas.

> *"I can say yes, but it can also be a no. Yes because the government through the Ministry of Health has that mandate to sponsor or provide funds for these prosthetics services and it is always budgeted and the money is given, but at the same time these services are not found everywhere, you know the country is big and people have to travel even more than 500 kilometres to get such services, so if it is somehow treated as part of the health sector then it supposed to be next to the doorstep of the patients, like the way we have clinics*

everywhere and mobile units everywhere for other healthcare services, that is how it supposed to be, but for these services (prosthetics), they are just concentrated in some areas and in many areas you cannot find prosthetic services and that is really a disadvantage to those who live in areas where these services are not available." (Service Manager 02)

8.7 Standard 42

Prosthetics services should be delivered in a three-tier system, at primary, secondary and tertiary levels, with established links and two-way pathways for referral and follow-up.

Qualitative findings showed that service managers had different opinions on the availability of prosthetics services at all three levels of healthcare. One indicated that prosthetics services were delivered at all three levels of healthcare, while the other indicated that these services were only available at secondary and tertiary levels.

"…when it comes to the primary level, and starting at the district hospitals, prosthetics services are not available not even crutches, so there is nothing but we have outreach services at that level. Coming to the secondary level yes, that is where we have now institutional-based prosthetics services where they are found in intermediate hospitals likewise at the tertiary level". (Service Manager 02).

Service providers said that lower limb prosthetics services were available at secondary and tertiary levels, and through mobile outreach visits at primary level.

"At the primary level in the district hospitals up to the referral level the services are available, but at the district level, they are provided via outreach clinics and not available in the district hospitals themselves…communication is usually done through the regional therapists in case there is an outreach that is being planned, the prosthetics team that is planning to travel will have to communicate with the regional therapists or the medical rehabilitation workers who are working at different district hospitals around the country." (Service Provider 05)

It seems that a referral pathway was in place.

> *"Yes, there is a very clear-cut referral system from the primary level up to tertiary. So, we have the medical rehabilitation workers and community health extension workers that are in the community who can identify patients and then refer them to the clinic, and then the patient will be provided with transport from the clinic to a certain hospital where they can be provided with the service. So, there is quite a very good referral system in place*." (Service Manager 01)

However, the system sometimes failed prosthetic users.

> *"The referral link is there, but the only hindrance when it comes to the provision of devices is that our patients are not given a priority. They are sometimes left behind because there are other cases that are treated as an emergency, and then it happens that sometimes our patients are left behind because the ambulance is full of emergency cases. So, the link is there its only that aspect that I mentioned that has to be addressed unless there can be a specific vehicle allocated for persons in need of prosthetic devices or persons with disabilities. If not, these people will continue to be neglected even when it is not intentional but it's happening".* (Service Provider 09).

> *Um, in terms of availability where they are, it might not be necessarily where they are but maybe at a certain district or a referral hospital that is where they can find the service. So, they have to travel most of the time. The referral is there, but to say it is well defined it is challenging because the communication sometimes can be lost during transfer from maybe district level to tertiary. So, I think it is something that needs to be polished up*. (Service Provider 06)

Users described the referral system as follows:

> *I went to the clinic and the clinic referred me to the doctor and the doctor then referred me to the orthopaedic doctors in Windhoek. It's easy there is nothing wrong or difficult* (Service User 03).

However, COVID-19 restrictions hampered this process as it did many others.

She says before Covid-19 it was easy because there was outreach services provided this side and it was very helpful it made everything easier but from the time when this Covid-19 started they were informed that people providing them with services will no longer be coming for outreach services therefore it became quite difficult to the extent that, the last prosthesis that she is using now she had to use her own money for transport to get to Windhoek to go and get a new prosthesis. but then before Covid-19 the ministry of health used to provide transport for them to go to Windhoek making everything easy to access, it might be far from here but since transport and accommodation were provided free of charge it was easy unlike now. She usually come to this hospital, Keetmanshoop hospital, and then she gets referred to Windhoek central hospital from here….and when it comes to follow-ups between the district hospital and the referral hospital, it is very easy because they provide her with accommodation, but then when she does it on her own it becomes difficult because of financial issues as she has to pay for taxi and it is a challenge because one may be required to go to the hospital sometimes even four times in a week going and coming, so that way its financially draining and also accommodation payments". (Service User 04)

8.8 Standard 43

Maintenance and repair services should be an integral part of a prosthetics service delivery system.

Qualitative findings showed that both service managers responded that their facilities were providing all kinds of lower limb prosthetics repair.

"We can overhaul the whole prosthesis at our centre…we listen to the complaints and then we do the assessment of the prosthesis to find out what is broken on it, then we can either repair or replace". (Service Manager 01)

Service providers and users concurred with the managers.

"The maintenance and repair, we look at the cosmetic finishing of the prosthesis, we look at the replacement of components such as the knee joints,

> *we look at attachment adapters as some of them can break and may still be replaced, we look also at replacement of SACH feet or any other type of foot or look at the socket replacement in cases when the patient outgrows the prosthesis or the stump had reduced in volume or shrinking and the socket appears to be bigger and you replace only that particular item. So, we do everything".* (Service Provider 04)

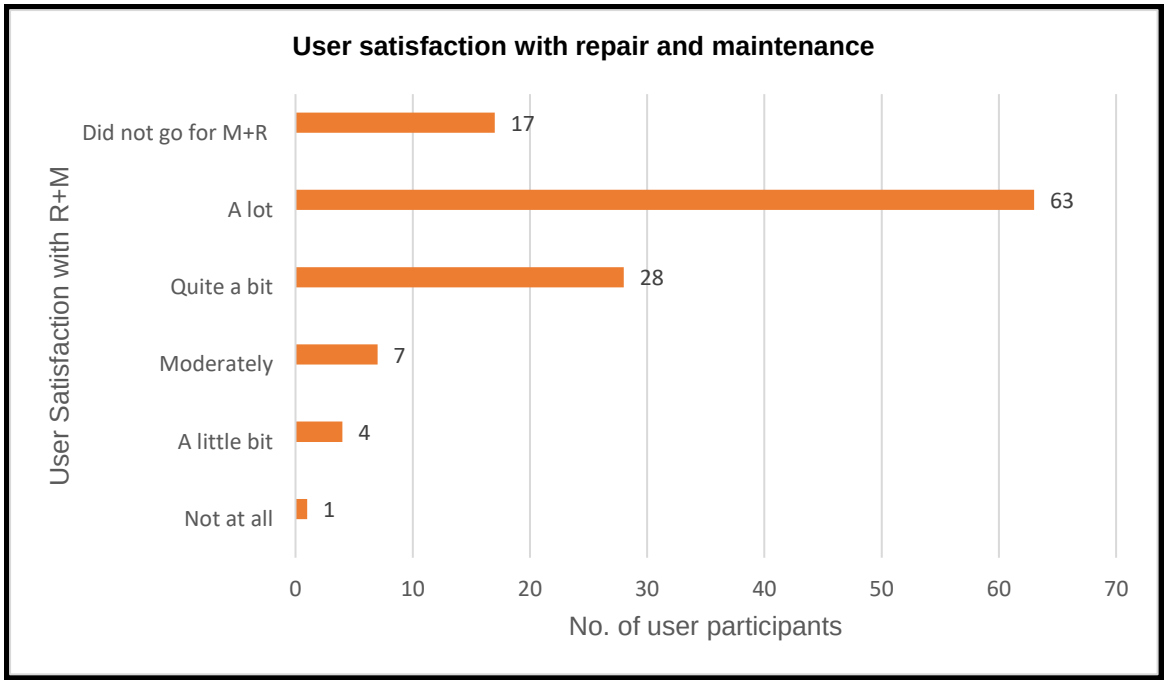
> *"When she got problems, she went back for repair and she was happy with the service that she got because the repair actually helped her to get back to her field and do some work and walk around, before the repair she faced a lot of problems because there was some pain caused by the artificial leg".* (Service User 08) Through an interpreter

Users were also taught to do basic maintenance themselves.

> *Yes, in most cases he goes to Oshakati for repair and maintenance, but he is saying he also have his own tools such as Allen key, because the main problematic part is usually the bolt that is attaching the foot to the main prosthesis, that is the one that gives him problems, so he always tightens it with his own tools. There are times when it is announced in the radio that people from Oshakati (service providers) are coming to Eenhana, so the service users they also usually use such an opportunity for maintenance and repair of their legs*. (Service User 16)

Quantitative findings concurred with those of the interviews and findings show that 85.8% (n=103) users took their devices for repair or maintenance in the past.

Figure 8.4 show that 52.5% (n=63) of service users were satisfied a lot with the repair and maintenance they received at service facilities.



R+M = Repair and Maintenance

Figure 8.4: User satisfaction with repair and maintenance (N=120)

8.9 Standard 44

The provision of prostheses in disaster conditions should be an integral part of the health sector response and be planned to ensure a seamless transition to long-term service provision.

The document search did not deliver any provision of prostheses in disaster conditions as part of the health sector in Namibia.

This standard was explored using the quantitative survey for managers and providers and the findings showed that 8/12 indicated that disaster preparedness was not included in their service plans.

8.10 Standard 45

Prosthetic service units should be established within or closely linked to health and rehabilitation service facilities, such as district and referral hospitals.

Qualitative findings from all three groups concurred that lower limb prosthetics services were within hospital setups and closely linked to other rehabilitation services.

> *"We are based at the Intermediate Hospital Oshakati and we are very close to other rehabilitation services and all others who are part of the rehabilitation team so we are really working together…We have a team, which comprises of orthopaedic surgeons we have two of them from there we have physiotherapists, and then we have orthotics and prosthetics professionals, social workers and then nurses…occupational therapists as well".* (Service Manager 02)

One service provider felt that if these departments could be in closer proximity to each other to ease user access.

> *"If the rehabilitation departments could be closer to each other because we need each other…the rehabilitation departments are scattered so the patients have to search for them and find them, so it could be good if they were placed close to each other where one can just say go there."* (Service Provider 07)

8.11 Standard 46

The possibility of integrating prosthetics service units into broader services for assistive products should be considered and explored.

This standard was not explored during the qualitative phase, but it was considered in the quantitative phase. Most managers and providers about 9/12, indicated that there is a possibility in future that prosthetics service units will be integrated into broader assistive products facilities.

8.12 Standard 47

At all service levels, prosthetics units should be designed to ensure effective, efficient, high-quality service provision in a user-friendly, barrier-free, safe clinical environment.

Both service managers indicated that the facilities were well designed, friendly, barrier free and safe.

> *"…we are lucky that this facility was just recently built just about 10 years old, and the whole design of it was based on modern facilities in Germany, so it is a German design and the equipment we have were based on our government being advised by the Germans, so, I can say it is one of the best facilities and maybe we meet all the standards in that regard".* (Service Manager 02)

Service providers (8/9) concurred that their facilities were well designed to ensure effective, efficient, high quality service provision in a user friendly, barrier free and safe clinical environment.

> *"Yes, I think that all those aspects are included in the setup of our facility, including the accessibility of it as there is no barrier to anyone who comes in, considering even the type of mobility devices they use."* (Service Provider 09)

However, it seems that directions to the facility were not clear.

> *"You will find that patients are sent here and there within the hospital because most of them don't know where the orthopaedic facility is. You will find that some are wrongly sent or directed to the physiotherapy or occupational therapy departments because people do not differentiate these facilities, meanwhile, these facilities are far from each other*." (Service Provider 07)

> *Yes, we have (signs], but I don't know by now because it was in a very bad state the last time, I saw it…it's not visible in all directions*. (Service Provider 08)

Among service users, 13/16 indicated that facilities where they received their lower limb prosthetics services were well designed, friendly, barrier free and clinically safe.

> *"She is saying the building is built in a friendly manner that is barrier-free and safe…and persons with artificial legs could go in without any difficulties in accessing it. She is saying that yes, the signs are there to read but for someone that has not been there, there are people who can always direct you and it is*

> *very easy to access through directions provided by someone, but still if you can read it can still be easy as well."* (Service User 08)

Some (3/16) raised concerns about the visibility of directions to the facility.

> *She says the direction signs from the main entrance of Windhoek Central Hospital are not clearly visible and therefore it is not easy to tell where the orthopaedic facility is, so it's better if there could be a signboard that indicates where to go because its somehow difficult to know where this facility is as it is hidden behind the hospital and there is no sign that is written orthopaedic workshop anywhere*." (Service User 02) Through an interpreter.

Service users also indicated that the permanent facilities were more user friendly than the ones where outreach services were provided.

> *"She says the place here in Windhoek is user-friendly it does not have any barriers and is open and fine, but she says as compared to the facility in Oshakati, the Oshakati facility has some steps at the entrance, therefore she could not access it easily".* (Service User 02)

The prosthetic section itself was spacious and well appointed.

> *"She says the place is built in a friendly manner because it is flat, so for persons using artificial legs they do not encounter any problems when the walk in, and also for the training area there is some parallel bars where they can hold on and support themselves, so the place is built in a conducive manner everything is easy"* (Service User 06)

Users agreed that service providers were considerate and helpful.

> *"…the service providers are so friendly and sometimes you may ask for something and they will tell you that, there is even something better than what you have asked for and then you will be provided with the item."* (Service User 02)

8.13 Standard 48

Prosthetics service providers should define and adhere to a plan for equipment maintenance and replacement.

Qualitative findings show that both service managers indicated that their facilities had no equipment maintenance and replacement plans. Service providers differed among themselves, with 4/9 indicating that there was a plan in place for equipment maintenance and replacement at their facilities, and 2/9 that there was no such plan. An additional challenge was that there were little funds allocated for equipment maintenance and replacement.

> *"The plan is there but the problem is that we cannot carry out the plan because there is no money".* (Service Provider 01)

The maintenance crew of the hospital did not have the specialised knowledge necessary to maintain and repair the equipment.

> *"Equipment maintenance is quite a challenge, although there are people employed within the hospital itself and they are supposed take care of the maintenance, they have very limited knowledge of our equipment or our machinery. Our machines or equipment mostly requires somebody from the manufacturing company to work on them, because these are not among the general hospital or medical equipment, they need somebody from the manufacturers to maintain them or to fix them whenever there is a problem. So, this is not an easy job as we have quite several items or machines that needs to be serviced or fixed, but they are still lying around and we explored locally to look for a technical person to fix them but unfortunately, it is challenging. Currently, what we are doing is to involve those having contracts, so that they can at least get somebody from the manufactures, so that the work can be done.* (Service Manager 01)

> *"…we don't have technicians to maintain the machines. So, you will find that we have a lot of machines in the department but most of them are not working and there is no one to maintain them. (*Service Provider 07)

Users did not provide any information on broken equipment.

8.14 Standard 49

The safety of service providers and users should be ensured by the establishment of documented health and safety regulations.

This standard was explored through the survey for managers and providers. Table 8.2 shows that 6/12 for service managers and providers indicated that there was documented health and safety regulations at their facilities.

Table 8.2: Documented health and safety measures in place at the facility (N=12)

	N	%
No	2	16.7%
Yes	6	50.0%
Not sure	2	16.7%
Don't Know	1	8.3%
Other	1	8.3%

8.15 Standard 50

Prosthetics service providers should identify and train partners in identifying and referring potential users.

Findings show that 8/12 of managers and providers indicated that they trained fellow health professionals on prosthetics aspects including identification and referral of potential users. On further exploring the topic, 8/12 of managers and providers indicated that such training was conducted occasionally rather than regularly.

8.16 Standard 51

All steps in the delivery of prosthetics services should be based on the best available evidence and should adhere to local, national, and international standards and practice.

Table 8.3 shows that most managers and providers (n=7/12) rated this aspect a score of 8 out of 10, with no-one scoring it lower than seven out of ten.

Table 8.3: The steps followed in the delivery of LLPP is based on the best available evidence and adherence to national and international standards and practice (rated out of 10) (N=11)

Score	N	%
7	3	25.0%
8	7	58.3%
9	1	8.3%

8.17 Standard 52

Service providers should involve service users and caregivers in assessment, setting goals and planning treatment.

Qualitative findings showed that both service managers indicated that service users are usually involved in the assessment, goal setting and treatment planning. One of the managers indicated that caregivers may only be involved in case of elderly or younger service users while the other manager indicated that caregivers are involved when present.

Eight out of nine service providers also indicated that, service users and caregivers are usually involved in the assessment, goal setting and treatment planning.

> *I think, for every step of the way, we try very much to involve the service user and the caregivers, because at the end of the day if I make my own decision that does not sit well with the user, it means the user might not use the product, so we try by all means to involve them as much as possible especially the old users, we ask them everything how they feel and where we supposed to do adjustments so that at the end of the day we end up with a comfortable product for the patient. So, we do try our best, and the caregivers depending on their availability especially when it comes to the elderly patients and the kids, we do try to give them the necessary information on how best we are going to make life comfortable for them*. (Service Provider 06)

However, from some explanations provided by service providers, it seems more like an educational session than collaboration.

> *"Uh, from the beginning when we are doing evaluation, we give them a plan on how we are going to provide them with the device and then we tell how the device should be taken care of and then we provide with information of how they supposed to be coming back to use and everything needed. So, we believe that such an arrangement gives them an overview on how to use the device and what they supposed to do for the device to have a long-life span. We also involve the caregivers, especially when the patient is an elderly or a child, the caregivers we also call them in and provide them with some information which will assist the service user on the use of the device and ensure that it is functional".* (Service Provider 02)

It seems that caregivers were mostly involved with children and the elderly.

> *"I think for us to involve the caregivers, it depends on the age of the patient for example if your patient is a first user and is young, you will definitely need a caregiver to come in, the same applies to a patient who is old because they need some assistance. For somebody who is middle-aged and does not require assistance then you may have to deal with that person directly".* (Service Provider 09)

Service users were interviewed on this standard, in the quantitative phase two.

Service users were asked about their involvement in treatment planning in the survey. Table 8.4 shows that a combined 71.5% (n=86) of service users were involved either quite a bit or a lot by service providers in the assessment, treatment plan and goal setting.

Table 8.4: User involvement in assessment, treatment plan and goal setting (N=120)

	N	%
Not at all	4	3.3%
A little bit	6	5.0%
Moderately	24	20.0%
Quite a bit	42	35.0%
A lot	44	36.7%

Figure 8.5 shows that a combined 72.5% (n=87) of service users were satisfied (either quite a bit or a lot) with the assessment, treatment plan and goal setting sessions.

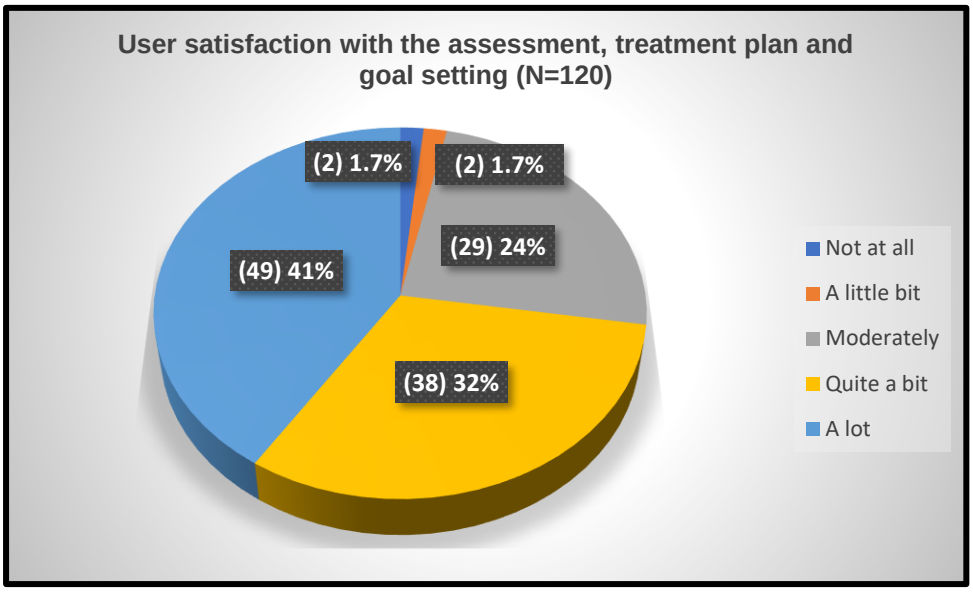


Figure 8.5: User satisfaction with the assessment, treatment plan and goal setting (N=120)

8.18 Standard 53

Peer support and counselling should be available to service users as appropriate.

There was a high level of agreement among the three participant groups that formal peer support was not provided, neither was counselling. Participants (6/9) service providers and (10/16) users also agreed that informal peer counselling often happen and that it was of huge value to users.

> *"…at times it [peer support] happens by chance in case you have a new patient and also an old patient and we see that we may get some good counselling or peer support we may then make use of the old patient. But to be available on a daily basis or on some planned days that does not exist."* (Service Manager 02)

> *"We don't really have a planned or well-arranged method of doing it but for instance, if there is a new patient under training and there is an old user who probably came in for some reason maybe for replacement or repair of his device, we can then ask him to go and assist or share his experience with the*

> *new user, that is the only platform that they can use. We usually leave them discussing while they are at our facility, then the old user will provide hints to the new user on how to use the device. But we do not really have an official platform where we call in the old users to come and guide the new users."* (Service Provider 02)

Users described peer support and its value as follows:

> *The first time before she received her prosthesis, the patients that she found there actually explained more to her about how to use the prosthesis and she felt that she was helped and it boosted her confidence and it made it easier for her to accept her new leg.* (Service User 04)

> *She says whenever she is at the Oshakati facility there and she sits closer to someone who also came for the same service they always chat and share experiences on the use of artificial legs*. (Service User 13)

Some users felt that support and guidance from a peer who has had similar experience can be valuable.

> *She says that would be beneficial in case old users could be there to encourage new users because if it is only the service provider telling you or encouraging you that you would walk well and that you will be fine, it is not really convincing because the person telling you as not using such a device, so it will be more courageous if there could be an old user who encourages the new ones and tell them that even me I am just like you and by you looking at how that person uses it, it will be very useful especially when the person is demonstrating the function of it.* (Service User 02) Through an interpreter.

> *If it can be made official that there should be a position created specifically for a person who motivates other lower limb prosthetic users, I think this would encourage all those who want to use the service because you know if you are not in the same nature of the person in need of the service they look at you and say you do not understand their situation, but when there is somebody with a similar nature or problem is theirs who is available to encourage them during*

training, it will be something that will be very helpful because the experience of somebody who has gone through the same thing can easily be shared with someone in a similar situation than for us who are just providing the same with no experience on using the devices. (Service Provider 09)

8.19 Standard 54

Prosthetics personnel should follow the instructions and guidelines of the component manufacturer and document any deviation from standard practice.

Qualitative findings showed that 8/9 of service providers usually followed instructions and guidelines provided by component manufacturers. However, deviations happened usually because components from different providers were used in combination. Deviations from standard practice were usually not documented.

When it comes now to instructions and guidelines of manufacturers, I can say yes and I can say no. Yes, we read and do understand them but again no because at times we have to mix components because we do not get 100% components that we need for a certain device. So, it happens that you are assembling a prosthetic foot coming from supplier "A" and then a knee unit from a different supplier "B" and some other attachments of the same prosthesis from another different supplier and then combining them means you have to compromise. So that is why I am saying I could say yes and no, sometimes we follow and sometimes we deviate depending on how we do the assembling of different components from different suppliers…and sometimes they don't even know that they are deviating simply because there are no proper procedures on assembling to say this must be done this way, there is no checklist that shows what you have done, it is done in a way that once the patient performs very well it is a job well done. But at times we are also affecting the performance by deviating…If we do document we will contribute to the development of the profession because one will be in touch with the manufacturers and the manufacturer will get the feedback from the patients and everything will be done in a better way, rather than now when the manufacturer does not get any feedback from us. (Service Manager 02)

> *"Yes, we try to follow the component manufacturers' guidelines, but sometimes we end up mixing. For example, a certain knee joint is supposed to be matched with a certain foot of a certain K level, but at the end of the day we end up using a K4 or K3 knee joint with a K2 foot because maybe at that moment, we do not have a suitable foot….It is when you have a K3 prosthetic knee joint and ideally, you suppose to match it with a K3 prosthetic foot, but sometimes you end up not having the K3 foot at the facility because maybe it is very expensive, therefore we end up buying, for example, a SACH foot which is a K1, where this will result in the inappropriate matching of components or mixing wrong components of different activity levels"*. (Service Provider 01)

Some providers only follow instructions when they are still new in the work environment but as time goes on, they gradually stop following.

> *"Maybe for the first time, we follow yes, but when you get used to it you don't bother reading the instructions anymore because you know what to do. You can start from "A-Z", but instead, you can start from "Z-A" because you already know what to do".* (Service Provider 03)

Other providers take this matter seriously and they follow as part of good professional practice but they still don't document the deviations.

> *"Ok, there are components that require specific instructions for us to use, in terms of bodyweight of the patient, how it should be aligned, and all those things. For me personally, those are some of the things that I consider before I supply to the patient, I have to see the weight of the patient and consider whether the joint can bear the weight of the patient. Yes, those are things that we have to look into, although may overlook one or two things it is something that should be taken seriously into play whenever you are doing that…Um, you know, let's say for example someone deviates from the specifications of a certain joint, from personal experience I have never come across a scenario where somebody documented that a joint got broken or something from deviating, I have never seen that, but although they are instances in which something can break may be due to poor alignment or something like that, and to really see where it is documented I have never seen it.* (Service Provider 06)

8.20 Standard 55

Service users should be given sufficient training to ensure safe, effective use of prostheses. Family members and caregivers should be involved as appropriate.

Qualitative findings show that, both service managers indicated that, the training provided to service users on using lower limb prosthetics services was sufficient, safe, and enabled the effective use of prostheses.

> *"It is actually a duty of every prosthetics clinician to be satisfied first to ensure that the user is able to use the device efficiently and effectively. At the same time, we also need the user or the family or caregiver to be involved in deciding that the user is ready to use this prosthesis. Otherwise, there is no limit on training as I said we do not charge they can come as much as they can".* (Service Manager 02).

Six out of nine of the service providers indicated that training provided to service users was usually sufficient, and 3/9 indicated that training was sufficient but at times it was hindered by transport costs.

> *"On sufficient training, I have to say yes, because normally when you fit someone with a prosthesis and then you go for gait training, that is the stage where you evaluate if the patient is able to take the prosthesis with him or her home for more training, if not we usually tell them, for now, you cannot go with it because you need to train more, so they train more and they have to keep on coming to the hospital, and I give them hours until the time when I am convinced that they can continue with it by themselves at home, so I have to say the training is sufficient. Most of the time the training does not take more than a week"* (Service Provider 08).

There was no fixed length of training or number of sessions.

> *"This actually depends from patient to patient, because we have young patients who catch things quickly and also let's say when you do the dynamic alignment and then you discharge them it is much faster for them, from taking of measurements fitting until delivery and the understanding also might be*

> *quicker for them to grasp everything from what you have been telling them such as how to wear it and how to take care of the prosthesis. Then we also have elderly patients and their way of grasping everything is a bit slower, so one takes more time with such patients."* (Service Provider 04)

Family members and caregivers are also usually involved.

> *"The caregivers are really involved especially when it comes to training as you would want to make sure that where this patient is not able to grasp all the information you are providing to them, then the caregiver could be able to assist"* (Service Provider 09)

Living out of town prevented sufficient training.

> *"We give them gait training, although I don't think it is enough, why because most of the patients are from far, so the moment you want to train the person well, he/she will be telling you the bus is going or the taxis are leaving. I might not have transport and I do not have accommodation in town. So, you find that we only give them little training and from there we ask them to train themselves further at home".* (Service Provider 07)

Of the service users, 14/16 responded that they received training to ensure safe and effective use of their prostheses, while 2/16 indicated that they did not receive any training and taught themselves to walk with the prosthesis.

> *Yes, they taught me how to walk, they even showed me how to walk on the stairs… It was 1 week* (Service User 05)

However, it seems that the training provided was limited to basic indoor mobility and did not include negotiating different outdoor terrains.

> *He was trained here at this facility on how to walk and that really helped him, and first he was not confident enough but as training days moved on, he developed confidence and that is how he learned how to walk with his artificial leg. Although he remembers that he fell twice but that encouraged him to walk even more until he mastered the process. It lasted two weeks, and then he went*

> *home after that, and he trained himself on how to walk in the sandy areas, because here the surface is nicely flat, but at home there is uneven ground and that is why he needed to train more*. (Service User 11)

Survey data confirmed that most users, 98.3% (n=118) received training on how to use their prostheses.

Findings also show that LLP users indicated that training lasted on average 6,96 days (sd 6.26).

According to providers, gait training sessions to first time prostheses users were more compared to the number of sessions provided to old users. Transtibial prosthesis first time users received trainings ranging from 1 to 20 days, mean 6.67 (sd. 5.263), while transfemoral prosthesis first time users received trainings ranging from 5 to 30 days, mean 11.17 (sd. 6.9).

Findings show that a combined number 73.3% (n=94) of service users indicated that training was sufficient either quite a bit or a lot.

8.21 Standard 56

Users or caregivers should make the final decision about the acceptability of the fit and function of the prosthesis.

One service manager indicated that the final decision is usually made by service users.

> *"The final deciding person is the end user. They are the ones who give us the final say on the product on whether they are comfortable in the fitting or if the suspension is good, the function in whether it can take them from one point to the other and they feel they can carry out activities without any challenge. So, the end-users are the final persons in this regard".* (Service Manager 01)

The other one indicated that while he involved the user, he made the final decision.

> *"At the moment it is the medical orthotist and prosthetist who is me definitely, I am the one who has the final decision, but also the user or the caregiver plays*

a role and at the end of the day it is a mutual decision that is not based on an individual, but it is me who makes the final decision". (Service Manager 02)

Just more than half (5/9) of the service providers indicated that the final decision is usually made by the service users.

"That decision is for the patient, there is no way you can impose a prosthesis on someone who does not want it. I have made one or two prostheses where patients said they are not interested, and we destroyed the socket and called in the supervisor to make a new socket…The caregiver also can't force the patient, it is the decision of the patient to accept but they only help to make the choice with the patient". (Service Provider 04)

For others, the final decision was usually made by mutual agreement between the service user and provider as indicated by 3/9 providers.

*"I think it's both the user and the professional, we have to agree. For example, I make a lower limb prosthesis and then give it to the patient, the patient fits in and then I tell him to walk, from there I always ask how it feels if it is fine, and if there is no pain, we have to agree, until that time when the patient indicates that, this is actually quite good you can actually go ahead and finish it off, so we both have to agree". (*Service Provider 08)

One provider said that he made the final decision sometimes with the assistance of the manager.

"The orthotist/prosthetist when they are available, but most of the time if I (orthopaedic technologist) attend to the case I will do everything and finish without calling them…they [patient] do, but sometimes I tell the patient that this is what is right for you, this is what I think is right for you". (Service Provider 03)

Users were positive that they made the final decision.

"For me, usually I do not leave if I am not happy with the work done, So I usually stay up until I am happy with everything then I go." (Service User 09)

Survey data concurred and showed that 88.3% (n=106) of service users indicated that they usually make the final decision regarding the acceptability of the fit and function of the prosthesis (Figure 8.6).

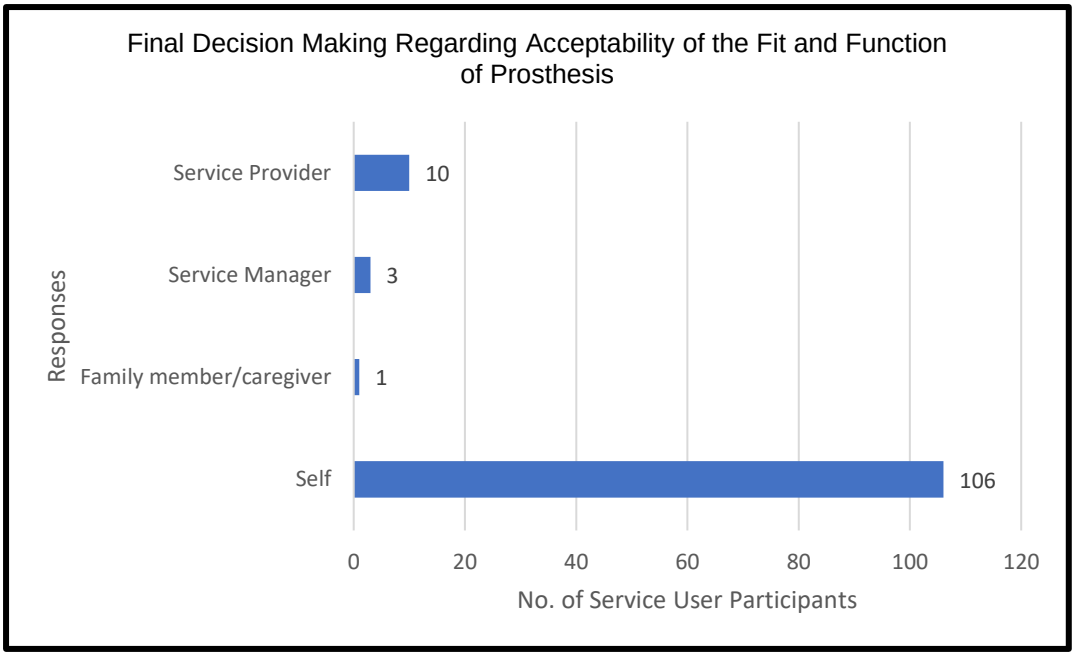


Figure 8.6: Who usually makes the final decision about the acceptability of the fit and function of the prosthetic leg (N=120)

8.22 Standard 57

The outcome of prosthetics treatment should be evaluated and documented.

Qualitative findings regarding this aspect show that both service managers indicated that, the outcome of prosthetics treatment is usually evaluated but never documented. Six out of nine service providers also indicated that the outcome and impact of prosthetics treatment is usually evaluated but not documented. On reflecting on this, they felt that it would be important to document the information.

> *"Yes the outcome currently depends on the patient feedback so it only happens during follow-ups and the clinical related information is the one that we do document on the individual files, so we do not really have proper documentation but if need certain information we go to the individual file and then we get what we have documented…Yes, I can say it is really important*

for number one, for planning, decision making and for us to learn if what we are really doing or does really improve their lives. If we can be able to implement a way in which we document such information on the outcome, I think that could be of benefit to the patients and the service providers". (Service Manager 02)

"Yeah, we don't have such a thing in place, there is no channel where we ask the patient in that way. It is just the patient coming in and tell you that my prosthesis is broken, or it is old I need a new one, but most of the time we really don't ask how was the first one or the old one and to know whether it was good or something, I think we have neglected that part….Yes, very [important to evaluate and document outcomes] because maybe sometimes you want to change the system or the type of prosthesis you gave like maybe the patient is probably using a modular prosthesis and maybe such a prosthesis is not suitable in the place where the patient resides, so it's very important to get such feedback which we are neglecting, I think this is an eye-opener we can take it up from now." (Service Provider 07)

8.23 Standard 58

Prosthetics service users should be followed up regularly.

Managers (2/2) and providers (8/9) felt that follow ups with users were done but they also indicated that follow ups were not guided by a set standard or plan. No standard follow-up plan meant a lack of uniform follow-up practice among professionals.

"…the follow-ups we have we normally just inform our patients that if the device is giving them problems, they can always come back but we don't really give them a time frame on when they are supposed to come back unless there is a specific thing that we are looking at, but if it is just a normal case then we give them that freedom that whenever the device is giving them issues then they should come back. (Service Provider 02)

Half (8/16) of the service users indicated that they went back when they experienced problems. Meanwhile, 4/16 users indicated that they usually received follow-up dates

and 2/16 said that they were told that they would be contacted telephonically on when to return back. Some users were happy with the arrangement to go back when they experienced problems and said that going back for follow ups if they do not have problems is unnecessary.

> *"She is saying the kind of follow-up that she got, she was told to come back only when there is a problem, so they never gave her a time frame, and then she did go back when she encountered a problem with her leg and the service was smooth from the time, she received her leg first to the time when she went back again. it's important [to have a date] but it is more important if one goes back only when there is a problem and says I have this problem, that way it is much easier"* (Service User 08)

Other users felt regular follow ups were necessary since they might not always be aware of problems.

> *"She says, yes it could be good if they make follow-ups and set a timeframe like maybe after three months or after six months because, so that they can see how the prosthesis is functioning well. At the moment some patients who have problems with their prosthetic legs do not even know what is wrong, so it could be good if the professionals could always make follow-ups".* (Service User 06)

Quantitative survey data (Table 8.5) confirmed that regular follow up appointments are rarely given (n=5).

Table 8.5: Follow up (N=12)

	N	%
Every 3 months	2	16.7%
Every 6 months	4	33.3%
After a year	1	8.3%
Rarely	5	41.7%

8.24 Standard 59

Annual and long-term strategic and operational plans should be in place, with performance indicators for continuous monitoring

Qualitative findings showed that, both service managers responded that annual and strategic plans together with staff performance agreements were available.

> *"Yes, when it comes to long-term operational plans and performance indicators, we do not work on our own, we are part of the ministry and we contribute to the objectives of the ministry, so with are using the annual plans for the ministry and we are also using the strategic plan which is a long-term plan of the ministry, and then we have the performance agreements that is where we do the performance indicators through the system that is compulsory for everyone, therefore I think all these are in place".* (Service Manager 02)

Providers concurred.

> *"That why we have a service running in the direction it's running now and because of the guide provided by the document the service is able to run smoothly throughout the country".* (Service Provider 09)

Figure 8.7 shows that a combined number of managers and providers (n=6) indicated that strategic plans were monitored and evaluated either every three months or once a year.

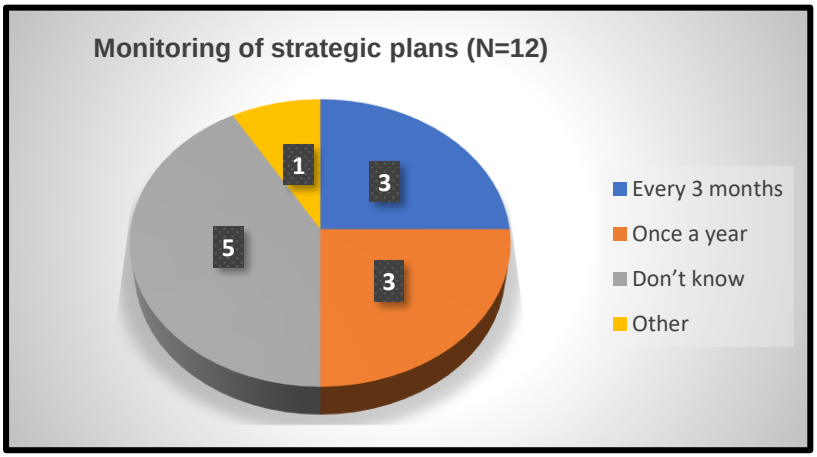


Figure 8.7: Monitoring of strategic plans (N=12)

8.25 Standard 60

The required quality should be defined and adhered to at all levels and in all parts of the prosthetics service delivery system.

Quantitative findings using the survey for managers and providers showed that service managers and providers rated the adherence of required quality at all levels at scores ranging between 5 and 10 out of 10 with a mode of 8/10 (Table 8.6).

Table 8.6: Adherence to quality of LLPP at all levels of the prosthetics delivery system (N=12)

Score	N	%
5	1	8.3%
6	2	16.7%
7	2	16.7%
8	4	33.3%
9	2	16.7%
10	1	8.3%

8.26 Conclusion

Several gaps were identified during the exploration of area four, provision of prosthetics services with standards 37,38,44,48,53 and 58 not adhered to. Standards 39 – 42, 46, 50, 51, 54, 55, 57 and 60 were partially adhered to, while standards 43, 45, 47, 52, 56 and 59 were adhered to. Service users, especially new users mostly had no choice in choosing the lower limb prosthetics service providers as they are regarded as not knowing anyone at facilities. Most of the time service users were not given the opportunity to choose the type of prosthetics components that they prefer due to either cost of products or users not knowing what was available for them as they were not usually oriented. Users usually made the final decision on the acceptability of the protheses. Prosthetics services were accessible to everyone, but challenges still exist related to distance from facilities and unfriendly building structures. Prosthetics services were part of the healthcare sector, but they might be deemed less important than other healthcare interventions. Prosthetics services were available at all three levels of healthcare in Namibia, but only in the form of outreach

services at primary level. There was no well-defined plan for equipment maintenance and repair. Managers and providers usually followed instruction and guidelines from component manufactures but deviations occurred, and these were not documented. Service users were at times not provided with sufficient gait training due to long distances. Training was focused on indoor mobility only. The next chapter focuses on a discussion of study findings.

CHAPTER NINE

Discussion of Findings

9.1 Introduction

This chapter provides a discussion of the study findings based on the demographic data of service users and the four focal areas of the WHO global prosthetics standards (2017), which include policy, products, personnel, and provision of prosthetics services. While these four headings are used, the discussion moves across them in some instances as they are interconnected.

9.2 Demographics

The high number of male users concurs with the NSA Disability Report (2011), which indicates that physical disabilities of lower limbs in Namibia were more common among males than females. Global trends also show that lower limb amputations are more associated with the male gender (Wrobel et al., 2001; Resnick et al., 2004, Wong et al., 2005; Godlwana et al., 2008).

Based on the age groups of participants, there was balanced participation of younger and older service users in this study, but the majority of participants were adults of middle age, an average of approximately 49 years of age. The incidence of disabilities in Namibia was previously found to be more common among the elderly, 60 years of age and above (NSA, 2011). Similarly, global trends in amputation show that the condition is more commonly associated with older individuals (Godlwana, 2008; Chalya et al., 2012). But findings in other African settings showed a younger average age among persons with lower limb amputation. This was mostly due to the higher incidence of traumatic causes of amputation (Agu & Ojiaku, 2016; Nwosu et al., 2017; Gebreslassie et al., 2018; Yempabe et al., 2021). As the most common cause of amputation in the current study was trauma, it might explain the lower average age.

Landmine injuries were found to be the highest single cause of amputation, and this might be linked to the country's past colonial history and civil war. The second most common cause of lower limb amputation that emerged was motor vehicle accidents. Motor vehicle accidents or road traffic accidents are a common cause of disability

globally and they have been reported to be common also in Namibia (Chatukuta et al., 2021).

Those with transtibial amputations were found to have participated in most activities more than those with transfemoral amputations. This is to be expected as an intact knee joint and thigh musculature support function. It also concurs with the findings of other studies in Africa and beyond (Ofiaeli, 2001; Umaru et al., 2015; Rathore et al, 2016). In traumatic causes, literature also shows that the transtibial level of amputation is preferred above the transfemoral level due to poor outcomes and decreased functional capacity associated with transfemoral amputations (Keklicek et al., 2019; Yempabe et al., 2021; Diment et al., 2022). Complications associated with the fitting of the prosthetic socket and reduced activity level have been found to reduce the quality of life in transfemoral amputation patients (Keklicek et al., 2019; Yempabe et al., 2021).

The younger average age, high incidence of trauma as the cause of amputation, and higher incidence of transtibial amputations might all be reasons why most users indicated they experience good or very good health, have good or very good physical capabilities, and participate in activities including going to work while wearing their prostheses. But they were not sufficiently functional to be able to run and carry out heavy-duty activities such as lifting heavy objects and participating in strenuous sports. These findings are in agreement with the findings of Langford et al. (2019) and Diment et al. (2022), although users in these studies were mostly above 50 years of age. However, younger lower limb prosthetics users, especially those using running blades, are capable of performing vigorous activities such as running and jumping even to levels better than able-bodied persons (Burkett et al., 2013; Hadj-Moussa et al., 2021). Therefore, the inability to perform vigorous activities could indicate that the prosthetic limbs received by younger active users in the current study may not be fully meeting their needs.

Finally, most users were satisfied with their devices and found them useful as reported in other African settings (Magnusson & Ahlström, 2017; Pienaar & Visagie, 2019; Diment et al., 2022).

9.3 Policy

The Namibian government through the MOHSS leads the implementation of prosthetics services and spearheads its development and coordination in Namibia, in line with the WHO prosthetics standards. However, the extent to which the ministry provided practical guidance and adhered to the 15 policy standards was limited. Limitations were most evident in the poor implementation of policy standards number 2, 3, 11, 12, 14, and 15.

The Health Professions Council of Namibia (HPCNA) (hpcna.com), a regulatory entity established through the MOHSS, guides the scope of practice, and conduct of prosthetics service providers but does not provide any guidance on how prosthetics services are provided or implemented in the country. MOHSS and/or the HPCNA also did not ensure service providers participation in CPD. Not staying abreast with developments in the field will hamper evidence-based practice and the quality of services (Highsmith 2015).

The Policy on Orthopaedic Technical Services of 2001 is outdated. An outdated policy can have serious negative repercussions as it may lead to poor decision making, not in line with current evidence, and not responsive to the current needs of service users, providers, and the context (Baudin et al., 2020; www.powerdms.com). Such a situation can cause the country's prosthetics services to fall behind global developments and other healthcare services in the country. Reports of the MOHSS already showed that rehabilitation services including prosthetics services are lagging compared to other healthcare services in Namibia (MOHSS, 2014).

A further concern is that most users were unaware of such a framework and reported never being involved in policy development, implementation, monitoring, and evaluation. For service users to be empowered and make informed decisions about health care, they supposed to be aware of their rights, the services available for them, and any other supporting information regarding such services (Baranger 2017; MacLachlan et al., 2018; Alemu et al., 2021).

Users are supposed to be at the centre of service delivery and thus involved in the policy development process as they understand their needs best. It is also important

to ensure that, whenever policies related to prosthetics services or rehabilitation are made available, they are supposed to be made known to service users so as to enrich them with appropriate information. Therefore, policy documents are supposed to be formulated with dissemination strategies targeting all stakeholders including end users, an approach that concurs with arguments by Baudin et al. (2020). Dissemination could be followed by user involvement in the policy implementation process as well as monitoring and evaluation (WHO, 2022).

The slogan “Nothing about us without us” makes it clear that persons with disabilities are not supposed to be excluded from planning and activities that involve them (Ginis et al., 2021). Therefore, for Namibia to be able to fulfil its national goals such as vision 2030 (NPC, 2004) and international obligations such as SDGs, all citizens including PWDs, are supposed to be involved in the execution of key activities in various sectors, including policy matters. The involvement of prosthetics service users and caregivers in policy matters will ensure that their views are incorporated into the country’s development plans according to NPC (2004). The involvement of PWDs helps to ensure that their rights are respected, and their views represented especially in activities that concern them (UN, 2006). Peta (2017) and Trafford and Swartz (2021) showed how persons with disabilities can be engaged in African settings to ensure their voices are heard in policy development, implementation, and monitoring. A national prosthetics committee or a similar entity can provide the basis for engagement with all stakeholders including persons with disabilities (MacLachlan et al., 2018). Such a body provides a foundation for collaboration, coordination, policy formulation, development, implementation, and monitoring of services.

African Union countries pledged to allocate at least 15% of their annual budget to improve the health sector through the Abuja Declaration (WHO, 2010). Meanwhile, in many countries, there is still limited integration of rehabilitation into health financing schemes, resulting in a small budget allocation compared to what is needed by those in need of services (WHO, 2021). The healthcare budget expenditure in Namibia is at 14.5% of total government spending, it is regarded as one of the highest in Southern Africa (World Bank, 2019). However, it is not known what percentage of the health care budget is allocated for rehabilitation service provision, including prosthetics services in Namibia. Funding for lower limb prosthetics services is not sufficient and

requires to be increased. Allocated funds had no guarantee to be utilised as per plans, and at times they were only availed towards the end of the financial year. Such a situation can deprive service users of their basic human right to access assistive devices that allow them to be mobile and fully participate in education, and access health services (Borg et al., 2011). If they do not receive what they need on time it can have far-reaching negative repercussions on their function, employment, and quality of life (Cote, 2021).

On a positive note, despite funding being insufficient, the economic benefits of prosthetic limbs were rated as above average. Service users, concurred that the prosthetic limbs they received assisted them in carrying out work activities in formal settings and at home, and assisted them in earning money to feed their families. This belief from users and providers that the prosthesis facilitates economic gains supports the argument that budgets are supposed to be adequate and timeously available as an appropriate prosthesis provided in a timely manner helps users to be economically active and contribute to the country's economy.

The WHO urges countries to effectively budget for rehabilitation services and consider investing in Universal Health Coverage (UHC) (WHO, 2021). The MOHSS is working towards the finalization of a UHC policy framework which commenced in 2018. Rehabilitation services are mentioned in the UHC framework; therefore, it is trusted that prosthetics services are as well included in such a policy. Furthermore, there is political will in Namibia to implement UHC, as it featured in parliamentary discussions in March 2022 (Government Republic of Namibia, 2022).

While some data on prosthetic services were collected through national systems, it seems as if data sets were incomplete, not done annually, and not readily accessible to all citizens. It was observed during this study that service user data such as contact details and physical addresses were not properly available. Similarly, records of treatment interventions and outcomes were not kept. Without adhering to these basics at the clinical level, one may not expect more high-level data to be available at the national level.

There was no database that specifically captured amputation and prosthetics service information in Namibia. The absence of such a database means a shortage in

information on prosthetics needs, and services, which can hamper planning and resource allocation leading to inequitable access to services. A database could also serve as an important source of evidence for research and can support evidence-based practice (Ramstrand & Brodtkorb, 2008).

International collaboration and support were only seen in long-term training of service providers conducted by donors. There was no meaningful international collaboration in terms of data sharing and research. Collaborating and sharing data with other stakeholders either at the national or international level, creates opportunities for new ideas to develop, and can be considered a cost-effective measure as repetitions might be minimized, and ineffective practices terminated (Ramstrand et al., 2020).

Clinical and technical research was usually not done. This is a worrisome situation as, research is much needed in investigating the quality of prosthetics components and materials, to determine what is suitable for service users in Namibia and other low- and middle-income countries (Andrysek, 2010; Balk et al., 2018).

Awareness raising on prosthetics services was carried out haphazardly. Awareness raising plays a crucial role in increasing access to services and eliminating the stigma associated with disability (MOHSS, 2001; Ennion & Johannesson, 2018). Promoting prosthetic services and raising the profile of prosthetics users through positive messages in formal and social media can assist with the inclusion of prosthetic users, decreasing native perceptions about prostheses and enhance the self-image of prosthetic users as media plays a role in shaping identities (Worrel, 2018).

9.4 Products

The Namibian government, through the MOHSS, ensures the availability of lower limb prosthetics products to those in need, in line with the WHO prosthetics standards (WHO, 2017). Providing these products free of charge meant that all users could afford them. However, service users had contradictory remarks towards the appropriateness of lower limb prosthetics products provided in government facilities, as some were satisfied, while some were not, but the majority of them were satisfied with the products. Satisfaction with prosthetic devices among users was similarly reported in other African settings (Magnusson & Ahlström, 2017). A reasonably wide range of prosthetics

products were provided in Namibia, and they could be considered context-appropriate and of good quality because most users were able to walk with them, carry out work activities as well as earn money while using them, the only limitation was on carrying out vigorous activities as discussed earlier.

Service providers indicated that facilities, where they worked, provided appropriate lower limb prosthetic products. A claim that was supported by the wide range of available products. These positive findings were heartening and somewhat surprising as the provision of free-of-charge prosthetics products is often linked to inappropriate or entry level products (Jarnhammer et al., 2018; Pienaar & Visagie, 2018). Prosthetic products of good quality and function are mostly acquired at high costs from suppliers, and may not be easily affordable and accessible, especially in African countries (Magnusson et al., 2014; WHO 2021). Most products provided in Namibia were generally found to be more advanced than those provided in other African settings where low-cost technology was still being utilised (Andrysek et al., 2011; Wyss et al., 2015; Magnusson and Ahlström, 2017).

Service user experiences are a good measure of assessing the appropriateness of lower limb prosthetics products (Ennion & Manig, 2019). The infrequency of communication between service users and service providers regarding the use of lower limb prostheses and follow-up intervals after prosthetic fitting could have led to differences in opinions between providers and users about the appropriateness of products (Anderson et al., 2022). It could also have happened that there was no proper engagement on expectations, between providers and users (Ostler et al., 2014; Anderson et at 2022). If providers do not initiate communication on the suitability of products, they might not understand users' experiences and thus deem products, with which users experience challenges, suitable.

To improve health care service delivery, health service research is important in providing evidence-based feedback on matters such as the satisfaction of service users regarding services they received (Nyongesa et al., 2015). In the current study context, no research of this nature has been done. Therefore, it is likely that the views of some service providers and users varied, because service providers may have provided responses based on personal judgement without acquiring prior evidence.

A national priority list is very important in helping to improve service delivery in terms of guiding policymakers, service managers, and providers on the essential products that the country requires. A national priority list is aimed at helping countries in improving access to assistive products through mobilisation and allocation of appropriate resources according to national needs (WHO, 2016) as mandated by the UNCRPD (UN, 2006). A priority list also helps in directing appropriate product development and improving service delivery and procurement (WHO, 2016). Other African countries like Nigeria, Sierra Leoni, and Malawi have developed such lists, and methods used by them can be explored to identify steps to follow in Namibia in the development of a national priority list of AP.

It was earlier mentioned that there was a lack of a database for capturing amputation and prosthetics service information. Without a database, it would be challenging to efficiently obtain the required information that can be used to improve prosthetics services (Akram et al., 2018) and support the development of a national priority list.

Structural testing of prosthetic products is important in terms of protecting service users from harm that can result from the structural failure of products. In addition, buying products not adhering to minimum quality standards can be expensive as frequent repairs and replacements might be needed. Therefore, imported prosthetic components and materials, could be regulated by a designated authority or group of experts with no conflict of interest, and then be cleared for compliance with ISO or equivalent standards before being bought (WHO, 2017, Sheehan et al., 2021) as some of the external suppliers may supply counterfeit or substandard products. All products included in the prosthetics tender are supposed to adhere to minimum quality standards such as ISO. There is no evidence that minimum standards are enforced in Namibia. From professional experience, government tender contracts do not usually contain a pre-requisite clause for ISO certification of imported components.

Based on my professional experience, the quality of prosthetics products in Namibia is at times estimated through observations, such as observing the lifespan of the prosthetic product. Findings of this study showed that prostheses in Namibia lasted for an average of five years, this concurs with O'Keeffe and Rout (2019) indicating that a lower limb prosthesis may last between five to seven years. But it cannot be concluded that for a product to last five or more years, it is regarded as appropriate or good quality

because one can't tell if such a product was continuously used on a daily basis over that period of time, and there is no evidence showing the type of activities that the user was engaged in.

The exemption from import duty, which is not currently happening, becomes very important as all products are imported. Losing some money on this might be preferable to funding a manufacturing plant. In addition, a manufacturing plant will not give the wide choice currently available, where products are sourced from leading suppliers in the field. However, such a plant can serve as an incubator where contextually appropriate products can be developed and researched as called for by Andrysek (2010).

The Namibian government ensured that prosthetics products provided to those in need are affordable, by providing them at no cost; the move is commendable as it is in line with recommendations of the UNCRPD in terms of member states promoting the availability of devices for persons with disabilities at an affordable cost (UN, 2006). Meanwhile as stated above, there were limitations of users in the performance of high-level vigorous activities, possibly due to the unavailability of high-tech products mainly due to limited budgetary provisions.

From professional experience, less expensive prosthetics products are usually acquired at a cheaper cost by the government with the aim to provide services to a larger number of users, whereas high-tech products are usually avoided as they are expensive to procure and the beneficiaries would be fewer. Therefore, service managers and providers would have to make informed choices, by choosing between the provision of free products with average function to more users, and the provision of expensive high-tech products with the assurance of performing optimum functions, especially for high-activity younger users, but fewer users or, a combination of cheaper and high-tech products.

9.5 Personnel

The study found that service providers were well trained but in short supply. The shortage of prosthetics professionals remains a persisting challenge in many African settings and other LMICs around the globe. This is mainly attributed to a lack of local

training institutions as there is only a few training institutions offering accredited prosthetic training courses in Africa (Magnusson et al., 2013 & 2014; Aduayom-Ahego et al., 2017). In Namibia, one or two prosthetists were found to be available at the prosthetics facilities, but the number was not sufficient when compared to the range of responsibilities they had to carry out. At least two (2) to three (3) supervisors were required per facility. Mduzana et al. (2020) and WHO (2017) indicated that the number of prosthetists required for a population of a million persons is between five (5) to ten (10). Namibia's population is estimated to be around 2.5 million (World bank, 2020), therefore, the country is ideally expected to have between ten (10) to twenty (20) prosthetists, instead of the current four (4).

The shortage of prosthetists is worsened by the absence of funding for training and development programs for prosthetics professionals in African settings. Many African countries including Namibia, have not shown any commitment toward the training of prosthetics professionals, as in the past years' African countries relied on donor funding to cover such training (Sexton, 2010; Sexton 2016; Boshof, 2021). Therefore, donor funding has been spearheading prosthetics human resource development in Africa, rather than government funding.

Meanwhile, the provision of rehabilitation services including prosthetics, especially for complex physical impairments, requires a multi-disciplinary team approach that may include orthopaedic surgeons, physiotherapists, occupational therapists, nurses, social workers, and other members depending on the setting (Ennion & Rhoda, 2016; WHO, 2017). The current study found these services were available and situated in proximity to tertiary and secondary levels of care. It also found that prosthetics professionals met with medical doctors and physiotherapists. Unfortunately, they rarely met with other professionals. Reasons as to why there were rare consultations between prosthetics professionals and other professionals could not be established, but it might be linked to the shortage of prosthetists and other professionals.

The shortage of various rehabilitation professionals has been found to be a common challenge to teamwork in many African settings (Marino et al., 2015; Ennion & Johannesson, 2018; Aenishänslin et al., 2022) and it may affect the much-needed multi-disciplinary team approach (Ennion & Johannesson, 2018). The shortage of professionals could also be due to a lack of guiding policy from the government, for

example, the dated 2001 policy on orthopaedic technical services, only paid attention to the training of prosthetics and orthotics professionals with no mention of other key professionals required for comprehensive rehabilitation services. Also, service providers used to work in silos and/or see the prosthetist, not as a core member of the rehab team (Khan et al., 2018). More research is necessary to determine the knowledge and training needs of members of other professional groups about O&P.

In addition to issues affecting teamwork in the management of complex rehabilitation conditions, professionals have to show competency at all times which may be facilitated through enrolment in continuous professional development (CPD) programs. Findings showed that in Namibia, short-term training was rare, and in the last few years, the situation was exacerbated by the COVID-19 pandemic, which prevented in-person training and traveling to training venues, especially venues that were outside the country.

Lack of continuing professional development has previously been reported in other African settings (Magnusson et al., 2016; Aduayom-Ahego & Ehara, 2016; McDonald et al., 2020). The lack of CPD may be linked to the absence of local training institutions in many African settings (Marino et al., 2015; Aduayom-Ahego et al., 2017; Boshof, 2021) and a lack of locally based product suppliers. The findings of this study showed that most suppliers of prosthetic products are based outside the country and at times they do conduct CPD training. But the prohibition on traveling prevented such training in 2020 and 2021. Therefore, the introduction of prosthetics training programmes at local training institutions can be a long-term solution in terms of CPD.

Other aspects that are crucial in having adequate and competent prosthetics professionals are linked to staff retention strategies and career progression. There was varying feedback on salaries. The reality is that salary issues are complex and difficult to solve for any professional category. Meanwhile, findings in other African settings show that prosthetics professionals were not pleased with their salary packages (Magnusson & Ahlström, 2012; Magnusson et al., 2016). Poor salaries may at times lead to poor service delivery, and difficulties to appoint and retain adequately trained service providers. Therefore, prosthetics professionals are supposed to be compensated fairly with packages similar to other healthcare professionals, based on qualification, risks involved, the importance of the service, and experience.

Career progression was not pleasing, as the organisational structure was considered not well aligned to allow appropriate promotions as compared to other allied healthcare professionals such as occupational therapists. Similar challenges exist in other African settings (Marino et al., 2015). In Namibia, gender and cultural affiliations were suspected as hindrances to career progression in careers such as nursing (Mwetulundila, 2019), but there was no evidence found of that in the current study. Instead, the MOHSS organisational structure emerged as the main hindrance.

From professional experience, the MOHSS is working on revising its organisational structure, but it is not known as to when this activity will be finalised. It is generally believed that, well-motivated professionals may possibly provide better services to clients (Andersen 2009; Bakker 2015), but it is an open debate as there is no strong evidence.

9.6 Provision of services

The CRPD requires persons with disabilities to have freedom of expression and choice (UN, 2006). Therefore, PWDs are supposed to be given the opportunity to choose their preferences including service providers, whom they prefer for the provision of any kind of services including healthcare and prosthetics services. The findings of this study showed that first-time lower limb prosthetics service users did not have the opportunity to choose a service provider. It was assumed that they do not know the providers and can therefore not choose one. The possibility that they might have done research about providers beforehand was not considered.

According to O'Keeffe and Rout (2019), as soon as a person loses a limb, it can be difficult to find a suitable service provider for an appropriate lower limb prosthesis, because there are several professionals available and some of them are not well experienced. Therefore, the surgical team may at times assist the service user and family in choosing a suitable well experienced lower limb prosthetics service provider. Stuckey et al. (2020) indicated that issues pertaining to the choice of prosthetics service providers, may also be linked to gender in some contexts but without much evidence. This matter may be among the barriers to prosthetics service provision (Stuckey et al., 2020). All in all, it is important for service users to make their choice based on what they know.

In addition to choosing a service provider, service users could also be given the opportunity, to choose the type of prosthetics components that they prefer based on personal needs (Schaffalitzky, 2010; O'Keeffe & Rout, 2019). It is, therefore, expected that service providers could orientate or educate service users regarding the range of prosthetics products available (Bosmans et al., 2009; Farrar et al., 2022). Prosthetic components are expected to meet various needs and realities of service users as per the level and cause of amputation, physical abilities, and functional requirements as well as the environment where they live (Kam et al., 2015; WHO, 2017).

Some service providers indicated that at times service users experience difficulties in understanding the function and benefits of various kinds of prosthetic components due to their level of education, and limited knowledge regarding prosthetic components. For such users, providers usually make the decision regarding the type of prosthetic components, based on clinical assessment. However, if service users are not involved in choosing prosthetics components that they want, there is a high possibility of abandoning the provided device, especially for first-time prosthetics users with high expectations (Schaffalitzky, 2010; Ostler et al., 2014; Anderson et at., 2022). Thus, persons in need of assistive technology services are not supposed to be regarded as passive recipients, they are supposed to be involved in the whole process, to ensure that services are user-centred and benefits the user (WHO, 2022).

First-time or inexperienced users could be encouraged to learn from experienced users who may share experiences as part of peer support. This may assist, first-time inexperienced users in building confidence, and making correct decisions and choices through learning from others and ultimately improve mobility (Liu et al., 2010; Murray & Forshaw, 2013; McDonald et al., 2019). Formal peer support and counselling were unavailable at facilities. Peer support and counselling occurred informally among users. Facilities could, therefore, improve on this aspect and find ways to formalize peer support and counselling.

Choosing appropriate prosthetics products can be hindered by the limitation in the available range of prosthetics products, especially in LMIC (Marino et al., 2015; Wyss et al., 2015). If suitable products are not available there is simply no choice to make, whatever is available may be provided. As indicated earlier in the section for products, a wide range of prosthetics products exists in Namibia, but the challenge that was

found to hamper the adequate availability of these products to all users in need was the inadequate budgetary provisions. Funding is a major challenge known to affect prosthetics service provision; a problem found to exist in other African settings (Wyss et al., 2015; Pienaar & Visagie 2019; Allen et al., 2020). It hinders the procurement of the necessary prosthetics components and materials, thereby affecting the overall provision of services.

The appropriate allocation of funds could be considered by governments, and where possible, funds meant for prosthetics service provision could be ringfenced for that purpose only, especially in countries such as Namibia where the healthcare budget allocation is rated as one of the highest in Africa (World Bank, 2019).

Furthermore, for service users to benefit from the range of prosthetic products that were available, users are supposed to receive sufficient gait training. Gait training provided was regarded as sufficient, this concurs with similar findings in other LMIC settings (Magnusson & Ahlström, 2017; Jarnahmmer et al., 2018). O'Keeffe and Rout (2019) indicated that for first-time users, initial prosthetic fitting and training could at least last two (2) weeks. The majority of service users in this study were experienced users, therefore the one-week average gait training they received is fairly sufficient. Meanwhile, the absence of a well-defined standard or guiding tool, for determining the length of the required gait training or number of sessions concurs with the findings of Wong et al. (2016). The most effective gait training exercises remain unknown, gait training itself is needed and it is important (Highsmith et al., 2016).

However, certain service users did not receive adequate gait training as required because of the distance from the prosthetics facilities. Long traveling distance is among the factors that hinder prosthetics service provision including the fitting process of prosthetic devices and training to function with them (Marino et al., 2015; Jarnhammer et al., 2018). That is why basic rehabilitation services such as gait training are supposed to be available in community clinics (Cullinan, 2006).

In addition to gait training, follow-up of service users is a crucial aspect of prosthetics service provision. Follow-up was done, but there was no standard procedure in place to guide how this process could be carried out. Most users returned back to facilities

when they experienced problems with their prosthetic devices, similar to findings in Sierra Leone (Magnusson & Ahlström, 2017).

Long travel distances were as well found to affect follow-up of service users just like in other African settings (Marino et al., 2015). It is important for a rehabilitation facility to provide appropriate follow-up appointments (Schaffalitzky, 2010; Marino et al., 2015; O'Keeffe & Rout, 2019). Initial follow-up appointments for first-time users are supposed to be two (2) to three (3) weeks after fitting (O'Keeffe & Rout, 2019) and further ongoing follow-up appointments can be done at least every 6 months (Callaghan et al., 2008; Schaffalitzky, 2010). Follow-up is important as it affects the rehabilitation process and is regarded as a control measure that ensures that service users are using their prosthetic devices. Problems can be detected and rectified early (Schaffalitzky, 2010). A poor follow-up plan exacerbated by poor fitting devices, discomfort, and pain are factors known to lead service users to abandon their devices (Lee & Veneri, 2018; Petrini et al., 2019).

Long traveling distances and a number of other factors such as expensive transport costs, lack of sign boards for directions, and the presence of steps at some facilities, were as well found as hindering access to prosthetics services. Factors that were found to hinder access to prosthetics service provision in Namibia are not unique to Namibia but they were previously found to exist in other African countries (Marino et al., 2015; Kam et al., 2015; Wyss et al., 2015; Ennion & Johannesson, 2018; Magnusson, 2019). From experience, MOHSS is currently having a plan, to expand the provision of prosthetics services to other regions such as ||Kharas, Erongo, Otjozondjupa, Omusati, and the Zambezi. This plan will help cut out long traveling distances which were found to exceed 1000 kilometres for some users, as well as minimize the burden caused by high transport costs.

The CRPD also indicates that it should be ensured that PWDs attain personal mobility with the greatest possible independence (UN, 2006). This is made possible by ensuring that users have access to assistive devices, technologies, and mobility aids. Therefore, access to prosthetics facilities is a basic human right as it allows PWDs to have access to mobility assistive devices that enables them to be independent and able to carry out activities of daily living (ADLs) as well as to participate in life roles

(Logan et al., 2018). All persons in need of prosthetics services including the youth, adults, and the elderly, male or female, had access to prosthetics services in Namibia.

Findings showed that the number of users who rely on paid public transport exceeds that of users using free transport. However, most of those who paid for transport out of their own pockets, indicated that the fees were either expensive or very expensive. This is a serious concern as it may deny many potential users from accessing these services or cause delays in receiving services in time (Magnusson & Ahlström, 2017; Allen et al., 2022). A further concern is that those using government transport sometimes had to return home as their conditions were seen as not serious and vehicles were full. Enough transport is supposed to be available for this not to happen.

The recent introduction of the physiotherapy and occupational therapy degree programs at the University of Namibia will help in increasing the number of rehabilitation professionals in the country, which may in the future ensure the availability of such professionals at the primary level of healthcare. That will ensure that services are brought closer to those in need (de Koster, 2018). Most persons with disabilities in Namibia, are found in rural areas and these services are much needed there (Indongo & Mufune, 2015; Chibaya et al., 2021). As mentioned earlier, prosthetics professionals require continuous training in their field as well as attending to disability and rehabilitation short courses just like other rehab professionals, thus, one is concerned that, the needs of service users remain not fully addressed as no programs for training orthotists/prosthetists have been developed.

The World Health Organization recommends that rehabilitation services including prosthetics services are supposed to be available at all three levels of healthcare (WHO, 2017). The current strategy used in taking services closer to people at the primary level is through conducting outreach visits to places where services are not available.

In Namibia, the national leadership and coordination of prosthetics services in the country falls under the Primary Health Care Directorate (mhss.gov.na). Therefore, it is surprising that these services are not permanently available in primary healthcare facilities. Reasons as to why the organisational arrangement is that way have not been fully explored. The current organizational structure appears to be unresponsive to

current service needs. Therefore, structural re-organisation and expansion, to allow these services to be available at all healthcare levels as per WHO (2017) recommendations is necessary.

In addition to structural arrangements, persons accessing prosthetics services at various levels require the provision of appropriate devices. Persons in need of AT products including prostheses may have multiple disabling conditions that can necessitate them to require more than one assistive device (Gitlin, 2002; Triccas et al., 2019). The design and prescription of the most appropriate device for a particular condition can be challenging and may require the input of different professionals (Smith et al., 2018). Therefore, this may necessitate future integration of prosthetics services into the broader assistive products facilities.

Prosthetics service units are known for not only providing prosthetic devices, but also providing crutches, walkers, medical compression stockings, maternity pantyhose, and a wide range of prefabricated orthoses. This is probably the reason why managers and providers indicated that there is a possibility for the integration of prosthetics into broader assistive product facilities. Meanwhile, there is no official available plan in place for this move, but the idea is positive. It is expected that, if the demand for assistive products that are meant to address multiple conditions for one service user continues to increase, there will be a need to avail more products that would allow the expansion of prosthetics units into broader assistive product units.

The WHO Global Report on Assistive Technology (2022) showed that a broader assistive products facility is aimed at ensuring that, there is a broader variety of assistive products available at one facility thereby increasing or promoting universal access to assistive products and cutting down on user assistive technology-related costs. When services are fragmented the user will be forced to travel from one place to another seeking services, thereby raising the individual's expenditure.

The example of a one-stop shop model implemented in Norway (WHO, 2022), may not exactly be practical for Namibia due to vast distances and a dispersed population. Therefore, the AT model required in Namibia is expected to be different from that of Norway, as it has to suit the geographical structure of Namibia and is supposed to address issues related to the creation of youth employment in all parts of the country

as the country faces high youth unemployment rates (World Bank, 2015) and shortage of various rehabilitation professionals.

Meanwhile, some of the managers and providers indicated that the final decision regarding the fit and function of prosthetic devices could be made by the manager. Others indicated that it could be a mutual agreement between the manager and the user, while others indicated that the final decision could be made by the user (WHO, 2017). As mentioned earlier, views of service providers and users may differ because service providers may provide responses based on personal judgement without acquiring input from users and the device may end up not being utilized (Ostler et al, 2014; Anderson et at., 2022). Meanwhile, the user's rights and psychosocial aspects in terms of making a choice and final decision requires consideration (Schaffalitzky et al., 2011).

Finally, findings showed that there was no plan in place for the maintenance and replacement of operational equipment used for the fabrication of prosthetic devices. This challenge has also been linked to poor budgetary provisions. Little or no allocation of funds for equipment maintenance and replacement, concurs with findings in other African settings (Kenney et al., 2019). Such situations if not resolved, contribute to the delayed provision of services as the machines may poorly perform the functions or may cease to function. This challenge is complex in the sense that, even if a maintenance and replacement plan is available, as long as there are no funds allocated, it will remain difficult to resolve, because the machines being utilised require skilled personnel to maintain them. From professional experience, there are times when manufacturers of some of these machines, such as Ottobock, volunteer to repair them free of charge, but they do not do it every year.

9.7 Conclusion

This chapter discussed the study findings as they relate to the 60 WHO global prosthetics standards and previous research. Out of the 60 standards, 12 appeared to have been well implemented in Namibia, whereas guidance and improvement, are still necessary for the continuous implementation of 48 standards. Of these 28 were partially adhered to and 20 were not adhered to.

There are no straightforward ways of executing the implementation of these standards as challenges such as funding are complex to solve in many African countries including Namibia. However, there are some standards that Namibia can implement with little additional expenditure, such as the involvement of service users in planning, monitoring, and evaluation of services, the formulation of a prosthetics committee, the development of frameworks, and a national priority list of assistive products as well as documentation, analysis, and sharing of service outcome data. More comprehensive recommendations are provided in chapter ten. Chapter ten shows how a Systems approach to AT service delivery can be utilised as a framework to assist Namibia to initiate strategies that can help the country to move towards the implementation of the WHO standards.

CHAPTER TEN

Conclusion, Limitations, a Prosthetics Service Delivery Model, and Recommendations

10.1 Conclusion

The study explored the delivery of lower limb prosthetics services in Namibia and compared the findings to the 60 WHO prosthetics and orthotics standards. Study objective one focussed on governance and policies. Namibia had two national policies that guided prosthetic service delivery. But policies were dated and not well adhered to. Funding was available but not sufficient. Regarding objective two it can be concluded from the findings that Namibia was doing well in ensuring that there was a wide range of prosthetics products available at no cost. Dealing with objective three, service providers were well trained but did not attend regular in-service training and CPD activities were not seen as essential. Training to qualify as a prosthetics service provider was not available in Namibia and in-service training opportunities were scarce. Under objective four it was shown that lower limb prosthetics services were provided to all in need, but this often-involved long travel distances to facilities. Prosthetics services in the public sector were found to be available at all three levels of healthcare. The only challenge was that, at the primary level, services were not readily available as needed, as these were usually provided through outreach visits.

Traumatic causes were found to be the leading cause of lower limb amputation in Namibia. Lower limb prosthetics service users were able to participate in most activities of daily living such as walking and going to work, but they had limitations when it comes to participation in vigorous activities such as lifting heavy loads and engaging in sports activities such as running. In general, service users were satisfied with their lower limb prosthetic devices.

Overall, as per figure 10.1, findings showed that the country was making positive efforts towards the implementation of at least twelve (12) standards out of 60. Twenty-eight (28) of the standards were found to require attention as they may be regarded as partially adhered to. More serious attention and efforts would be required to work

towards the implementation of at least twenty (20) of the standards which were found to have been poorly adhered to.

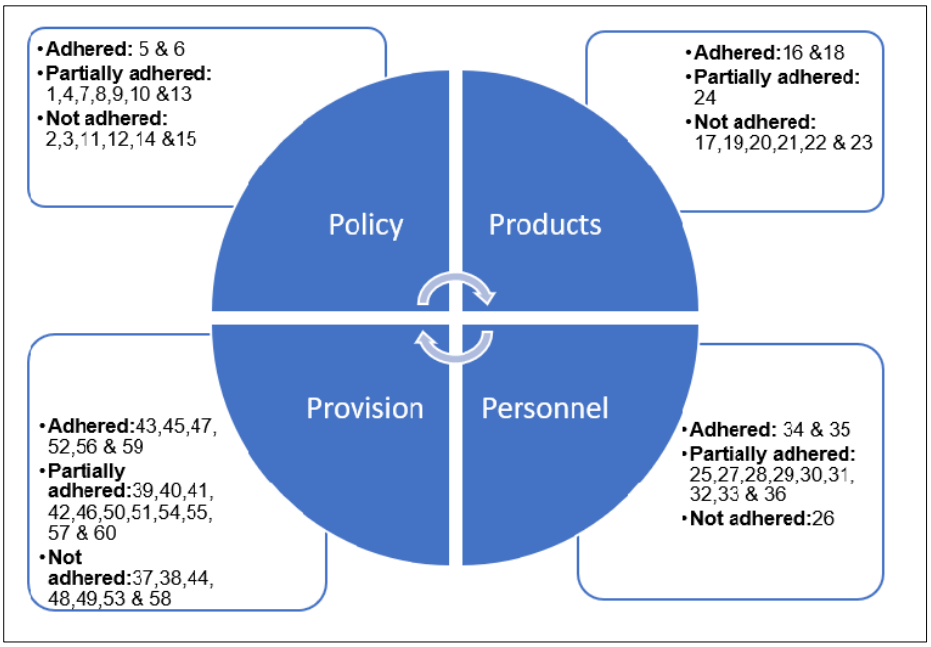


Figure 10.1: Implementation of standards in each focal area.

Priorities for action as per objective four should focus on:

- Ensuring that guiding documents and frameworks are updated and include the input of users,
- Structured collecting, analysing, and sharing of service level data on services provided to users, user function, and satisfaction, with a view to developing a national database,
- Making services permanently available at the primary healthcare level,
- The allocation and transparent management of sufficient funds for service provision (including maintenance of equipment and enough qualified providers),
- Ensuring the availability of adequate prosthetics service providers and other rehabilitation professionals,
- Considerations to establish local academic training programs for prosthetics and orthotics, and
- Ensuring that provided prosthetics products meets the needs of service users.

It is recommended that the areas requiring attention be addressed through a systems approach as presented under 10.3 below.

10.2 Study limitations and weaknesses

Data collection tools were developed to be as complete as necessary while not wasting participants' time, and to support adherence to the tight timeframe of the study for degree purposes. However, with the analysis of the data, it became clear that for some standards, data should have been collected from additional participant groups and/or with additional methods. This was especially true for users who should have provided input into standards 10, 26, 29, 45, 49, 50, and 52 during the qualitative phase.

In instances where language interpreters were deployed, it may have happened that some of the interpreted statements might have been misunderstood by the participants or the interpreters, leading to inaccurate captured data. To minimise this risk, interpreters were trained, were fluent in the languages they interpreted to and from, and knowledgeable on prosthetic terminology.

It was not possible to attain the proposed sample size of service users in the quantitative phase, which would have provided sufficient power to show statistical significance, due to unavailability of contact details, change of physical addresses, and service users not meeting the inclusion criteria due to being younger than 18 or having additional impairments. The reduced figure and the use of non-probability sampling for service users in the quantitative phase negatively affect the generalisability of findings (O'Leary, 2017). However, a sample size of 120 service users may be considered large enough to represent a much larger population of service users (Delice, 2010; nngroup.com, 2022). Meanwhile, since the demographic and amputation details of non-participants were not known, it was not possible to determine if the two groups are similar or if those who could not be located differed in fundamental ways from those who did participate.

Internal validity could have been negatively influence by the interpretation of which standards were achieved, not achieved, or partially achieved. This interpretation was

based on the triangulated data and made by me with support from my supervisors. We reached consensus by discussing any interpretation where we did not agree.

The study tools utilised in phase two were not fully tested for criterion validity and reliability.

The study was funded by the researcher, which limited finances. Therefore, certain activities such as trying to locate more service users living in remote hard-to-reach areas could not be carried out due to financial limitations.

Time was also a limitation, as this study was completed within the time frame recommended for PhD. studies.

10.3 Proposed prosthetics service delivery model

Based on the results and discussion of the current study the 10 ‘Ps’ of Systems thinking in AT as developed by MacLachlan and Scherer (2018), is suggested as a prosthetics service delivery model for Namibia. Prosthetics services are part of AT services, it is, therefore, important to consider using a prosthetics service delivery model that bases its foundation on systems thinking in AT (MacLachlan & Scherer, 2018). Based on this framework systems thinking in AT consists of 10‘Ps’ illustrated by the people-centred conceptual framework developed by MacLachlan and Scherer (2018). The 10 Ps represents people (prosthetics service users) at the centre of the framework, the four main focal areas as presented in the current study and the WHO standards (WHO, 2017), policy, products, personnel, and provision, in the middle, and five contextual elements, procurement, place, pace, promotion, and partnership on the periphery as depicted in Figure 10.2.

Open systems like AT provision systems are interconnected with the environment in which they function. They depend on and respond to the environment. They are thus fluid and can change over time to adapt to changing objectives. The dynamic and collaborative nature of a systems approach suits the complexity of prosthetic service delivery (De Savigny & Adam, 2009).

The components of the system are also interconnected to each other in the sense that a change to one of the components influences other components (MacLachlan &

Scherer, 2018). For instance, a change in the needs of service users regarding the products that are provided to them can lead to change in other components of the system such as procurement, policy, provider training, and so forth (De Savigny & Adam, 2009).

Figure 10.2: Conceptual framework: The 10 'Ps' of Systems thinking in AT (MacLachlan & Scherer, 2018)

10.3.1 Relating the 10 Ps to current study findings

People (Lower limb prosthetics service users): Lower limb prosthetics service users are at the centre of the framework because they are the main beneficiaries in the provision of lower limb prosthetics services and because all AT services, including prosthetic services must be person-centred. As per the WHO standards (2017), users should be given the opportunity to participate in policy development, implementation, monitoring, and evaluation. They should as well be given the opportunity to choose the preferred service provider and prosthetics products based on their needs, and make the final decision regarding the suitability of the prosthesis.

Policy: The dated policy for prosthetics service provision (MOHSS, 2001) should be updated through consultation with all stakeholders and be made available to all stakeholders including users. All other policies that influence the provision of prosthetics services such as the National Policy on Disability of 1997 must as well be updated and disseminated accordingly. Service users should be involved in the development of these policies, as well as implementation, monitoring, and evaluation. The development of a policy on Universal Health Coverage (UHC) must ensure the inclusion of prosthetics service access with no burden to the users as per UHC objectives. A database that captures and stores prosthetics-related data, such as the number of lower limb amputations and devices provided for a particular period of time must be developed and kept current to assist in planning and decision making.

Products: The wide range of products currently available in Namibia is commendable. There should be appropriate allocation and utilisation of public funds as per existing strategic and annual national plans to ensure continuous availability of a wide range of prosthetics products in the public healthcare sector of Namibia. The government of the Republic of Namibia should continue providing these services at no cost so that persons with no access to medical insurance can continue to have access to these services. The use of advanced technology such as computer-aided design/computer-aided manufacture and components containing microprocessors should be explored.

Personnel: The government of the Republic of Namibia in its strategies to ensure human resources for healthcare service provision, must include the continuous training of prosthetics professionals and other professionals that are part of the multi-disciplinary rehabilitation team. Local training institutions should be approached for the introduction of prosthetics training courses and to help ensure that CPD training is conducted as necessary. The current number of prosthetics professionals especially prosthetist/orthotists, is not enough for the country and should be increased to meet population needs.

Provision: Prosthetics services should be made available and provided at all three levels of health care service provision, tertiary, secondary, and primary healthcare levels as recommended by the WHO Prosthetics Standards (2017). Barriers that prevent access to prosthetics service provision should be tackled gradually, such as the construction of new prosthetics service facilities in places that are extremely far

from the existing facilities. In addition to the consideration of vast distances, the population size and need for prosthetic services should be considered in areas where new facilities might be constructed, as prosthetics facilities are quite expensive to establish and maintain.

Addressing the barriers regarding transport through adding additional trips and making sure that persons needing prosthetic services are not left behind and ensuring regular outreach services to remote areas might be more efficient ways of ensuring services to users in remote rural areas. However, to sustain this the number of providers might need to increase as outreach services are time-consuming for providers and take them out of their primary place of service delivery for weeks. Services should continuously be provided to all those who are in need, the youth, adults, the elderly whether male or female without any discrimination of any kind as is the case currently.

Figure 10.3 suggests a framework for service provision over all three levels of care. It shows the Ministry of Health and Social Services (MOHSS) is mandated to lead and spearhead the development and provision of prosthetics services on the top left connecting to the primary health care directorate that is expected to coordinate, control, and monitor the provision of these services. Policy and services should be developed and provided with the support of internal and external stakeholders. Internal stakeholders include finance personnel and procurement officers to ensure the availability of prosthetics products. Whereas external stakeholders include training institutions, product suppliers, and any other relevant stakeholders. Together under the guidance of the MOHSS, the stakeholders must ensure continuous human resource development, research, and data sharing as well as the development of a database.

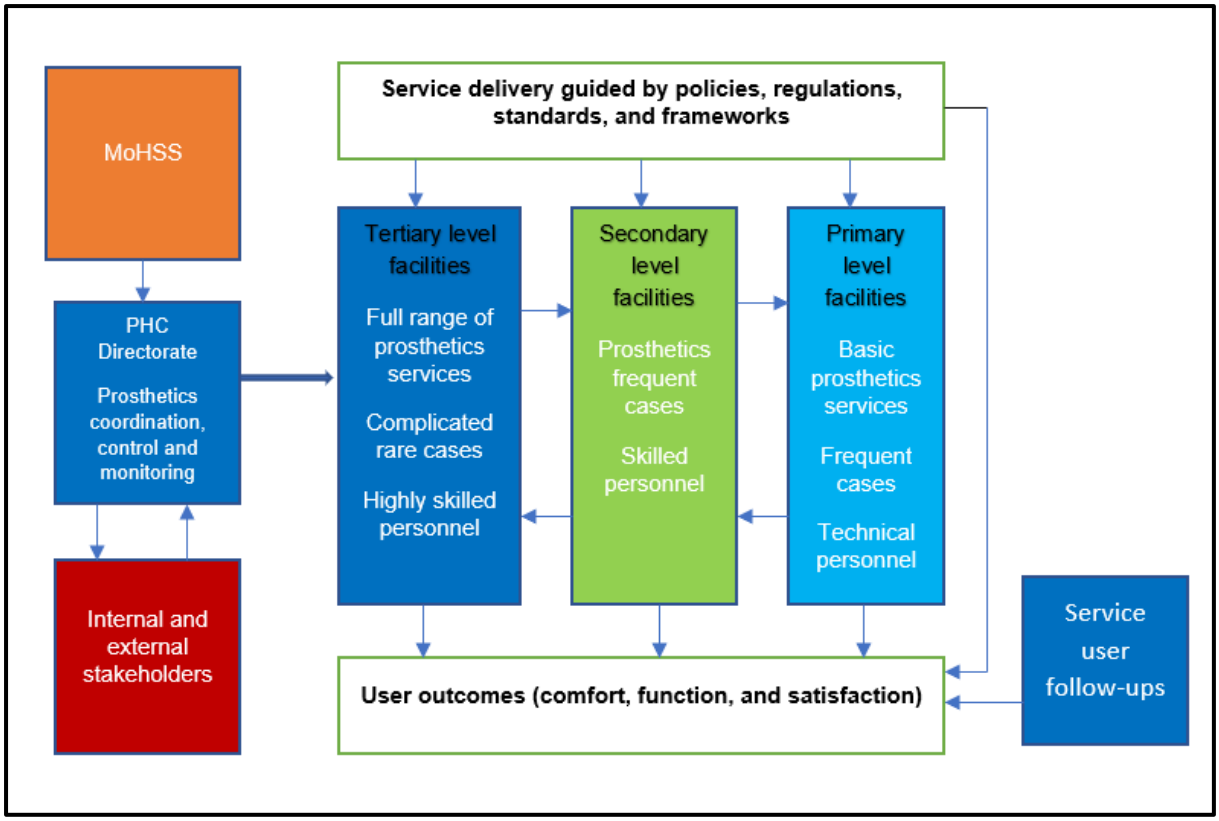


Figure 10.3: A framework for prosthetics service provision at all levels of care in Namibia (by author)

The provision of services should be guided by comprehensive, current policies, regulations, standards, and frameworks. Services should be made available at tertiary, secondary, and primary level facilities. In Namibia, there is only one tertiary level referral hospital which is Windhoek Central Hospital (WCH). WCH is therefore expected to provide a full range of prosthetics services, and be able to serve mostly service users with the most complicated cases requiring the availability of highly trained prosthetics personnel, mostly trained at degree level or master's degree (WHO, 2017) and a few diploma holders, supported by a rehabilitation team knowledgeable on prosthetics rehabilitation.

Secondary level facilities are the intermediate hospitals, Oshakati, Rundu, and district hospitals, which are expected to provide a wide range of prosthetics services, by paying attention to the most frequent cases. Professionals expected to be available at this level are prosthetist/orthotists (degree holders) and orthopaedic technologists (diploma holders) (WHO, 2017) as per service demands and physiotherapists.

Whereas, primary level facilities such as health centres and clinics are expected to provide basic prosthetics services such as repair and maintenance of devices as well as gait training for service users who received new prosthetic devices and are unable to visit secondary and tertiary level facilities on a regular basis due to distance or transport issues. Prosthetics professionals expected to be available at the primary level can mostly be certificate holders (WHO, 2017; WHO, 2018; de Koster, 2018) supported by community health workers and or community-based rehabilitation workers.

Arrows between the three levels of healthcare represent the two-way referral system. Service users may be referred either way depending on their condition and the interventions required (WHO, 2018).

Service user follow-up and outcomes are part of the model. Follow-up is an important aspect of prosthetics service delivery, and a means of ensuring that users are using their devices appropriately, identifying problems early, and ensuring no secondary complications have developed. Outcomes such as comfort, user function, and satisfaction must be regularly assessed, documented, and reported on. The findings must inform services, policies, and guidelines.

Procurement: An adequate ring-fenced budget should annually be allocated for the procurement of prosthetics components and materials as per the need of the country. Procurement planning can be informed by a database that is currently absent. Money must be available timeously. Tender contracts with appropriate specifications of prosthetics products must be timeously made available. Tender contracts should clearly include a clause that requires ISO certification of imported prosthetics products (WHO, 2017, Sheehan et al., 2021), to ensure the safety of users and to prevent the acquisition of counterfeit products and/or products of poor quality. Imported products should be exempted from import tax, and products that are reused should be regulated by a designated independent authority to ensure the safety of users.

Place: The facility where prosthetics services are provided should be designed in a way that ensures the effective, efficient, high-quality service provision in a manner that is friendly to the users, with no barriers, and safe for the users and providers as per the WHO Prosthetics Standards (2017). Traveling distances to prosthetics facilities

are too long for some service users, and some of them have been found to pay high transport costs, therefore services should be brought closer to them.

Pace: Due to the absence of relevant policies in Namibia, to drive the provision of prosthetics services. Prosthetics services have been lagging in development compared to other healthcare interventions. For so long they have not been readily available at levels where they are much needed such as the primary healthcare level and in rural areas of Namibia where PWDs have been found to mostly live (Indongo and Mufune, 2015; NSA, 2016; Chibaya et al., 2021). The pace at which the development is taking place can be labelled as very slow, as the necessary steps and actions to ensure that these services are developed at a pace that can address the urgent needs of service users have not been implemented in time.

Promotion: Promotion is part of raising awareness. Awareness-raising efforts must be coordinated and done in ways that will help to reach the intended audiences. The current strategies in place at facilities must be supplemented by using traditional and social media platforms.

Partnership: Partnership with external stakeholders was only found to have been practiced in areas that involve long-term training. Whereas, partnership in data sharing and research is non-existent and still much needed. Local stakeholders may also be involved in supporting the government to procure necessary equipment for the provision of prosthetics services and also in the construction of new facilities in places where these services are currently not available.

10.4 Recommendations

As per the findings of this study, several recommendations are made under the service delivery model above. These are summarised here.

To the Namibian government and the MOHSS:

- Consider establishing a national committee or similar entity that will promote the development and coordination of prosthetics services in the country. Service users must be included in such a committee.

- Ensure that the government's strategic and annual plans include prosthetics service development and sustainability.
- Ensure that prosthetics and rehabilitation services in general have the same priority as other healthcare services in all aspects.
- Ensure the allocation of reasonable funds for the procurement of required prosthetics products and continuous provision of services (Including staffing and maintenance of equipment).
- Ensure that the guiding framework or policies for prosthetics services are developed comprehensively and periodically reviewed so as to remain responsive to current evidence as well as changing service needs.
- Ensure the development of a national database on amputations and prosthetics, and sharing of data and research information with all relevant stakeholders.
- Ensure, with the assistance of Organizations of Persons with Disabilities, and service providers continuous awareness raising, regarding the rights of persons with disabilities and prosthetics service provision.
- Ensure that prosthetics services and other rehabilitation services are available at all three levels of healthcare, tertiary, secondary, and primary levels.
- Consider establishing local academic training programmes for prosthetics and orthotics.
- Ensure continuous availability of well-trained and competent prosthetics professionals and other rehabilitation personnel.
- Ensure availability of staff retention strategy and a well-functioning organizational structure.
- Ensure prosthetics service users are treated in well-designed, easily accessible, and barrier-free facilities.

To prosthetics service managers and providers:

- Ensure the implementation and dissemination of developed policies, guidelines, and standards, and conduct appropriate monitoring and evaluation of policies.
- Ensure adherence to local and international professional standards and regulations.
- Ensure involvement in the continuous professional development programmes.

- Ensure involvement of service users in the selection of appropriate prosthetics products.
- Ensure the availability of a standard follow-up plan for service users
- Ensure involvement in local and international research activities.

To other stakeholders:

- The National Disability Council of Namibia should be persuaded to continually monitor the implementation of policies related to PWDs and to monitor the inclusion of PWDs by various organisations in activities such as policy development, planning, implementation monitoring, and evaluation.
- Collaborate with the government in the following areas:
    - Establishment of prosthetics training programs.
    - Conducting research activities, and
    - Involvement in infrastructure development.

To prosthetics service users:

- Establish a representative body to engage the government regarding prosthetics service provision and policy development, implementation, monitoring, and evaluation.
- Feel free to get involved in the selection of suitable prosthetics products, assessment procedures, and treatment goals.
- Feel free to choose preferred prosthetics service providers, and
- Have the final say on the function and satisfaction of prosthetics products.

For further study:

- Prosthetics-related research activities should be conducted focusing on the following aspects:
    - Continuous comparison of prosthetics and orthotics service delivery with the 60 WHO prosthetics and orthotics standards in other settings.
    - Strategies to improve policy adherence and implementation.
    - Research to determine the prosthetics knowledge and training needs of other healthcare professional groups such as nurses and physiotherapists.
    - Incorporation of high-tech prosthetics products in Africa.

- Ways to improve function and satisfaction of service users.
- Cheaper methods of testing the quality of prosthetics products, and
- More research on education and training of prosthetics service providers.
- The methodology utilized in this study may be adopted as a blue print for future similar studies in Africa.

The reduced sample size and the use of non-probability sampling for service users in the quantitative phase may negatively affect the generalisability or the external validity of the findings. However, the sample that was finally utilized may be considered large enough to represent the population of lower limb prosthetics service users in Namibia and other similar settings. Similarly, the sample size in the qualitative phase was small but the experiences that were captured from the few participants could be seen as rich enough to represent the experiences of lower limb prosthetics users in Namibia and other similar settings.

It is hoped that this study will add to the body of knowledge in prosthetics service delivery. It would also assist in sensitizing service managers and providers in the future planning to help bring lower limb prosthetics services closer to the people in need. It is also expected that this study would influence improvement of prosthetics service delivery in Namibia, so that users could receive suitable devices that could possibly help them become self-reliant and participate in activities of daily living, education and economic activities. Finally, the study is also expected to provide information that could be used by public policy makers for future decision making, planning, policy development and implementation.

References

Aduayom-Ahego, A. & Ehara, Y. 2016. Current position and challenges in prosthetics and orthotics education in Ghana. *Niigata Journal of Health and Welfare,* 16(1):26-34.

Aduayom-Ahego, A., Ehara, Y. & Anareme, K. 2017. Prosthetics and Orthotics education in sub-Saharan Africa: Issues and challenges. *Ec Orthopaedics*, 6(2):80-81.

Aenishänslin, J., Amara, A. & Magnusson, L. 2022. Experiences accessing and using rehabilitation services for people with physical disabilities in Sierra Leone. *Disability and Rehabilitation,* 44(1):34-43.

Agu, T.C. & Ojiaku, M.E. 2016. The indications for major limb amputations: 8 years retrospective study in a private orthopaedic and trauma centre in the south-east Nigeria. *Journal of Clinical Orthopaedics and Trauma*, *7*(4):242-247.

Akram, M.A., Mahmud, M.I., Ashraf, S.R.B., Awal, S. & Talapatra, S. 2018. Enhancing the healthcare service using quality function deployment and database management system in the outpatient Department of a Government Hospital of Bangladesh. *Int. res. J. Eng. Technol*, 5(4):2022-2029.

Alemu, W., Girma, E. & Mulugeta, T., 2021. Patient awareness and role in attaining healthcare quality: A qualitative, exploratory study. *International Journal of Africa Nursing Sciences,* 14:100278.

Allcock, S.H., Young, E.H. & Sandhu, M.S. 2019. Sociodemographic patterns of health insurance coverage in Namibia. *International Journal for Equity in Health*, 18(1), pp.1-11.

Allen, A.P., Bolton, W.S., Jalloh, M.B., Halpin, S.J., Jayne, D.G. & Scott, J.D. 2020. Barriers to accessing and providing rehabilitation after a lower limb amputation in Sierra Leone–a multidisciplinary patient and service provider perspective. *Disability and Rehabilitation*:1-8.

Allen, A.P., Bolton, W.S., Jalloh, M.B., Halpin, S.J., Jayne, D.G. & Scott, J.D. 2022. Barriers to accessing and providing rehabilitation after a lower limb amputation in Sierra Leone–a multidisciplinary patient and service provider perspective. *Disability and Rehabilitation*, *44*(11):2392-2399.

Andersen, L.B. 2009. What determines the behaviour and performance of health professionals? Public service motivation, professional norms and/or economic incentives. *International Review of Administrative Sciences*, 75(1):79-97.

Anderson, C.B., Kittelson, A.J., Wurdeman, S.R., Miller, M.J., Stoneback, J.W., Christiansen, C.L. & Magnusson, D.M. 2022. Understanding decision-making in

prosthetic rehabilitation by prosthetists and people with lower limb amputation: a qualitative study. *Disability and Rehabilitation*:1-10.

Anderson, S., Stuckey, R. & Oakman, J.R., 2016. Prosthetists and orthotists' experience of their work and workspace–characterising the physical and organisational environment: focus group findings. *Prosthetics and Orthotics International*, 40(6):703-712.

Andrysek, J. 2010. Lower-limb prosthetic technologies in the developing world: A review of literature from 1994–2010. *Prosthetics and Orthotics International*, 34(4):378-398.

Andrysek, J., Klejman, S., Torres-Moreno, R., Heim, W., Steinnagel, B. & Glasford, S. 2011. Mobility function of a prosthetic knee joint with an automatic stance phase lock. *Prosthetics and Orthotics International,* 35(2):163-170.

Arts, K. 2017. Inclusive sustainable development: a human rights perspective. *Current Opinion in Environmental Sustainability*, 24:58-62.

Asif, M., Tiwana, M.I., Khan, U.S., Qureshi, W.S., Iqbal, J., Rashid, N. & Naseer, N. 2022. Advancements, trends and future prospects of lower limb prosthesis. IEEE Access, 9:85956-85977.

Bakker, A.B. 2015. A job demands–resources approach to public service motivation. *Public Administration Review*, *75*(5):723-732.

Balk, E.M., Gazula, A., Markozannes, G., Kimmel, H.J., Saldanha, I.J., Resnik, L.J. & Trikalinos, T.A. 2018. *Lower limb prostheses: measurement instruments, comparison of component effects by subgroups, and long-term outcomes*. Rockville (MD): Agency for Healthcare Research and Quality (US); 2018 Sep. Report No.: 18-EHC017-EF. https://europepmc.org/article/NBK/nbk531523 [cited 8/10/22]

Baranger, A. 2017. Article 8 [awareness-raising]. In The United Nations convention on the rights of persons with disabilities (213-223). Springer, Cham.

Baudin, K., Mullersdorf, M., Sundstrom, A. & Gustafsson, C. 2020. The policies of provision of assistive and welfare technology- A literature review. *Societies*, 10(1):22.

Borg, J., Lindström, A. & Larsson, S. 2009. Assistive technology in developing countries: national and international responsibilities to implement the Convention on the Rights of Persons with Disabilities. *The Lancet*, 374(9704):1863-1865.

Borg, J., Lindström, A. & Larsson, S. 2011. Assistive technology in developing countries: a review from the perspective of the Convention on the Rights of Persons with Disabilities. *Prosthetics and Orthotics International*, *35*(1):20-29.

Boshof, P.I. 2021. *Availability, importance, and accessibility of postgraduate education for Orthotists and Prosthetists in South Africa: A mixed method study* (Master`s dissertation, Stellenbosch: Stellenbosch University).

Bradshaw, C., Atkinson, S. & Doody, O. 2017. Employing a qualitative description approach in health care research. *Global Qualitative Nursing Research*, 4, 2333393617742282.

Burkett, B., McNamee, M. & Potthast, W., 2013. Shifting boundaries in sports technology and disability: equal rights or unfair advantage in the case of Oscar Pistorius?. In *Moving Beyond Boundaries in Disability Studies*:143-154. Routledge.

Callaghan, B., Condie, E. & Johnston, M. 2008. Using the common-sense self-regulation model to determine psychological predictors of prosthetic use and activity limitations in lower limb amputees. *Prosthetics and Orthotics International*, *32*(3):324-336.

Cavanagh, S.R., Shin, L.M., Karamouz, N. and Rauch, S.L., 2006. Psychiatric and emotional sequelae of surgical amputation. Psychosomatics, 47(6), pp.459-464.

Chalya, P.L., Mabula, J.B., Dass, R.M., Ngayomela, I.H., Chandika, A.B., Mbelenge, N. & Gilyoma, J.M. 2012. Major limb amputations: A tertiary hospital experience in northwestern Tanzania. *Journal of orthopaedic surgery and research*, *7*(1):1-6.

Chatukuta, M., Groce, N., Mindell, J.S. & Kett, M. 2021. Perceptions of healthcare workers on road traffic injuries in Namibia: An untapped source of expertise. *Disability and rehabilitation*:1-7.

Chen, C., Hanson, M., Chaturvedi, R., Mattke, S., Hillestad, R. & Liu, H.H. 2018. Economic benefits of microprocessor controlled prosthetic knees: A modelling study. *Journal of Neuroengineering and Rehabilitation*, 15(1):1-11.

Chibaya, G., Govender, P. & Naidoo, D. 2021. United Nations Convention on the Rights of Person with Disabilities (UNCRPD) Implementation: Perspectives of Persons with Disabilities in Namibia. *Occupational Therapy International*, *2021*.

Chichaya, T.F., Joubert, R. & McColl, M.A. 2019. Applying the occupational justice framework in disability policy analysis in Namibia. *South African Journal of Occupational Therapy*, 49(1):19-25.

Chichaya, T.F., Joubert, R.W.E. & McColl, M.A. 2020. Voices on disability issues in Namibia: Evidence for entrenching occupational justice in disability policy formulation. *Scandinavian Journal of Occupational Therapy*, 27(1):14-27.

Christians, F. 2020. Country profile–Primary healthcare and family medicine in Namibia. *African Journal of Primary Health Care and Family Medicine,* 12(1):1-3.

Clarke, L., Puli, L., Ridgewell, E., Dillon, M.P. & Anderson, S. 2021. Regulation of the global orthotist/prosthetist workforce, and what we might learn from allied health professions with international-level regulatory support: A narrative review. *Human Resources for Health,* 19(1):1-14.

Cote, A. 2021. Social protection and access to assistive technology in low-and middle-income countries. *Assistive Technology,* 33(sup1): 102-108.

Cullinan, K., 2006. Health services in South Africa: A basic introduction. *Health-e News Service*, *1*(1-38).

De Brún, A., O'Donovan, R. and McAuliffe, E. 2019. Interventions to develop collectivistic leadership in healthcare settings: A systematic review. *BMC Health Services Research,* 19(1):1-22.

de Koster, R. 2018. *Development of an interim prosthesis for use in rural South Africa: A problem analysis* (Doctoral dissertation).

de Laat, F.A., Dijkstra, P.U., Rommers, G.M., Geertzen, J.H. and Roorda, L.D., 2014. Perceived independence and limitations in rising and sitting down after rehabilitation for a lower-limb amputation. J Rehabil Med, 46(8), pp.824-827.

De Savigny, D. & Adam, T. eds., 2009. *Systems thinking for health systems strengthening*. World Health Organization.Geneva.

de Witte, L., Steel, E., Gupta, S., Ramos, V.D. & Roentgen, U. 2018. Assistive technology provision: towards an international framework for assuring availability and accessibility of affordable high-quality assistive technology. *Disability and Rehabilitation: Assistive Technology*, 13(5):467-472.

Delice, A. 2010. The sampling issues in quantitative research. *Educational Sciences: Theory and Practice*, 10(4):2001-2018.

Diment, L., Nguon, R., Seng, S., Sit, V., Lors, P., Thor, P., Srors, S., Kheng, S., Granat, M., Donovan-Hall, M. & Worsley, P. 2022. Activity, socket fit, comfort and community participation in lower limb prosthesis users: A Cambodian cohort study. *Journal of NeuroEngineering and Rehabilitation*, 19(1):1-18.

Domholdt, E. 2005. *Rehabilitation research: Principles and applications*, 3rd edn., Elsevier Saunders, St. Louis.

Eide, A.H. & Øderud, T. 2009. Assistive technology in low-income countries. In *Disability & international development*:149-160). Springer, New York, NY.

Eide, A.H., Mannan, H., Khogali, M., Van Rooy, G., Swartz, L., Munthali, A., Hem, K.G., MacLachlan, M. & Dyrstad, K. 2015. Perceived barriers for accessing health services among individuals with disability in four African countries. *PLoS One*, 10(5), p.e0125915.

Ennion, L. & Johannesson, A. 2018. A qualitative study of the challenges of providing pre-prosthetic rehabilitation in rural South Africa. *Prosthetics and Orthotics International*, 42(2):179-186.

Ennion, L. & Manig, S. 2019. Experiences of lower limb prosthetic users in a rural setting in the Mpumalanga Province, South Africa. *Prosthetics and Orthotics International,* 43(2):170-179.

Ennion, L. & Rhoda, A. 2016. Roles and challenges of the multidisciplinary team involved in prosthetic rehabilitation, in a rural district in South Africa. *Journal of Multidisciplinary Healthcare*, 9:565.

Ennion, L., Johannesson, A. & Rhoda, A. 2017. The use of a direct manufacturing prosthetic socket system in a rural community in South Africa: A pilot study and lessons for future research. *Prosthetics and Orthotics International*, 41(5):455-462.

Fanciullacci, C., McKinney, Z., Monaco, V., Milandri, G., Davalli, A., Sacchetti, R., Laffranchi, M., De Michieli, L., Baldoni, A., Mazzoni, A. & Paternò, L. 2021. Survey of transfemoral amputee experience and priorities for the user-centered design of powered robotic transfemoral prostheses. *Journal of Neuroengineering and Rehabilitation*, 18(1):1-25.

Farrar, M., Niraula, Y.R. & Pryor, W. 2022. Improving access to prosthetic services in Western Nepal: a local stakeholder perspective. *Disability and Rehabilitation*:1-10.

Federal Ministry of Health. 2022. *Priority Assistive Products List*. Abuja: 1-29.

Fortington, L.V., Geertzen, J.H., van Netten, J.J., Postema, K., Rommers, G.M. and Dijkstra, P.U., 2013. Short and long term mortality rates after a lower limb amputation. European Journal of Vascular and Endovascular Surgery, 46(1), pp.124-131.

Gallagher, P. & MacLachlan, M. 2000. Development and psychometric evaluation of the trinity amputation and prosthesis experience scales (TAPES). *Rehabilitation Psychology,* 45(2):1-30.

Gallagher, P., Franchignoni, F., Giordano, A. & MacLachlan, M., 2010. Trinity amputation and prosthesis experience scales: a psychometric assessment using classical test theory and rasch analysis. *American Journal of Physical Medicine & Rehabilitation,* 89(6):487-496.

Gebreslassie, B., Gebreselassie, K. & Esayas, R. 2018. Patterns and causes of amputation in Ayder Referral Hospital, Mekelle, Ethiopia: A three-year experience. *Ethiopian Journal of Health Sciences*, *28*(1):31-36.

Geneva, 22-23 August 2019

Ghoseiri, K. & Bahramian, H. 2012. User satisfaction with orthotic and prosthetic devices and services of a single clinic. *Disability and Rehabilitation*, 34(15):1328-1332.

Gilson, L. & Schneider, H. (2008). Understanding health service access: Concepts and experience. *Global Forum Update on Research for Health*, 4, 028-033. Retrieved from http://research.brac.net/publications/GlobalUpdate4Full.pdf

Ginis, K.A.M., van der Ploeg, H.P., Foster, C., Lai, B., McBride, C.B., Ng, K., Pratt, M., Shirazipour, C.H., Smith, B., Vásquez, P.M. & Heath, G.W. 2021. Participation of people living with disabilities in physical activity: A global perspective. *The Lancet*, 398(10298):443-455.

Gitlin, L.N. 2002. *Assistive technology in the home and community for older people: Psychological and social considerations*. In M. J. Scherer (Ed.), Assistive technology: Matching device and consumer for successful rehabilitation (pp. 109–122). American Psychological Association. https://doi.org/10.1037/10420-007

Godlwana, L., Nadasan, T. & Puckree, T. 2008. Global trends in incidence of lower limb amputation: a review of the literature. *South African Journal of Physiotherapy*, 64(1):8-12.

Google.com.na. 2022. *Namibia Regions - Google Search*. [online] Available at: http://www.google.com.na/search?biw=1600&bih=745&tbm=isch&sa=1&btnG=Search&q=Namibia+Regions.

Government of Sierra Leone, Ministry of Health and Sanitation. 2022. *Priority Assistive Products List of Sierra Leone*:1- 23.

Government Republic of Namibia. 2004. *National Disability Council Act. 26, Office of the Prime Minister*. Windhoek, Namibia.p15.

Government Republic of Namibia. 2022. *Fifth Session, Seventh Parliament, Order Paper of the National Assembly. Parliament.* Windhoek, Namibia: 2.

Guetterman T.C. 2015. Descriptions of sampling practices within five approaches to qualitative research in education and the health sciences. *Forum: Qualitative Social Research,* 16(2):25.

Gupta, N., Castillo-Laborde, C. & Landry, M.D. 2011. Health-related rehabilitation services: assessing the global supply of and need for human resources. *BMC Health Services Research,* 11(1):1-11.

Gutfleisch, O., 2003. Peg legs and bionic limbs: the development of lower extremity prosthetics. Interdisciplinary Science Reviews, 28(2), pp.139-148.

Hadj-Moussa, F., Zahid, H.B., Wright, F.V., Kelland, K. & Andrysek, J. 2021. 'It's more than just a running leg': a qualitative study of running-specific prosthesis use by children and youth with lower limb absence. *Disability and Rehabilitation*, pp.1-9.

Hashemi, G., Kuper, H. & Wickenden, M. 2017. SDGs, Inclusive Health and the path to Universal Health Coverage. Disability and The Global South. *Disability and the Global South*, 4(1):1088-1111.

Heale, R. & Forbes, D. 2013. Understanding triangulation in research. Evidence-based nursing, 16(4):98-98.

Highsmith, M. J. 2015. Is orthotics and prosthetics a profession?. *Journal of Prosthetics and Orthotics* 27(4):115-117 doi: 10.1097/JPO.0000000000000078

Highsmith, M.J., Andrews, C.R., Millman, C., Fuller, A., Kahle, J.T., Klenow, T.D., Lewis, K.L., Bradley, R.C. & Orriola, J.J. 2016. Gait training interventions for lower extremity amputees: a systematic literature review. *Technology & Innovation*, 18(2-3):99-113.

https://aabme.asme.org/posts/3-d-printing-to-lower-prosthetic-costs

https://allafrica.com/stories/201306251170.html#:~:text=The%20ministry%20says%20many%20nationals,of%20amputations%20in%20the%20country.

https://miusa.globaldisabilityrightsnow.org/infographics/link-between-sustainable-development-goals-and-crpd

https://www.hpcna.com

https://www.ipsprosthetics.com/what-are-k-levels/

https://www.nngroup.com/articles/summary-quant-sample-sizes/

https://www.physiopedia.com/Trinity_Amputation_and_Prosthesis_Experiences_Scales.

https://www.powerdms.com/policy-learning-center/why-it-is-important-to-review-policies-and-procedures

Indongo, N. & Mufune, P. 2015. ICT barriers for people with disability in Namibia: Evidence from the 2011 Namibia Population and Housing Census. *Review of Disability Studies: An International Journal*, *11*(1):34-65.

International Society for Prosthetics and Orthotics (ISPO). *2018. ISPO education standards for prosthetic/orthotic occupations.*

Järnhammer, A., Andersson, B., Wagle, P.R. & Magnusson, L., 2018. Living as a person using a lower-limb prosthesis in Nepal. *Disability and Rehabilitation*, 40(12):1426-1433.

Johnston, B.M., Burke, S., Kavanagh, P.M., O'Sullivan, C., Thomas, S. & Parker, S. 2021. Moving beyond formulae: a review of international population-based resource allocation policy and implications for Ireland in an era of healthcare reform. *HRB Open Research*, *4*:1-21.

Kam, S., Kent, M., Khodaverdian, A., Daiter, L., Njelesani, J., Cameron, D. & Andrysek, J. 2015. The influence of environmental and personal factors on participation of lower-limb prosthetic users in low-income countries: prosthetists' perspectives. Disability and Rehabilitation: Assistive Technology, 10(3):245-251.

Keklicek, H., Kirdi, E., Yalcin, A., Topuz, S., Ulger, O., Erbahceci, F. & Sener, G. 2019. Comparison of gait variability and symmetry in trained individuals with transtibial and transfemoral limb loss. *Journal of Orthopaedic Surgery*, *27*(1):2309499019832665.

Kenney, L.P.J., Ssekitoleko, R., Chadwell, A.E.A., Donovan-Hall, M., Morgado Ramirez, D., Holloway, C., Graham, P., Cockroft, A., Deere, B., McCormack, S. & Semwanga, A. 2019. Prosthetics services in Uganda: a series of studies to inform the design of a low cost, but fit-for-purpose, body-powered prosthesis. Global Report on Assistive Technology (GReAT) Consultation. WHO. Geneva.

Khan, F., Amatya, B., De Groote, W., Owolabi, M. Syed, I. et al. 2018. Capacity-building in clinical skills of rehabilitation workforce in low-and middle-income countries. *J. Rehabil Med*, *50*:00-00

Khan, M.Z., Smith, M.T., Bruce, J.L., Kong, V.Y. and Clarke, D.L., 2020. Evolving indications for lower limb amputations in South Africa offer opportunities for health system improvement. World journal of surgery, 44(5), pp.1436-1443.

Khasnabis, C., Mirza, Z. & MacLachlan, M. 2015. Opening the GATE to inclusion for people with disabilities. *The Lancet*, 386(10010):2229-2230.

Kroll, T., Neri, M.T. & Miller, K., 2005. Using mixed methods in disability and rehabilitation research. *Rehabilitation Nursing*, 30(3):106-113.

Kuhlmann, A., Krüger, H., Seidinger, S. & Hahn, A., 2020. Cost-effectiveness and budget impact of the microprocessor-controlled knee C-Leg in transfemoral amputees with and without diabetes mellitus. *The European Journal of Health Economics*, 21(3):437-449.

Kumar, P.K., Charan, M. & Kanagaraj, S., 2017. Trends and challenges in lower limb prosthesis. *IEEE Potentials*, 36(1):19-23.

Lang, R., Schneider, M., Kett, M., Cole, E. & Groce, N. 2019. Policy development: An analysis of disability inclusion in a selection of African Union policies. *Development Policy Review*, 37(2):155-175.

Langford, J., Dillon, M.P., Granger, C.L. & Barr, C. 2019. Physical activity participation amongst individuals with lower limb amputation. *Disability and Rehabilitation*, 41(9), pp.1063-1070.

Lee, D.J. & Veneri, D.A. 2018. Development and acceptability testing of decision trees for self-management of prosthetic socket fit in adults with lower limb amputation. *Disability and Rehabilitation*, 40(9):1066-1071.

Lemaire, E.D., Supan, T.J. & Ortiz, M. 2018. Global standards for prosthetics and orthotics. *Canadian Prosthetics & Orthotics Journal*, 1(2).

LIMBS INTERNATIONAL. 2021. *Why Limbs*. [online] Available at:<https://www.limbsinternational.org/why-limbs.html>.

Liu, F., Williams, R.M., Liu, H.E. & Chien, N.H. 2010. The lived experience of persons with lower extremity amputation. *Journal of Clinical Nursing*, 19(15-16):2152-2161.

Logan, S.W., Bogart, K.R., Ross, S.M. & Woekel, E. 2018. Mobility is a fundamental human right: Factors predicting attitudes toward self-directed mobility. *Disability and Health Journal*, 11(4):562-567.

Luthi, F., Praz, C., Léger, B., Vouilloz, A., Favre, C., Loiret, I., Paysant, J., Martinet, N., Lacraz, A., Suva, D. & Lambert, J. 2020. Cross-cultural adaptation and measurement properties of the French version of the Trinity Amputation and Prosthesis Experience Scales—revised (TAPES-R). *PloS One*, 15(2):e0229084.

Mabuza, L.H., Govender, I., Ogunbanjo, G.A. & Mash, B. 2014. African primary care research: Qualitative data analysis and writing results. African journal of primary health care & family medicine, 6(1):1-5.

MacLachlan, M. & Scherer, M.J. 2018. Systems thinking for assistive technology: a commentary on the GREAT summit. *Disability and Rehabilitation: Assistive Technology*, 13(5):492-496.

MacLachlan, M., Banes, D., Bell, D., Borg, J., Donnelly, B., Fembek, M., Ghosh, R., Gowran, R.J., Hannay, E., Hiscock, D. & Hoogerwerf, E.J. 2018. Assistive technology policy: a position paper from the first global research, innovation, and education on assistive technology (GREAT) summit. *Disability and Rehabilitation: Assistive Technology,* 13(5):454-466.

Magaqa, Q., Ariana, P. & Polack, S. 2021. Examining the availability and accessibility of rehabilitation services in a Rural District of South Africa: A mixed-methods study. *International Journal of Environmental Research and Public Health*, 18(9):4692.

Magnusson, L. & Ahlström, G. 2012. Experiences of providing prosthetic and orthotic services in Sierra Leone–the local staff's perspective. *Disability and rehabilitation*, *34*(24):2111-2118.

Magnusson, L. 2019. Professionals' perspectives of prosthetic and orthotic services in Tanzania, Malawi, Sierra Leone and Pakistan. *Prosthetics and orthotics International,* 43(5):500-507.

Magnusson, L. and Ahlström, G. 2017. Patients' satisfaction with lower-limb prosthetic and orthotic devices and service delivery in Sierra Leone and Malawi. *BMC health Services Research*, 17(1):1-13.

Magnusson, L., Ahlstrom, G. & Shangali, H.G. 2016. Graduates' perceptions of prosthetic and orthotic education and clinical practice in Tanzania and Malawi. *African Journal of Disability*, 5(1):1-9.

Magnusson, L., Ahlström, G., Ramstrand, N. & Fransson, E. 2013. Malawian Prosthetic and Orthotic Users' Performance and Satisfaction with Their Lower Limb Assistive Device. https://swepub.kb.se/showrecord?q=onr%3A%22swepub%3Aoai%3ADiVA.org%3Ahj-20722%22&n=1&d=swepub&language=en&noredirect=true&tab2=abs [cited 8/10/22]

Magnusson, L., Ramstrand, N., Fransson, E. & Ahlström, G. 2014. Mobility and satisfaction with lower-limb prostheses and orthoses among users in Sierra Leone: A cross-sectional study. *Journal of Rehabilitation Medicine*, 46(5):438-446.

Marino, M., Pattni, S., Greenberg, M., Miller, A., Hocker, E., Ritter, S. & Mehta, K. 2015. October. *Access to prosthetic devices in developing countries: Pathways and challenges.* In 2015 IEEE global humanitarian technology conference (GHTC):45-51). IEEE.

McDonald, C.L., Cheever, S.M., Morgan, S.J. & Hafner, B.J. 2019. Prosthetic limb user experiences with crossover feet: a pilot focus group study to explore outcomes that matter. *JPO: Journal of Prosthetics and Orthotics*, *31*(2):121-132.

McDonald, C.L., Kartin, D. & Morgan, S.J., 2020. A systematic review in prosthetics and orthotics education research. *Prosthetics and Orthotics International*, 44(3):116-132.

Mduzana, L., Tiwari, R., Lieketseng, N. & Chikte, U. 2020. Exploring national human resource profile and trends of Prosthetists/Orthotists in South Africa from 2002 to 2018. *Global Health Action*, 13(1):179-2192.

Meanley, S. 1995. Different approaches and cultural considerations in third world prosthetics. *Prosthetics and Orthotics International*, 19(3):176-180.

Ministry of Health and Social Services. 2001. *Policy on Orthopaedic Technical Services*. Windhoek: Directorate: Primary Health Care:1-20.

Ministry of Health and Social Services. 2013. *National Referral Policy*. Windhoek: Public Relations Unit.

Ministry of Health and Social Services. 2014. *Guidelines on Mobile Orthopaedic Technical Services*. Windhoek: Directorate: Primary Health Care.

Ministry of Health and Social Services. 2014. *Guidelines on Mobile Orthopaedic Technical Services*. Windhoek: Directorate: Primary Health Care.

Ministry of Health and Social Services. 2017-2022. *Strategic Plan.* Windhoek: Public Relations Unit.

Ministry of Health and Social Services. 2018. *Annual Report*. Windhoek: Directorate of Policy and Planning.

Ministry of Lands, Resettlement and Rehabilitation. 1997. *National Policy on Disability. Windhoek: Ministry of Lands, Resettlement and Rehabilitation*:1-17.

Mokkink, L.B., Terwee, C.B., Patrick, D.L., Alonso, J., Stratford, P.W., Knol, D.L., Bouter, L.M. & De Vet, H.C. 2010. The COSMIN checklist for assessing the methodological quality of studies on measurement properties of health status measurement instruments: an international Delphi study. *Quality of Life Research*, 19(4):539-549.

Moon, M.D., 2019. Triangulation: A method to increase validity, reliability, and legitimation in clinical research. *Journal of Emergency Nursing*, 45(1):103-105.

Morris, L.D., Grimmer, K.A., Twizeyemariya, A., Coetzee, M., Leibbrandt, D.C. & Louw, Q.A. 2021. Health system challenges affecting rehabilitation services in South Africa. *Disability and Rehabilitation*, 43(6):877-883.

Morse, J. 2015. “Data were saturated…” *Qualitative Health Research* 25(5):587-588.

Murray, C.D. & Forshaw, M.J. 2013. The experience of amputation and prosthesis use for adults: A metasynthesis. *Disability and rehabilitation*, *35*(14):1133-1142.

Mwetulundila, P.K. 2019. *Gender equity and career progression in the Ministry of Health and Social Services in Khomas region of Namibia* (Doctoral dissertation, University of Namibia).

Naidoo, U. & Ennion, L. 2019. Barriers and facilitators to utilisation of rehabilitation services amongst persons with lower-limb amputations in a rural community in South Africa. *Prosthetics and Orthotics International*, 43(1):95-103.

Namibia Statistics Agency (NSA). 2016. *Namibia 2011 Census Disability Report*. Windhoek: NSA.

Namibia Statistics Agency. 2011. *Namibia 2011 Population & Housing Census Main Report*. Windhoek: NSA.

Namibian newspaper. 2013. *Windhoek*. Republic of Namibia.

National Planning Commission (NPC), Namibia. 2004. *President's Foreword, Vision 2030*. Windhoek: NPC:11.

Ned, L., Cloete, L. & Mji, G. 2017. The experiences and challenges faced by rehabilitation community service therapists within the South African Primary Healthcare health system. *African Journal of Disability*, 6(1):1-11.

Ngarambe, R., Sagahutu, J.B., Nuhu, A. and Tumusiime, D.K., 2022. The status and use of prosthetic devices by persons with lower limb amputation in Rwanda. African Journal of Disability, 11, p.8.

Ntuli, S.M. and Letswalo, D.M., 2021. Diabetic Foot Amputations at Central and Provincial Hospital in Gauteng. A Signpost for Inadequate Foot Health Services at Primary Healthcare Level in South Africa.

Nwosu, C., Babalola, M.O., Ibrahim, M.H. & Suleiman, S.I. 2017. Major limb amputations in a tertiary hospital in North Western Nigeria. *African Health Sciences*, 17(2): 508-512.

Nyongesa, M.W., Onyango, R. & Ombaka, J. 2015. Evaluation of health care quality in public and faith-based hospitals in Kiambu and Nairobi countries, in Kenya: A

comparative study. *Journal of Emerging Trends in Educational Research and Policy Studies,* 6(2):150-158.

Ofiaeli, R.O. 2001. Indications level and outcome of lower extremity amputations in Nnewi, Nigeria. *Journal of Medical Investigation and Practice*, 2:18-21.

O'Keeffe, B. & Rout, S. 2019. Prosthetic rehabilitation in the lower limb. *Indian Journal of Plastic Surgery*, 52(01):134-143.

O'Leary, Z. 2017. *The essential guide to doing your research project*. 3rd ed. Sage. London

Orendurff, M.S., Raschke, S.U., Winder, L., Moe, D., Boone, D.A. & Kobayashi, T. 2016. Functional level assessment of individuals with transtibial limb loss: Evaluation in the clinical setting versus objective community ambulatory activity. *Journal of Rehabilitation and Assistive Technologies Engineering*, 3:2055668316636316.

Ostler, C., Ellis-Hill, C. & Donovan-Hall, M. 2014. Expectations of rehabilitation following lower limb amputation: a qualitative study. *Disability and Rehabilitation*, *36*(14):1169-1175.

Palinkas LA., Horwitz SM., Green CA., Wisdom JP., Duan N. & Hoagwood, K. 2016. Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Adm Policy Ment Health.* 42(5):533-544

Parliament of the Republic of Namibia. (2015). *Child Care and Protection Act 3 of 2015*. Windhoek: Parliament of the Republic of Namibia:21.

Paternò, L., Ibrahimi, M., Gruppioni, E., Menciassi, A. & Ricotti, L. (2018). Sockets for limb prostheses: a review of existing technologies and open challenges. *IEEE Transactions on Biomedical Engineering,* 65(9), 1996-2010.

Patrick, D.L., Burke, L.B., Gwaltney, C.J., Leidy, N.K., Martin, M.L., Molsen, E. & Ring, L., 2011. Content validity-establishing and reporting the evidence in newly developed patient-reported outcomes (PRO) instruments for medical product evaluation: ISPOR PRO good research practices task force report: Part 1 - Eliciting concepts for a new PRO instrument. *Value in Health*, 14(8):967-977.

Patton, M.Q., 1999. Enhancing the quality and credibility of qualitative analysis. *Health Services Research*, 34(5 Pt 2):11-89.

Penchansky, R. & Thomas, J.W. 1981. The concept of access: definition and relationship to consumer satisfaction. Medical Care:127-140.

Perkins, Z.B., De'Ath, H.D., Sharp, G. and Tai, N.R.M., 2012. Factors affecting outcome after traumatic limb amputation. Journal of British Surgery, 99(Supplement_1), pp.75-86.

Peta, C. 2017. Disability is not asexuality: The childbearing experiences and aspirations of women with disability in Zimbabwe. *Reproductive Health Matters*, 25(50):10-19.

Peters, D.H., Garg, A., Bloom, G., Walker, D.G., Brieger, W.R. & Rahman, M.H. (2008). Poverty and access to health care in developing countries. *Ann N Y Acad Sci*, 1136, 161-71. DOI: 10.1196/annals.1425.011

Petrini, F.M., Valle, G., Bumbasirevic, M., Barberi, F., Bortolotti, D., Cvancara, P., Hiairrassary, A., Mijovic, P., Sverrisson, A.Ö., Pedrocchi, A. & Divoux, J.L. 2019. Enhancing functional abilities and cognitive integration of the lower limb prosthesis. *Science Translational Medicine,* 11(512):eaav8939.

Pienaar, E. 2018. *Prosthetic use by persons with unilateral above knee amputation in the Western Cape* (Master`s dissertation, Stellenbosch: Stellenbosch University).

Pienaar, E. and Visagie, S., 2019. Prosthetic use by persons with unilateral transfemoral amputation in a South African setting. *Prosthetics and Orthotics International*, 43(3):276-283.

Ramstrand, N. & Brodtkorb, T. H. (2008). Considerations for developing an evidenced-based practice in orthotics and prosthetics. Prosthetics and orthotics international, 32(1):93-102.

Ramstrand, N., Fatone, S., Dillon, M.P. & Hafner, B.J. 2020. Sharing research data. *Prosthetics and Orthotics International*, *44*(2):49-51.

Rathore, F.A., Ayaz, S.B., Mansoor, S.N., Qureshi, A.R. & Fahim, M., 2016. Demographics of lower limb amputations in the Pakistan military: A single center, three-year prospective survey. *Cureus*, *8*(4).

Resnick, H.E., Carter, E.A., Sosenko, J.M., Henly, S.J., Fabsitz, R.R., Ness, F.K., Welty, T.K., Lee, E.T. & Howard, B.V., 2004. Incidence of lower-extremity amputation in American Indians: The Strong Heart Study. *Diabetes Care*, 27(8):1885-1891.

Ricketts, T.C., & Goldsmith, L.J. (2005). Access in health services research: The battle of the frameworks. *Nurs Outlook*, 53(6):274-280. doi:10.1016/j.outlook.2005.06.007

Roffman, C.E., Buchanan, J. & Allison, G.T. 2016. Locomotor performance during rehabilitation of people with lower limb amputation and prosthetic non-use 12 months after discharge. *Physical Therapy*, 96(7):985-994.

Rosenberger, M.R. 2020. Utilizing 3d printing for prosthetic limbs in developing nations and conflict zones. *Craft Research*, 11(1):9-38.

Savage, M., Bhatnagar, T., Liao, C., Chaudron, M., Boyar, J., Laurentius, D., Torrens, G., Perry, K., Morjaria, P., Barajas, F.R. & Goedde, B. 2020. Product narrative: Digital assistive technology. A market landscape and strategic approach to increasing access to digital assistive technology in low-and middle-income countries. Loughborough University. https://hdl.handle.net/2134/14578815.v1.

Schaffalitzky, E., Gallagher, P., Maclachlan, M. & Ryall, N. 2011. Understanding the benefits of prosthetic prescription: exploring the experiences of practitioners and lower limb prosthetic users. *Disability and Rehabilitation*, 33(15-16):1314-1323.

Schaffalitzky, E.M. 2010. *Optimising the prescription and use of lower limb prosthetic technology: A mixed methods approach* (Doctoral dissertation, Dublin City University).

Seidu, A.A., Malau-Aduli, B.S., McBain-Rigg, K., Malau-Aduli, A.E. & Emeto, T.I. 2021. Level of inclusiveness of people with disabilities in Ghanaian health policies and reports: a scoping review. *Disabilities*, 1(3):257-277.

Sexton, S. 2010. Appropriate prosthetic and orthotic technologies in low-income countries (2000-2010). International Society for Prosthetics and Orthotics. Brussels. https://swisslimbs.org/contents/files/appropriate_prosthetic_orthotic_technologies.pdf [cited 8/10/22]

Sexton, S. 2016. *Rehabilitation of people with physical disabilities in developing countries*. Brussels: International Society for Prosthetics and Orthotics. Brussels. http://iiofoandp.org/wp-content/uploads/2018/04/rehabilitation_of_people_with_physical_disabilities_in_developing_countries_ispo_dfd-a-00-08-00309-00.pdf [cited 8/10/22]

Sheehan, B., Dyson-Holland, R., Jolly, A. & Cavenett, S. 2021. Donating orthotic and prosthetic components to low income and low to middle income countries. Guidance document. *Australia National Member Society of the International Society for Prosthetics and Orthotics. https://www.ispo.org.au/wp-content/uploads/2021/10/ISPO-Australia-Donating-Components-Guidance-Document-3.pdf* [cited 8/10/22]

Singh, R.K. and Prasad, G., 2016. Long-term mortality after lower-limb amputation. Prosthetics and orthotics international, 40(5), pp.545-551.

Sinha, R., van den Heuvel, W.J. and Arokiasamy, P., 2014. Adjustments to amputation and an artificial limb in lower limb amputees. Prosthetics and orthotics international, 38(2), pp.115-121.

Smith, E.M., Ebuenyi, I.D., Kafumba, J., Jamali-Phiri, M., Munthali, A. & MacLachlan, M. 2022. Network analysis of assistive technology stakeholders in Malawi. *Global Health Action*, 15(1):2014046.

Smith, R.O., Scherer, M.J., Cooper, R., Bell, D., Hobbs, D.A., Pettersson, C., Seymour, N., Borg, J., Johnson, M.J., Lane, J.P. & Sujatha, S. 2018. Assistive technology products: a position paper from the first global research, innovation, and education on assistive technology (GREAT) summit. *Disability and Rehabilitation: Assistive Technology*, 13(5):473-485.

Strafella, T. 2021. *A qualitative exploration of the experience of using an above-knee prosthesis with a microprocessor knee*. Masters' thesis. Department of Global health Stellenbosch University.

Stuckey, R., Draganovic, P., Ullah, M.M., Fossey, E. & Dillon, M.P., 2020. Barriers and facilitators to work participation for persons with lower limb amputations in Bangladesh following prosthetic rehabilitation. *Prosthetics and Orthotics International*, *44*(5):279-289.

Tangcharoensathien, V., Witthayapipopsakul, W., Viriyathorn, S. & Patcharanarumol, W. 2018. Improving access to assistive technologies: challenges and solutions in low- and middle-income countries. *WHO South-East Asia Journal of Public Health,* 7(2):84.

Tebbutt, E., Brodmann, R., Borg, J., MacLachlan, M., Khasnabis, C. and Horvath, R. 2016. Assistive products and the sustainable development goals (SDGs). *Globalization and Health,* 12(1):1-6.

Thurston, A.J., 2007. Paré and prosthetics: The early history of artificial limbs. *ANZ Journal of Surgery,* 77(12):1114-1119.

Topuz, S., Ülger, Ö., Yakut, Y. & Gül Şener, F. 2011. Reliability and construct validity of the Turkish version of the Trinity Amputation and Prosthetic Experience Scales (TAPES) in lower limb amputees. *Prosthetics and Orthotics International*, 35(2):201-206.

Trafford, Z. & Swartz, L. 2021. The Care Dependency Grant for children with disabilities in South Africa: Perspectives from implementation officials. *Development Southern Africa*: Published online.1-14. https://doi.org/10.1080/0376835X.2021.1981250

Triccas, L.T., McLening, B., Hendrie, W. & Peryer, G. 2019. Is there a standard procedure for assessing and providing assistive devices for people with neuro-disabling conditions in United Kingdom? A nation-wide survey. *Disability and Health Journal*, *12*(1):93-97.

Umaru, H., Madubueze, C.C., Alada, A. & Onu, C.M. 2015. Limb amputations in Nigeria: The national hospital Abuja experience. *Nigerian Journal of Surgical Research*, *16*(1):1-11.

United Nations (UN). 2006. *Convention on the rights of persons with disabilities: Some facts about disability, New York*. www.un.org/ disabilities/convention/facts.shtml.

Utiyama, D.M.O., Alfieri, F.M., dos Santos, A.C.A., Ribeiro, C.P.C., Sales, V.C. & Battistella, L.R. 2022. Effects of an Inpatient Physical Rehabilitation Program Designed for Persons with Amputations of Traumatic or Vascular Etiologies. *JPO: Journal of Prosthetics and Orthotics*, 34(3):152-158.

Vaismoradi, M., Jones, J., Turunen, H. & Snelgrove, S. 2016. Theme development in qualitative content analysis and thematic analysis. *Journal of Nursing Education and Practice*. 6(5):100-110

Van Netten, J.J., Fortington, L.V., Hinchliffe, R.J. and Hijmans, J.M., 2016. Early post-operative mortality after major lower limb amputation: a systematic review of population and regional based studies. European Journal of Vascular and Endovascular Surgery, 51(2), pp.248-257.

Van Rooy, G., Amadhila, E.M., Mufune, P., Swartz, L., Mannan, H. & MacLachlan, M., 2012. Perceived barriers to accessing health services among people with disabilities in rural northern Namibia. *Disability & Society,* 27(6):761-775.

Visagie, S., Eide, A.H., Mannan, H., Schneider, M., Swartz, L., Mji, G., Munthali, A., Khogali, M., van Rooy, G., Hem, K.G. & MacLachlan, M. 2017. A description of assistive technology sources, services and outcomes of use in a number of African settings. *Disability and Rehabilitation: Assistive Technology*, 12(7):705-712.

Visagie, S., Scheffler, E., Seymour, N. and Mji, G., 2020. Assistive technology service delivery in South Africa: Conceptualising a systems approach. South African Health Review, 2020(1), pp.119-127.

von Kaeppler, E.P., Hetherington, A., Donnelley, C.A., Ali, S.H., Shirley, C., Challa, S.T., Lutyens, E., Haonga, B.T., Morshed, S., Andrysek, J. and Shearer, D.W., 2021. Impact of prostheses on quality of life and functional status of transfemoral amputees in Tanzania. African Journal of Disability (Online), 10, pp.1-10.

Walt, G. & Gilson, L. 1994. Reforming the health sector in developing countries: the central role of policy analysis. *Health Policy and Planning*, *9*(4):353-370.

Windricht, M., Grimmer, M., Christ, O., Rinderknecht, S. & Beckerle, P. 2016. Active lower limb prosthetics: A systematic review of design issues and solutions. *Biomedical Engineering Online*, 15(3):5-19.

Wong, C.K., Ehrlich, J.E., Ersing, J.C., Maroldi, N.J., Stevenson, C.E. & Varca, M.J. 2016. Exercise programs to improve gait performance in people with lower limb amputation: A systematic review. *Prosthetics and Orthotics International*, *40*(1):8-17.

Wong, M.W. 2005. Lower extremity amputation in Hong Kong. *Hong Kong Med. J.*, 11(3):147-52.

World Bank, 2019. *Namibia Health Sector Public Expenditure Review*. World Bank.

World Bank. 2015. Namibia. [online] Available at: https://www.worldbank.org/en/country/namibia

World Bank. 2020. Namibia. [online] Available at: https://www.worldbank.org/en/country/namibia

World Bank. 2021. Namibia. [online] Available at: https://www.worldbank.org/en/country/namibia

World Health Organization 2010. *The Abuja declaration: Ten years on*.

World Health Organization. 2016. *Priority Assistive Products List: Improving access to assistive technology for everyone, everywhere* (No. WHO/EMP/PHI/2016.01). World Health Organization.

World Health Organization. 2017. WHO standards for prosthetics and orthotics.

World Health Organization. 2018. *Access to rehabilitation in primary health care: an ongoing challenge* (No. WHO/HIS/SDS/2018.40). World Health Organization.

World Health Organization. 2018. *Access to rehabilitation in primary health care: an ongoing challenge* (No. WHO/HIS/SDS/2018.40). World Health Organization.

World Health Organization. 2021. Framework for improving access to assistive technology in the WHO African Region (AFR/RC71/11). World Health Organization. Regional Office for Africa.

World Health Organization. 2021. Financing rehabilitation in health systems. [online] Available at: www.who.int/activities/integrating-rehabilitation-into-health-systems/financing>.

World Health Organization. 2022. *Global report on assistive technology*.

World Health Organization. *Global Cooperation on Assistive Technology – About us*. Geneva: WHO;2020.

Worrell, TR. 2018. Disability in the media: Examining stigma and identity. *Communication Research Trends*, 39(1):38-69.

Wrobel, J.S., Mayfield, J.A. & Reiber, G.E. 2001. Geographic variation of lower-extremity major amputation in individuals with and without diabetes in the Medicare population. *Diabetes Care*, *24*(5):860-864.

www.disabled-world.com/assistivedevices/prostheses/prosthetics-costs.php

www.gov.na. 2022. About Namibia - GRN Portal. [online] Available at: http://www.gov.na/about-namibia.

www.hpcna.com

www.mhss.gov.na

Wyss, D., Lindsay, S., Cleghorn, W.L. & Andrysek, J. 2015. Priorities in lower limb prosthetic service delivery based on an international survey of prosthetists in low-and high-income countries. *Prosthetics and Orthotics International,* 39(2):102-111.

Yempabe, T., Salisu, W.J., Buunaaim, A.D., Hussein, H. & Mock, C.N. 2021. Epidemiology of Surgical Amputations in Tamale Teaching Hospital, Ghana. *Journal of Medical and Biomedical Sciences*, *8*(1):34-43.

APPENDICES

Appendix 1: 60 WHO Prosthetics and Orthotics Standards (2017)

1. Governments should assume a leading role in the development and coordination of national prosthetics and orthotics service provision.

2. Government should involve all relevant stakeholders including service users, caregivers and user groups in policy development, planning, implementation, monitoring and evaluating prosthetics services.

3. A national prosthetics and orthotics committee or similar entity, with a wide range of stakeholders, should be in place for the coordination and development of national prosthetics and orthotics service provision.

4. There should be a national guiding framework for prosthetics service provision.

5. Prosthetics and orthotics service provision should be regulated by the State

6. Prosthetics and orthotics service should be monitored nationally and regionally

7. Governments and national stakeholders should collaborate internationally and share experience, data and research on prosthetics and orthotics service provision.

8. International support,when provided,should contribute to the establishment and implementation of national prosthetics and orthotics policies and strategic plans and be aligned with the provision system of the national health and welfare services.

9. The cost of providing prosthetics services should be assesed periodically.

10. The direct and indirect economic benefits of prosthetics and orthotics services should be analysed at individual, family, community, society, health sector and national levels.

11. Prosthetics services should be an integral part of universal health coverage (UHC)

12. Prosthetics and orthotics services should be included in national health and social insurance systems, like other health interventions.

13. Data on prosthetics and orthotics service provision should be collected periodically, analysed at service level and shared at national level.

14. A national prosthetics database should be established to identify total need, types of need and unmet need.

15. Strategies for raising awareness about prosthetics services should be established,including rights-based, social and economic arguments.

16. An appropriate range of prosthetic and orthotic products should be available in countries to suit local needs and realities.

17. A national list of priority prosthetic and orthotic products should be drawn up, respected, and updated regularly.

18. International standards should be used for national classification of prosthetic and orthotic products.

19. Components, materials, consumable, tools, machines, and other equipment used exclusively for fabrication of prosthetic and orthotic products that are not available in a country should be exempted from import duty and customs fees.

20. Reuse of prosthetic and orthotic components should be regulated by a designated authority or group of experts with no conflict of interests and involve proper quality control and documentation.

21. National regulation of prosthetic and orthotic products, components and materials should be an integral part of the national health care regulatory system.

22. Prosthetic and orthotic products should be tested structurally for compliance with ISO or equivalent standards before being sold on the market.

23. Clinical and technical research should be conducted in prosthetics and orthotics, and the results should be shared nationally and globally.

24. Affordable prosthetic and orthotic products that are cost-effective, of good quality and context-appropriate should be developed and made widely available.

25. Prosthetics and orthotics services should be provided by competent, adequately trained professionals.

26. Complicated prosthetics and orthotics treatment and care of complex cases should be provided by a multidisciplinary team of professionals with complementary skills.

27. Training in prosthetics and orthotics should be aligned with national and international educational standards.

28. Training in prosthetics and orthotics should be available at various levels to fully meet national needs.

29. Health care professionals, especially rehabilitation professionals, who provide treatment relevant to prosthetics and orthotics services should have adequate knowledge about prosthetics and orthotics.

30. Continuing professional development should be compulsory in prosthetics and orthotics professional practice.

31. Workforce planning should take into account all the disciplines required in prosthetics and orthotics services at all levels.

32. Prosthetics and orthotics service units should have at least one prosthetist and orthotist to supervise and guide clinical and technical work.

33. A strategy to retain prosthetics and orthotics personnel should be in place.

34. Prosthetics and orthotics clinicians should be regulated by the State within regulations for health professionals.

35. Prosthetists and orthotists should assume responsibility for services provided by associate and nonclinical personnel under their supervision.

36. Prosthetics and orthotics personnel should have a clear career structure and employment conditions that are aligned with those of other health care professionals, associates and technical personnel.

37. A documented policy to safeguard the rights of users of prosthetics and orthotics services should be in place and in effect, outlining the features of user-centred services.

38. Service users and their representatives should be involved in policy-making, planning, implementing, monitoring and evaluating prosthetics and orthotics services, take part in decision-making at all levels and be represented on relevant committees.

39. Service users should be given the opportunity to choose their service provider and technology, including components and materials, according to their need, among the options available in the country and the limits set for financing or reimbursement.

40. Prosthetics and orthotics services should be accessible to all the people who need them: girls, boys, women, men and older adults.

41. Prosthetics and orthotics services should be part of the health sector or be closely linked to it.

42. Prosthetics and orthotics services should be delivered in a three-tier system, at primary, secondary and tertiary levels, with established links and two-way pathways for referral and follow-up.

43. Maintenance and repair services should be an integral part of a prosthetics and orthotics service delivery system.

44. The provision of prostheses and orthoses in disaster conditions should be an integral part of the health sector response and be planned to ensure a seamless transition to long-term service provision.

45. Prosthetics and orthotics service units should be established within or closely linked to health and rehabilitation service facilities, such as district and referral hospitals.

46. The possibility of integrating prosthetics and orthotics service units into broader services for assistive products should be considered and explored.

47. At all service levels, prosthetics and orthotics units should be designed to ensure effective, efficient, high-quality service provision in a user-friendly, barrier-free, safe clinical environment.

48. Prosthetics and orthotics service providers should define and adhere to a plan for equipment maintenance and replacement.

49. The safety of service providers and users should be ensured by the establishment of documented health and safety regulations.

50. Prosthetics and orthotics service providers should identify and train partners in identifying and referring potential users.

51. All steps in the delivery of prosthetics and orthotics services should be based on the best available evidence and should adhere to local, national and international standards and practice.

52. Service providers should involve service users and caregivers in assessment, setting goals, and planning treatment.

53. Peer support and counseling should be available to service users as appropriate.

54. Prosthetics and orthotics personnel should follow the instructions and guidelines of the component manufacturer and document any deviation from standard practice.

55. Service users should be given sufficient training to ensure safe, effective use of prostheses and orthoses. Family members and caregivers should be involved as appropriate.

56. Users or caregivers should make the final decision about the acceptability of the fit and function of the prosthesis or orthosis.

57. The outcome of prosthetics and orthotics treatment should be evaluated and documented.

58. Prosthetics and orthotics service users should be followed up regularly.

59. Annual and long-term strategic and operational plans should be in place, with performance indicators for continuous monitoring.

60. The required quality should be defined and adhered to at all levels and in all parts of the prosthetics and orthotics service delivery system.

Appendix 2: Standards, participants, and data collection method used

Standard No.	Participants	Data collection method
1	SM and SP	Qualitative interviews
2	SM, SP and SU	Qualitative interviews
3	None	Document search
4	SM, SP and SU	Qualitative interviews
5	None	Document search and websites (MOHSS and HPCNA)
6	None	Document search
7	SM and SP	Qualitative and Interviews and Quantitative survey
8	SM	Qualitative interviews
9	SM, SP and SU	Qualitative interviews
10	SM, SP and SU	SM & SP quantitative survey and SU TAPES-R
11	SM	Qualitative interviews
12	SM, SP and SU	Qualitative interviews
13	SM and SP	Qualitative interviews and Quantitative survey
14	None	Document search
15	SM, SP and SU	Qualitative interviews and Quantitative survey (SM&SP)
16	SM, SP and SU	Qualitative interviews, SM & SP quantitative survey and SU TAPES-R
17	SM	Qualitative interviews and document search
18	SM	Quantitative survey
19	SM & SP	Quantitative survey
20	SM & SP	Quantitative survey and document search
21	SM & SP	Quantitative survey and document search

22	SM	Qualitative interviews
23	SM & SP	Quantitative survey
24	SM, SP & SU	Qualitative interviews, SM & SP quantitative survey and SU TAPES-R
25	SM, SP & SU	Qualitative interviews
26	SM & SP	Qualitative interviews and SM & SP quantitative survey
27	SM	Qualitative interviews
28	SM	Qualitative interviews
29	SM & SP	Qualitative interviews and SM & SP quantitative survey
30	SM, SP & SU	Qualitative interviews
31	SM & SP	SM & SP quantitative survey
32	SM & SP	Qualitative interviews and SM & SP quantitative survey
33	SM & SP	Qualitative interviews
34	SM & SP	Qualitative interviews
35	SM & SP	SM & SP quantitative survey
36	SM, SP & SU	Qualitative interviews
37	SM, SP & SU	SU Qualitative interviews and SM & SP Quantitative
38	SU	Qualitative interviews
39	SM, SP & SU	Qualitative interviews
40	SM, SP & SU	SM & SP Qualitative Interviews and SU TAPES-R
41	SM	Qualitative interviews
42	SM, SP & SU	Qualitative interviews
43	SM, SP & SU	SM & SP Qualitative Interviews and SU TAPES-R
44	SM & SP	Quantitative survey
45	SM & SP	Qualitative interviews

46	SM & SP	Quantitative survey
47	SM, SP & SU	Qualitative interviews
48	SM & SP	Qualitative interviews
49	SM & SP	Quantitative survey
50	SM & SP	Qualitative interviews and Quantitative survey
51	SM & SP	Quantitative survey
52	SM, SP & SU	Qualitative interviews and SU TAPES-R
53	SM, SP and SU	Qualitative interviews
54	SM and SP	Qualitative interviews
55	SM, SP & SU	Qualitative interviews, SM & SP Quantitative Survey and SU TAPES-R
56	SM, SP and SU	Qualitative interviews, SM & SP Quantitative Survey and SU TAPES-R
57	SM & SP	Qualitative interviews
58	SM, SP and SU	Qualitative interviews and SM & SP Quantitative survey
59	SM & SP	Qualitative Interviews and SM & SP Quantitative survey
60	SM & SP	SM & SP Quantitative survey

1. Participant Groups

SM = Service Managers,

SP = Service Providers and

SU = Service Users

2. Data collection methods

TAPES-R = Trinity Amputation and Prosthesis Experience Scales Revised version (Quantitative tool for service users)

Appendix 3: Lower Limb Prosthetics Service Manager Interview Schedule, Phase 1 Qualitative

Date: _____

Participant Number: _____

Name of Region:

Khomas (01)	Oshana (02)	Kavango (O3)

Title of Manager: _____

Section A: Demographic Information		
1. Name of institution	Windhoek Central Referral Hospital	
	Oshakati Intermediate Hospital	
	Rundu Intermediate Hospital	
2. Age	Years in Service	
3. Gender	Male	
	Female	
4. Profession		

Section B. Interview schedule

A. POLICY *(20 Minutes)*

1. Does the government involve all relevant stakeholders (e.g., service users, caregivers or user groups) in the development of policies, planning, implementation, monitoring and evaluation of prosthetics services?

2. Is there any national framework or guiding document for prosthetics service provision? If yes, tell me about it.

3. Do you have or are you aware of any information on whether the government usually receive any international support that contributes to the establishment and implementation of national prosthetics policies and strategic plans?

4. Do you regard prosthetics services in the public sector of Namibia, to be well supported and funded?

5. In your own understanding, do you think that in Namibia, prosthetics services are regarded as being part and parcel of universal health coverage? Explain more.

B. PRODUCTS *(5 Minutes)*

1. Do you consider your facility to have the appropriate range of lower limb prosthetic products that suits local patient needs and realities? Please explain.

2. Is there any existing national list of priority lower limb prosthetic products? If yes, is it usually respected and updated regularly? Are the products listed sufficient in your opinion?

3. Do you consider lower limb prosthetic products developed/used at your facility to be affordable and cost effective, of good quality, well appropriate to the users and available to all?

C. PERSONNEL *(10 Minutes)*

1. Do you regard professionals that provides lower limb prosthetic products at your facility to be competent and adequately trained? Participant to explain more.

2. How often are professionals at your facility, sent for short and long-term training at various levels that are in line with the national needs? Participant to explain more

3. Is continuous professional development compulsory for prosthetics professional practice in Namibia? Participant to explain more

4. What professional disciplines that are required for the provision of prosthetics services are considered in your workforce plan? Explain more

5. How many qualified prosthetist/s and orthotist/s that supervises and guides all clinical and technical duties does your facility have? Tell me about the sufficiency of this number.

6. In your own view, do you regard your professional category as having a clear career structure and employment conditions that are aligned with those of other health care professionals?

D. PROVISION OF SERVICES AT YOUR FACILITY *(60 Minutes)*

1. How accessible are lower limb prosthetics services to all people in need of them: The youth, adults, the elderly, women and men?

2. Do lower limb prosthetics service users usually have a choice in selecting the professional to provide service to them? Explain more

3. How much choice do lower limb prosthetics service users usually get when selecting the type of technology that is provided to them, including components and materials, according to their needs based on the options available in the country and financial limits?

4. At your facility, do lower limb service users usually receive sufficient training to ensure safe and effective use of their prosthetic devices? If yes, are family members and caregivers usually involved?

5. To what extent is peer support and counselling available to lower limb prosthetics users at your facility?

6. At your facility, who is usually making the final decision in regard to acceptability of the fitting and function of the prosthetic device? Participant to clarify if the user and caregiver are the final decision makers?

7. How often are follow-ups of lower limb prosthetics users done?

8. What maintenance and repair of lower limb prosthetic devices are done at your facility?

9. How is the outcome and impact of prosthetics treatment evaluated and documented at your facility?

10. Is your prosthetics facility established within a hospital setup and closely linked to rehabilitation service facilities?

11. Is your prosthetics service unit designed in a manner that ensures, effective, efficient, high quality service provision in a user friendly, barrier free and safe clinical environment? Please explain

12. At your prosthetics facility, is there any well-defined plan for equipment maintenance and replacement? Please explain

13. Do prosthetics personnel at your facility follow instructions and guidelines of component manufacturers? If yes, do they usually document any deviations from the standard practice?

14. What annual and long-term strategic and operational plans that includes performance indicators for the purpose of continuous monitoring and service sustainability are in place at your facility?

15. In Namibia, are prosthetics services considered to be part of the health sector?

16. Do you think lower limb prosthetics services are delivered at all three levels of health care,

    - Primary (Clinics, Health Centres and District Hospitals)
    - Secondary (Intermediate Hospitals) and
    - Tertiary (Referral Hospital)?

    As per your answer, is there a well-established link for referral and follow-up?

Thank you so much for taking time to answer my Questions

Appendix 4: Lower Limb Prosthetics Service Provider Interview Schedule, Phase 1 Qualitative

Date: _____

Participant Number: _____

Name of Region:

Khomas (01)	Oshana (02)	Kavango (O3)

Section A: Demographic Information		
1. Name of Institution	Windhoek Central Referral Hospital	
	Oshakati Intermediate Hospital	
	Rundu Intermediate Hospital	
2. Age		
3. Gender	Male	
	Female	
4. Years of experience		
	Prosthetist/Orthotist	
	Orthopaedic Technologist	

Section B. Interview schedule

POLICY *(6 minutes)*

1. Does the government involve all relevant stakeholders (e.g. service users, caregivers or user groups) in the development of policies, planning, implementation, monitoring and evaluation of prosthetics services?

2. Is there any national framework or guiding document for prosthetics service provision? If yes, tell me about it.

3. Do you regard prosthetics services in the public sector of Namibia, to be well supported and funded?

PRODUCTS *(4 Minutes)*

1. Do you consider your facility to have the appropriate range of lower limb prosthetic products that suits local patient needs and realities? Please explain

2. Do you consider lower limb prosthetic products developed/used at your facility to be affordable and cost effective, of good quality, well appropriate to the users and available to all?

PERSONNEL *(10 Minutes)*

1. How competent and adequately trained are professionals that provides lower limb prosthetic products at your facility? Participant to explain more.

2. Is continuous professional development, compulsory for prosthetics professional practice in Namibia? Participant to explain more

3. How many qualified prosthetist/s and orthotist/s that supervises and guides all clinical and technical duties does your facility have? Is this number sufficient?

4. In your own view, do you regard your professional category as having a clear career structure and employment conditions that are aligned with those of other health care professionals?

PROVISION OF SERVICES AT YOUR FACILITY *(60 Minutes)*

1. How accessible are lower limb prosthetics services to all people in need of them: The youth, adults, the elderly, women and men?

2. Do lower limb prosthetics service users have any choice to select a professional to provide service to them?

3. How much choice do lower limb prosthetics service users get when selecting the type of technology, including components and materials, according to their needs based on the options available in the country and financial limits?
4. To what extent do lower limb prosthetics service providers involve service users and caregivers in the assessment, goal setting and treatment plan?

5. At your facility, who is usually making the final decision in regard to acceptability of the fitting and function of the prosthetic device? Participant to clarify if the user and caregiver are the final decision makers?

6. How is the outcome and impact of prosthetics treatment evaluated and documented at your facility?

7. At your facility, do lower limb service users usually receive sufficient training to ensure safe and effective use of their prosthetic devices? If yes, are family members and caregivers usually involved?

8. To what extent is peer support and counselling available to lower limb prosthetics users at your facility?

9. How are follow-ups of lower limb prosthetics users done at your facility?

10. What maintenance and repair of lower limb prosthetic devices are done at your facility? Please explain

11. In Namibia, are prosthetics services considered to be part of the health sector?

12. Do you think lower limb prosthetics services are delivered at all three levels of health care?

    - Primary (Clinics, Health Centres and District Hospitals)
    - Secondary (Intermediate Hospital) and
    - Tertiary (Referral Hospital)?

As per your answer, is there a well-established link for referral and follow-up?

13. Is your prosthetics facility established within a hospital setup and closely linked to rehabilitation service facilities?

14. Is your prosthetics service unit designed in a manner that ensures, effective, efficient, high quality service provision in a user friendly, barrier free and safe clinical environment? Please explain

15. At your prosthetics facility, is there any well-defined plan for equipment maintenance and replacement? Please explain

16. Do prosthetics personnel at your facility follow instructions and guidelines of component manufacturers? If yes, do they usually document any deviations from standard practice?

Thank you for answering the questions

Appendix 5: Lower Limb Prosthetics Service User Interview Schedule, Phase 1 Qualitative

Date: _____

Participant Number: _____

Name of Region:

Khomas (01)	Oshana (02)	Kavango (O3)

PROVISION OF SERVICES *(40 minutes)*

1. Could you tell me how you got your artificial leg?

2. As a user of an artificial leg, are you usually given the opportunity to choose the service provider you want and type of leg, including components and materials?

3. How easy is it for Namibians in need of artificial legs, to reach the places where the legs are provided: The youth, adults, the elderly, women and men?

4. Where do you normally receive your artificial leg?
   - Clinic,
   - Health Centre,
   - District Hospital (any other regional hospital)
   - Intermediate Hospital (Rundu, Oshakati or Katutura Hospital) or
   - Referral Hospital (Windhoek Central Hospital)?

   As per your answer, is it usually easy for you to be referred from one health facility to the next and are follow-ups usually conducted?

5. Is the maintenance and repair of your artificial leg, also usually done at the same facility where you usually go to?

6. How happy are you with the maintenance and repair?

7. Do you think the place where you usually go, is built in a manner that is user friendly, barrier free and safe? Please explain

8. Was there any counselling services and support from other patients about your artificial leg or disability at the facility where you usually go? Explain more

9. What training did you receive, to ensure safe and helpful use of your leg? Please explain. Were family members or caregivers also involved?
10. Do you usually have follow-ups from the professionals who made your artificial leg? Are the follow-ups enough? Please explain

11. Could you please explain if there are challenges that you faced and or continue to face in terms of the service provision for artificial legs?

POLICY *(10 minutes)*

1. How does the government involve persons with disabilities like yourself or your representatives, in the development of policies used for planning, use, monitoring and evaluation of services for artificial legs?

2. Do you perhaps know of any government document that talks about the provision of artificial legs? If it is there, is it helpful in any way?
3. What information is usually provided to you or your representatives in regard to your rights as a person with disability, when it comes to the provision of artificial legs?

PRODUCTS *(5 minutes)*

1. Do you consider the place where you usually receive your services, to have the appropriate type of artificial legs that suits your needs and realities? Please explain

2. Do you consider the artificial leg that you received to be affordable, of good quality, suitable to use and available to everyone who needs it?

PERSONNEL *(5 minutes)*

1. Do you think the professionals that made your artificial leg know their job well? Participant to explain more.

2. In your own view do you think the same professionals that provided you with the leg should keep on learning or get new skills that could benefit you?

Thank you for answering these Questions

Appendix 6: **Trinity Amputation and Prosthesis Experiences Scales Revised Version (TAPES-R) For LLP Service Users, Quantitative Phase 2**

Date: _____

Participant Number: _____

Region of Residence: _____

Region where service user receives prosthetics services

Khomas (01)		Oshana (02)		Kavango (O3)	

Trinity Amputation & Prosthesis Experience Scales (TAPES)

What is this survey about?

This questionnaire looks at different aspects of having a prosthesis. The information gathered will be used to improve our understanding of aspects of prosthesis use and to assist in the development of better services for prosthesis users.

Who should complete the questionnaire?

The questionnaire should be completed by the person with a prosthesis. However, if the person needs help to complete the questionnaire, the answers should be given from his/her point of view – not the point of view of the person who is helping?

How to complete the questionnaire?

Please answer every item as honestly as you can. For each question, please tick or complete clearly inside the given box/space using a black or blue pen. Don't worry if you make a mistake: simply cross out the mistake and put a tick in the correct box. There are no right or wrong answers.

Your answers will be treated in strictest confidence

This is a questionnaire designed to investigate different aspects of having a prosthesis.
Please answer every item as honestly as you can. There are no right or wrong answers.
Your responses will remain confidential.

1. Service user age: _____

2. Gender: male.... [ ]

female... [ ]

other [ ]

3. How long ago did you have your amputation?

_____ years _____ months (If you have had more than one amputation surgery please refer to your first amputation surgery).

4. How long have you had a prosthesis?

_____ years _____ months

5. How long have you had the prosthesis that you wear at the moment?

_____ years _____ months

6. What type of prosthesis do you have? (Please tick the appropriate box)

Below-Knee [ ]
Above-Knee [ ]
Other [ ]

7. What was your amputation a result of? (Please tick the appropriate box)

Peripheral Vascular Disorder [ ]
Diabetes [ ]
Cancer [ ]
Accident [ ]
Other (please specify) _____

Part I

Below are written a series of statements concerning the wearing of a prosthesis. Please read through each statement carefully. Then ***tick the box*** beside each statement, which shows how strongly you agree or disagree with it.

	Strongly disagree	Disagree	Agree	Strongly agree	Not applicable
1. I have adjusted to having a prosthesis.....	[1]	[2]	[3]	[4]	[ ]
2. As time goes by, I accept my prosthesis more...	[1]	[2]	[3]	[4]	[ ]
3. I feel that I have dealt successfully with this trauma in my life .....[1]		[2]	[3]	[4]	[ ]
4. Although I have a prosthesis, my life is full .....[1]		[2]	[3]	[4]	[ ]
5. I have gotten used to wearing a prosthesis.....[.1]		[2]	[3]	[4]	[ ]
6. I don't care if somebody looks at my prosthesis .....[1]		[2]	[3]	[4]	[ ]
7. I find it easy to talk about my prosthesis .....[.1]		[2]	[3]	[4]	[ ]
8. I don't mind people asking about my prosthesis .....[.1]		[2]	[3]	[4]	[ ]
9. I find it easy to talk about my limb loss in conversation ..... [1]		[2]	[3]	[4]	[ ]
10. I don't care if somebody notices that I am limping ..[1]		[2]	[3]	[4]	[ ]
11. A prosthesis interferes with the ability to do my work..... [.4]		[3]	[2]	[1]	[ ]
12. Having a prosthesis makes me more dependent on others than I would like to be .....[.4]		[3]	[2]	[1]	[ ]
13. Having a prosthesis limits the kind of work that I can do .....[.4]		[3]	[2]	[1]	[ ]
14. Being an amputee means that I can't do what I want to do.....[4]		[3]	[2]	[1]	[ ]
15. Having a prosthesis limits the amount of work that I can do.....[.4]		[3]	[2]	[1]	[ ]

The following questions are about activities you might do during a typical day. Does having a prosthesis limit you in these activities? If so, how much? Please tick the appropriate box.

	Yes, limited a lot	**Limited a little**	**No, not limited at all**
(a) Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.....	[2]	[1]	[0]
(b) climbing several flights of stairs	[2]	[1]	[0]
(c) running for a bus/taxi	[2]	[1]	[0]
(d) sport and recreation	[2]	[1]	[0]
(e) climbing one flight of stairs	[2]	[1]	[0]
(f) walking more than 1 kilometer.....	[2]	[1]	[0]
(g) walking half a kilometer.....	[2]	[1]	[0]
(h) walking 100 metres	[2]	[1]	[0]
(i) working on hobbies	[2]	[1]	[0]
(j) going to work.....	[2]	[1]	[0] [NA]

NA= Not Applicable

Please tick the box that represents the extent to which you are satisfied or dissatisfied with each of the different aspects of your prosthesis mentioned below:

	Not Satisfied	**Satisfied**	**Very Satisfied**
(i) Colour.	[1]	[2]	[3]
(ii) Shape	[1]	[2]	[3]
(iii) Appearance	[1]	[2]	[3]
(iv) Weight	[1]	[2]	[3]
(v) Usefulness	[1]	[2]	[3]
(vi) Reliability	[1]	[2]	[3]
(vii) Fit	[1]	[2]	[3]
(viii) Comfort	[1]	[2]	[3]

Please circle the number (0-10) that best describes how satisfied you are with your prosthesis?

0 1 2 3 4 5 6 7 8 9 10

Not at all Satisfied Very Satisfied

Part II

(For the following questions, please tick the appropriate boxes)

1. On average, how many hours a day do you wear your prosthesis? ___ _____ hours

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

Very Poor [1] Poor [2] Fair [3] Good [4] Very Good [5]

3. In general, would you say your physical capabilities are:

Very Poor [1] Poor [2] Fair [3] Good [4] Very Good [5]

4. **(a)** Do you experience stump pain (pain in the remaining part of your amputated limb)? No [0] .... (If no, go to question 5)

Yes [1] .... (If yes, answer part (b), (c), (d) and (e))

(b) During the last week, how many times have you experienced stump pain? _____

(c) How long, on average, did each episode of pain last? _____

(d) Please indicate, the average level of stump pain experienced during the last week on the scale below by ticking the appropriate box:

Excruciating	Horrible	Distressing	Discomforting	Mild
[5]	[4]	[3]	[2]	[1]

(e) How much did stump pain interfere with your normal lifestyle (e.g., work, social and family activities) during the last week?

A Lot	Quite a Bit	Moderately	A Little Bit	Not at All
[5]	[4]	[3]	[2]	[1]

5. (a) Do you experience phantom limb pain (pain in the part of the limb which was amputated)?

No [0] .... (If no, go to question 6)

Yes [1] .... (If yes, answer part (b), (c), (d), and (e))

(b) During the last week, how many times have you experienced phantom limb pain? _____

(c) How long, on average, did each episode of pain last? _____

(d) Please indicate the average level of phantom limb pain experienced during the last week on the scale below by ticking the appropriate box:

Excruciating	Horrible	Distressing	Discomforting	Mild
[5]	[4]	[3]	[2]	[1]

(e) How much did phantom limb pain interfere with your normal lifestyle (e.g., work, social and family activities) during the last week?

A Lot	Quite a Bit	Moderately	A Little Bit	Not at All
[5]	[4]	[3]	[2]	[1]

6. (a) Do you experience any other medical problems apart from stump pain or phantom limb pain?

No [0]

Yes [1] (If yes, answer part (b), (c), (d), (e), (f) and (g))

(b) Please specify what problems you experience _____

(c) During the last week, how many times have you suffered from these medical problems? _____

(d) How long, on average, did each problem last? _____

(e) Please indicate the level of pain experienced as a result of these problems during the last week on the scale below by ticking the appropriate box:

Excruciating	Horrible	Distressing	Discomforting	Mild
[5]	[4]	[3]	[2]	[1]

(f) How much did these medical problems interfere with your normal lifestyle (e.g., work, social and family activities) during the last week?

A Lot	Quite a Bit	Moderately	A Little Bit	Not at All
[5]	[4]	[3]	[2]	[1]

(g) Do you experience any other pain that you have not previously mentioned?

No [0]
Yes [1]
If yes, please specify _____

Additional questions for service users

1. How far is the prosthetics service facility from where you live? _____ Kilometres

2. Select the type of transport you normally use to go to the prosthetics service facility.

Free government transport [ ] taxi [ ] public buses [ ] own private care [ ]

On foot [ ] Other _____

3. How do you find the cost of transport to and from prosthetics facility?

Cheap [ ] Expensive [ ] Very Expensive [ ]

4. Did you receive training on how to use your lower limb prosthesis?

Yes [ ] No [ ]

4 (a) If yes, how long did the training last?

_____hours

_____ days

_____week/s

(b) Was the training sufficient?

A Lot	Quite a Bit	Moderately	A Little Bit	Not at All
[5]	[4]	[3]	[2]	[1]

5. Have you ever taken your prosthetic leg for repair & maintenance?

Yes [ ] No [ ]

5(a) If yes, how satisfied are you with the repair and maintenance services that you received?

A Lot	Quite a Bit	Moderately	A Little Bit	Not at All
[5]	[4]	[3]	[2]	[1]

6. How satisfied are you with accessibility to the prosthetics service facility?

A Lot	Quite a Bit	Moderately	A Little Bit	Not at All
[5]	[4]	[3]	[2]	[1]

7. To what extend have service providers involved you in the prosthetics assessment, treatment plan and goal setting?

A Lot	Quite a Bit	Moderately	A Little Bit	Not at All
[5]	[4]	[3]	[2]	[1]

7 (a) How satisfied are you with the assessment, treatment plan and goal setting?

A Lot	Quite a Bit	Moderately	A Little Bit	Not at All
[5]	[4]	[3]	[2]	[1]

8. Who usually makes the final decision about the acceptability of the fit and function of the prosthetic leg?

Yourself [ ] family member/caregiver [ ] Service manager [ ] service provider [ ]

9. To what extent did service providers enquire from you about the usefulness of the prosthetic limb in your life?

A Lot	Quite a Bit	Moderately	A Little Bit	Not at All
[5]	[4]	[3]	[2]	[1]

10. Does the prosthesis, help you do what you need to do every day?

A Lot	Quite a Bit	Moderately	A Little Bit	Not at All
[5]	[4]	[3]	[2]	[1]

11. Which economic benefit, did the prosthetic leg help you with?

(a) Carrying out work activities [ ]

(b) Running a business [ ]

(c) feeding oneself and other family members [ ]

(d) None [ ]

(e) Other _____

12. Before you finally received your prosthetic leg from the service facility (hospital), were you given any form to fill in, that safeguards your rights as a prosthesis user?

(a) Yes [ ]
(b) No [ ]
(c) Not sure [ ]
(d) I Don't know [ ]

Please check that you have answered all the questions.

Thank you for all your help.

Appendix 7: Cross-Sectional Quantitative Survey for LLP Managers and Providers, Quantitative Phase 2

Date: _____

Participant Number: _____

Name of Region:

Khomas (01)		Oshana (02)		Kavango (O3)	

Prosthetics Service Manager	
Rank:	
Years of Experience in Prosthetics	

Service Provider	
Medical Orthotist/Prosthetist	
Orthopaedic Technologist	
Years of Experience	

Who should complete the questionnaire?

The questionnaire should be completed by individual service managers and service providers for lower limb prosthetics.

1. How many prosthetics professionals are employed at this facility in the following categories? **(respondent = P&O Manager only)**

   (a) Medical Orthotist & Prosthetist (degree holder) _____

   (b) Orthopaedic Technologist (diploma holder) _____

   (c) Orthopaedic Assistant/Technician (Certificate Holder) _____

2. How many prosthetics professionals are ideally required for this facility in the following categories? **(respondent = P&O Manager only)**

   (a) Medical Orthotist & Prosthetist (degree holder) _____

   (b) Orthopaedic Technologist (diploma holder) _____

(c) Orthopaedic Assistant/Technician (Certificate Holder) _____

3. What is the usual annual budget amount allocated for prosthetics service provision? **(respondent = P&O Manager only)**

_____

3(a) Is the allocated amount sufficient for prosthetics service provision?

Yes ( ) No ( )

(b) If no, what is the ideal amount required for prosthetics service provision?

_____

4. What is the average lifespan of lower limb prosthetic limbs that you provide to service users?

Below Knee Prosthesis _____Years

Above Knee Prosthesis _____Years

Unknown, not documented ( )

5. On an average basis**,** how long is the training provided to lower limb prosthetics service users? For the following groups of users.

Below knee amputation **first time users** _____

Below knee amputation **old users (>5yrs of using)** _____

Above knee amputation **first time users** _____

Above knee amputation **old users (>5yrs of using)** _____

6. Is the government exempted from paying import tax, for components and materials used in the assembly and manufacturing of lower limb prosthetic limbs?

Yes, the gov. is exempted ( ) No ( ) I don't know ( )

7. Prosthetics professionals are known to be members of the multi-disciplinary rehabilitation team. How often do prosthetics professionals meet and discuss patient cases with the following professionals?

	Daily	**2-3** times a week	**Once** a week	**Once** a month	Occasionally	Rarely	Never
Physiotherapist							
Occupational Therapist							
Social Worker							
Nurse							
Medical Doctor							
Orthopaedic Surgeon							
Other, specify…….							

8. How often are strategic and annual plans for prosthetics services monitored & evaluated?
Question only applicable to service managers.

Every after 3 months ( ) Every after 6 months ( )

Once a year ( ) Don't know ( )

Other_____

9. What type of suspension systems are available for lower limb prosthetics at your facility? Tick, all possible options.

Cuffs, Straps & Belts suspension systems ( )

Pin & lock suspension ( )

Suction without a liner system ( )

Suction with a liner system ( )

Vacuum assisted suspension system ( )

Self-suspending sockets ( )

Other: Specify_____

10. What type of prosthetic knee units (for above knee prosthetics) are available at your facility? Tick, all possible options.

Manual locking knee units ( )

Single axis constant friction knee units ( )

Weight activated stance control knee units ( )

Polycentric knee units ( )

Hydraulic Knee units ( )

Pneumatic knee units ( )

Computerized/Programmable knees ( )

Other; Specify_____

11. What type of prosthetic feet are available at your facility? Tick, all possible options

Solid Ankle Cushion Heel (SACH) foot ( )

Dynamic – Response foot ( )

Flexible Keel Foot ( )

Multi-axis foot ( )

Microprocessor foot ( )

Other; Specify, _____

12. How often are lower limb prosthetic service users, followed-up at your facility?

Every after 3 months ( )

Every after 6 months ( )

Every after one year ( )

Other: specify, _____

Additional Questions for Service Managers & Service Providers

1. The Namibian government assumes a leading role in prosthetic service provision in the country

Yes [ ]

Never [ ]

Not so sure [ ]

2. Prosthetics services are monitored nationally and regionally in Namibia.

Yes [ ]
Never [ ]
Not so sure [ ]
Don't know [ ]

3. Prosthetics services is an integral part of universal health coverage in Namibia

Yes [ ]
No [ ]
Not so sure [ ]
Don't know [ ]

4. Prosthetics services is included in national health and social insurance systems in Namibia.

Yes [ ]
No [ ]
Not so sure [ ]
Don't know [ ]

5. Namibia has a national prosthetics database to identify need, and unmet need.

Yes [ ]
No [ ]
Not so sure [ ]
Don't know [ ]

6. At your facility, do you usually share your experience in lower limb prosthetics with either local or international stakeholders?

Yes, with local stakeholders only [ ]

Yes, with both local & international [ ]

No [ ]

Other. _____

If yes, how often do you share your experiences?

Weekly [ ] Monthly [ ] Quarterly [ ] Annually [ ] Occasionally [ ] Never [ ]

7. Does your facility, usually share any data and or research activities for lower limb prosthetics with either local or international stakeholders?

Yes, with local stakeholders only [ ]

Yes, with both local & international [ ]

Never [ ]

Other. _____

If yes, how often do you share data and research activities on lower limb prosthetics?

Weekly [ ] Monthly [ ] Quarterly [ ] Annually [ ] Occasionally [ ]

8. Based on your work experience, how would you rate the economic benefits of a lower limb prothesis, made at your facility, to the average user?

Please circle

0 1 2 3 4 5 6 7 8 9 10

Not Beneficial Highly Beneficial

9. At your facility, how often do you collect data on lower limb prosthetics service provision?

Weekly [ ] Monthly [ ] Quarterly [ ] Annually [ ] Occasionally [ ] Never [ ]

10. Do you usually carry out data analysis of the collected data?

Yes [ ]

Never [ ]

Not so sure [ ]

11. Do you usually share the collected data with the national level?

Yes [ ]

Never [ ]

Not so sure [ ]

12. How often do you share the collected data with national level?

Weekly [ ] Monthly [ ] Quarterly [ ] Annually [ ] Occasionally [ ] Never [ ]

13. Does your facility have any established strategies meant for prosthetics service awareness raise?

Yes [ ]

No [ ]

Not so sure [ ]

If yes, does your awareness raising strategies include (tick all relevant options).

Rights of service users [ ]

Social issues regarding service users (participation in various activities) [ ]

economic aspects [ ]

General prosthetics service provision [ ]

Other [ ] If other please explain _____

14. At your facility, do you follow international standards to classify lower limb prosthetics products?

Yes [ ]

No [ ]

Not so sure [ ]

Classification is usually not done [ ]

15. Components, materials, consumables, tools, machines, and other equipment used exclusively for fabrication of prosthetic products that are not available in Namibia are exempted from import duty and customs fees.

Yes [ ]

No [ ]

Not so sure [ ]

Don't know [ ]

16. At your facility, do you normally reuse any lower limb prosthetics components

Yes [ ]

No [ ]

If yes, is there any designated authority or group of experts with no conflict of interests that carries out proper quality control and documentation?

Yes [ ]

No [ ]

17. Is there any national regulatory system in Namibia, for the regulation of prosthetic products, components, and materials as part of the national health care regulatory system.

Yes [ ]

No [ ]

18. How much clinical and/or technical research in lower limb prosthetics is conducted at your facility?

Please circle

0 1 2 3 4 5 6 7 8 9 10

No research Multiple ongoing research projects

If research is conducted, are results shared (tick all options)

Locally [ ]

Nationally [ ]

Regionally [ ]

Globally [ ]

19. How would you rate the knowledge related to prosthetics, of other rehabilitation professionals working closely with your facility?

Please circle

0 1 2 3 4 5 6 7 8 9 10

Poor Highly Knowledgeable

20. In Namibia, prosthetics workforce planning considers all disciplines required for prosthetics service provision at all levels (national, tertiary, secondary, primary levels)?

Yes [ ]

No [ ]

Not sure [ ]

Don't Know [ ]

21. In Namibia, are prosthetics clinicians regulated by the state within regulations for health professionals?

Yes [ ]

No [ ]

Not sure [ ]

Don't Know [ ]

Other_____

22. At your facility, do Prosthetist/Orthotists take-up responsibility for services provided by associate and non-clinical personnel under their supervision?

Yes [ ]

No [ ]

Not sure [ ]

Don't Know [ ]

Other_____

23. At your facility, is there any existing policy that is meant to safeguard the rights of prosthetics service users and outlines the features of user-centred services?

Yes [ ]

No [ ]

Not sure [ ]

Don't Know [ ]

Other_____

24. At your facility, does prosthetics service planning, include plans for disaster preparedness as an integral part of the health sector response to lower limb prosthetic needs?

Yes [ ]

No [ ]

Not sure [ ]

Don't Know [ ]

Other_____

25. At your facility, do you foresee any possibility of integrating prosthetics service units into broader services for assistive products?

Yes [ ]

Never [ ]

Not sure [ ]

Don't Know [ ]

Other_____

26. At your facility, is there any safety measures in place for prosthetics service providers and service users which are safeguarded by well documented health and safety regulations?

Yes [ ]

No [ ]

Not sure [ ]

Don't Know [ ]

Other_____

27. At your facility, do prosthetics service providers usually train fellow health professionals in identifying and referring potential prosthetics service users?

Yes [ ]

No [ ]

Not sure [ ]

Don't Know [ ]

Other_____

If yes, how often do they conduct such trainings?

Weekly [ ] Monthly [ ] Quarterly [ ] Annually [ ] Occasionally [ ]

28. At your facility, is the delivery of lower limb prosthetics services based on the best available evidence and in adherence to local, national, and international standards and practice?

Please circle

0 1 2 3 4 5 6 7 8 9 10

Poor Highest Standard

29. At your facility, is the required quality of prosthetics products defined?

Please circle

0 1 2 3 4 5 6 7 8 9 10

Poor Well defined

30. At your facility, is the required quality of prosthetics products adhered to?

Please circle

0 1 2 3 4 5 6 7 8 9 10

Poor Well adhered to

31. Are service users in Namibia involved in lower limb prosthetic service policy development?

Please circle

0 1 2 3 4 5 6 7 8 9 10

Not at all They are driving policy

32. Service users have the final say in the components to be used in their lower limb prothesis

Please circle

0 1 2 3 4 5 6 7 8 9 10

Not at all Very much

Thank you for answering

Appendix 8: Service Manager Consent Form, Qualitative Phase 1

SERVICE MANAGER INFORMATION LEAFLET AND CONSENT FORM
(FOR QUALITATIVE PHASE 1)

TITLE OF RESEARCH PROJECT:	
An Exploration of Lower Limb Prosthetics Service Delivery in Namibia, In Comparison to Global Standards	
DETAILS OF PRINCIPAL INVESTIGATOR (PI):	
Name: Mr. Christopher Mubita Likando	**Ethics reference number: S20/04/090 (PhD)**
Full postal address: P.O. Box 24990, Windhoek, Namibia	**PI Contact number: +264 814147080**

I would like to invite you 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 me any questions about any part of this project that you do not fully understand. It is very important that you are completely 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 decline to participate. In other words, you may choose to take part, or you may choose not to take part. Nothing bad will come of it if you say no: it will not affect you negatively in any way whatsoever. Refusal to participate will involve no penalty or loss of benefits or reduction in the level of care to which you are otherwise entitled. You are also free to withdraw from the study at any point, even if you do agree to take part initially.

The Health Research Ethics Committee at Stellenbosch University has approved this study**.** The study will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, the South African Guidelines for Good Clinical Practice (2006), the Medical Research Council (MRC) Ethical Guidelines for Research (2002), and the Department of Health Ethics in Health Research: Principles, Processes and Studies (2015).

What is this research study all about?

- The study will be conducted in Khomas and Oshana regions.
    - The number of participants in this study will be as follows.
        - For this qualitative phase, at most **16** persons who received lower limb prosthetics devices in the two regions, Khomas and Oshana.

- For the quantitative phase, at most **367** persons who received lower limb prosthetic devices in the two regions, Khomas and Oshana. To be conducted at a later stage.
- At least **1-2** Prosthetist/Orthotists and **4-5** Orthopaedic Technologists who are all regarded as service providers, will be sampled at each of the mentioned two sites
- One (**1**) service manager per region

- The study aims to explore the status of lower limb prosthetics service delivery in Namibia, with an idea of developing a framework that might guide how these services could be delivered in future for the benefit of all persons in need of lower limb prosthetics services.
- You will be interviewed individually, and the conversation will be recorded through audio equipment. All information obtained will be treated with strict confidentiality and only used for study purposes.
- No medicines of any form or medical devices will be used or tested in this study.

Why do we invite you to participate?

- You have been invited to participate because you are a manager of a prosthetics facility situated in the Khomas or Oshana region and you hold information on lower limb prosthetics services. Your participation is very much appreciated.

What will your responsibilities be?

- Your responsibility is to answer the questions that you are asked, based on your own experiences, knowledge and understanding. You are also free to ask questions.

Will the Interview be recorded?

- Yes, the interview will be recorded and used only for the purpose of this study.

Where will the interview take place?

- The interview will take place at your most convenient place which can be either at your workplace or home.

How long will it take?

- The interview will last somewhere between one (1) to two (2) hours.

What type of questions will be asked?

- Mostly open-ended questions which are related to lower limb prosthetics services/services for artificial legs in Namibia.

Will you benefit from taking part in this research?

- There are no immediate benefits for you. But this study is anticipated to be of benefit to service managers, service providers and users of lower limb prosthetics services in future.

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

- There are no physical risks involved.

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

- Taking part in this study is voluntary. If you do not take part, it will not have any negative consequences for you.

Who will have access to your medical records/Information?

- Your medical records will not be accessed during the study. The information collected will be treated as confidential. When used in a publication or thesis, your identity will remain anonymous. It is only me and my study supervisors who will have access to this information.

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

- No, you will not be paid to take part in the study, but your time and inconvenience will be covered for each study visit. There will be no costs involved for you if you do take part.
- Therefore, an amount of R50 will cover your time and inconvenience for each visit

Is there anything else that you should know or do?

- You can contact the principal investigator at (+264) 814147080 if you have any further queries or encounter any problems.
- You can phone the Health Research Ethics Committee at 021 938 9677/9819 if there still is something that your study investigator has not explained to you, or if you have a complaint.
- You will receive a copy of this information and consent form for your own records.

Declaration by participant

By signing below, I ……..……. agree to take part in a research study entitled *(insert title of study)*.

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 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 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 study investigator or 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*) ……...……. 2020.

....

Signature of participant **Signature of witness**

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 Afrikaans//Oshiwambo/Oshiherero/Rukavango or Other…….
- 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*) ……...…….2020

....

Signature of interpreter **Signature of witness**

Declaration by investigator

I *(name)* ……..…… 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 an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*

Signed at (*place*) .....…..…… on (*date*) ……...……. 2020.

....

Signature of investigator **Signature of witness**

Permission to have all anonymous data shared with journals:

Please carefully read the statements below (or have them read to you) and think about your choice. No matter what you decide, it will not affect whether you can be in the research study, or your routine health care

When this study is finished, we would like to publish results of the study in journals. Most journals require us to share your anonymous data with them before they publish the results. Therefore, we would like to obtain your permission to have your anonymous data shared with journals.

Permission for sharing samples and/or information with other investigators:

Please carefully read the statements below (or have them read to you) and think about your choice. No matter what you decide, it will not affect whether you can be in the research study, or your routine health care.

In order to do the research, we have discussed, we are not going to collect any blood/tissue/urine samples from you. We shall only collect health information related to lower limb prosthetics from professionals like yourself. No tests will be carried out. Once we have done the research that we are planning for this research project, we would like to store your information. Other investigators from all over the world can ask to use this information in future research, but this information for now will only be available in Namibia and South Africa and will be securely stored and only persons who are involved or responsible for this study will have access to it. To protect your privacy, we will replace your name with a unique study number. We will only use this code for information about you. We will do our best to keep the code private. It is however always possible that someone could find out about your name, but this is very unlikely to happen. Therefore, we would like to ask for your permission to share your information with other investigators.

Tick the Option you choose for anonymous data sharing with journals:

I agree to have my anonymous data shared with journals during publication of results of this study

☐ Signature_____

OR

I do not agree to have my anonymous data shared with journals during publication of results of this study

☐ Signature_____

Tick the Option you choose for sharing information with other investigators:

I do not want my information to be shared with other investigators

☐ Signature_____

OR

My information may be shared with other investigators for further analysis and future research in a field related to Rehabilitation Medicine/ Sciences and or Orthotics and Prosthetics.

☐ Signature_____

Appendix 9: Service Provider Consent Form, Qualitative Phase 1

SERVICE PROVIDER INFORMATION LEAFLET AND CONSENT FORM
(FOR QUALITATIVE PHASE 1)

TITLE OF RESEARCH PROJECT:	
An Exploration of Lower Limb Prosthetics Service Delivery in Namibia, In Comparison to Global Standards	
DETAILS OF PRINCIPAL INVESTIGATOR (PI):	
Name: Mr. Christopher Mubita Likando	**Ethics reference number: S20/04/090 (PhD)**
Full postal address: P.O. Box 24990, Windhoek, Namibia	**PI Contact number: +264 814147080**

I would like to invite you 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 me any questions about any part of this project that you do not fully understand. It is very important that you are completely 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 decline to participate. In other words, you may choose to take part, or you may choose not to take part. Nothing bad will come of it if you say no: it will not affect you negatively in any way whatsoever. Refusal to participate will involve no penalty or loss of benefits or reduction in the level of care to which you are otherwise entitled. You are also free to withdraw from the study at any point, even if you do agree to take part initially.

The Health Research Ethics Committee at Stellenbosch University has approved this study**.** The study will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, the South African Guidelines for Good Clinical Practice (2006), the Medical Research Council (MRC) Ethical Guidelines for Research (2002), and the Department of Health Ethics in Health Research: Principles, Processes and Studies (2015).

What is this research study all about?

- The study will be conducted in Khomas and Oshana regions.
    - The number of participants in this study will be as follows.
        - For the qualitative phase, at most **16** persons who received lower limb prosthetics devices in the two regions, Khomas and Oshana

- For the quantitative phase, at most **367** persons who received lower limb prosthetic devices in the two regions, Khomas and Oshana. To be conducted at a later stage.
- At least **1-2** Prosthetist/Orthotists and **4-5** Orthopaedic Technologists who are all regarded as service providers, will be sampled at each of the mentioned two sites
- One (**1**) service manager per region

- The study aims to explore the status of lower limb prosthetics service delivery in Namibia, with an idea of developing a framework that might guide how these services could be delivered in future for the benefit of all persons in need of lower limb prosthetics services.
- You will be interviewed individually, and the conversation will be recorded through audio equipment. All information obtained will be treated with strict confidentiality and only used for study purposes.
- No medicines of any form or medical devices will be used or tested in this study.

Why do we invite you to participate?

- You have been invited to participate because you are a prosthetics service provider at a prosthetics facility in the Khomas or Oshana region and you hold information on lower limb prosthetics services. Your participation is very much appreciated.

What will your responsibilities be?

- Your responsibility is to answer the questions that you are asked, based on your own experiences, knowledge and understanding. You are also free to ask questions.

Will the Interview be recorded?

- Yes, the interview will be recorded and used only for the purpose of this study.

Where will the interview take place?

- The interview will take place at your most convenient place which can be either at your workplace or home.

How long will it take?

- The interview will last somewhere between one (1) to two (2) hours.

What type of questions will be asked?

- Mostly open-ended questions which are related to lower limb prosthetics services/services for artificial legs that are provided to patients in Namibia.

Will you benefit from taking part in this research?

- There are no immediate benefits for you. But this study is anticipated to be of benefit to service managers, service providers and users of lower limb prosthetics services in future.

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

- There are no physical risks involved.

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

- Taking part in this study is voluntary. If you do not take part, it will not have any negative consequences for you.

Who will have access to your medical records/Information?

- Your medical records will not be accessed during the study. The information collected will be treated as confidential. When used in a publication or thesis, your identity will remain anonymous. Only I and my study supervisors will have access to this information.

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

- No, you will not be paid to take part in the study, but your time and inconvenience will be covered for each study visit. There will be no costs involved for you if you do take part.
- Therefore, an amount of R50 will cover your time and inconvenience for each visit

Is there anything else that you should know or do?

- You can contact the principal investigator at (+264) 814147080 if you have any further queries or encounter any problems.
- You can phone the Health Research Ethics Committee at 021 938 9677/9819 if there still is something that the investigator has not explained to you, or if you have a complaint.
- You will receive a copy of this information and consent form for your own records

Declaration by participant

By signing below, I ……..……. agree to take part in a research study entitled *(insert title of study)*.

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 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 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 study investigator or 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*) ……...……. 2020.

....

Signature of participant **Signature of witness**

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 Afrikaans//Oshiwambo/Oshiherero/Rukavango or Other…….
- 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*) ……...…….2020

....

Signature of interpreter **Signature of witness**

Declaration by investigator

I *(name)* …… 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 an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*

Signed at (*place*) .....…..…… on (*date*) ……...……. 2020.

....

Signature of investigator **Signature of witness**

Permission to have all anonymous data shared with journals:

Please carefully read the statements below (or have them read to you) and think about your choice. No matter what you decide, it will not affect whether you can be in the research study, or your routine health care

When this study is finished, we would like to publish results of the study in journals. Most journals require us to share your anonymous data with them before they publish the results. Therefore, we would like to obtain your permission to have your anonymous data shared with journals.

Permission for sharing samples and/or information with other investigators:

Please carefully read the statements below (or have them read to you) and think about your choice. No matter what you decide, it will not affect whether you can be in the research study, or your routine health care.

In order to do the research, we have discussed, we are not going to collect any blood/tissue/urine samples from you. We shall only collect health information related to lower limb prosthetics from professionals like yourself. No tests will be carried out. Once we have done the research that we are planning for this research project, we would like to store your information. Other investigators from all over the world can ask to use this information in future research, but this information for now will only be available in Namibia and South Africa and will be securely stored and only persons who are involved or responsible for this study will have access to it. To protect your privacy, we will replace your name with a unique study number. We will only use this code for information about you. We will do our best to keep the code private. It is however always possible that someone could find out about your name, but this is very unlikely to happen. Therefore, we would like to ask for your permission to share your information with other investigators.

Tick the Option you choose for anonymous data sharing with journals:

I agree to have my anonymous data shared with journals during publication of results of this study

☐ Signature_____

OR

I do not agree to have my anonymous data shared with journals during publication of results of this study

☐ Signature_____

Tick the Option you choose for sharing information with other investigators:

I do not want my information to be shared with other investigators

☐ Signature_____

OR

My information may be shared with other investigators for further analysis and future research in a field related to Rehabilitation Medicine/ Sciences and or Orthotics and Prosthetics.

☐ Signature_____

Appendix 10: Service User Consent Form, Qualitative Phase 1

SERVICE USER INFORMATION LEAFLET AND CONSENT FORM

(FOR QUALITATIVE PHASE 1)

TITLE OF RESEARCH PROJECT:	
An Exploration of Lower Limb Prosthetics Service Delivery in Namibia, In Comparison to Global Standards	
DETAILS OF PRINCIPAL INVESTIGATOR (PI):	
Name: Mr. Christopher Mubita Likando	**Ethics reference number: S20/04/090 (PhD)**
Full postal address: P.O. Box 24990, Windhoek, Namibia	**PI Contact number:** **+264 814147080**

I would like to invite you 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 me any questions about any part of this project that you do not fully understand. It is very important that you are completely 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 decline to participate. In other words, you may choose to take part, or you may choose not to take part. Nothing bad will come of it if you say no: it will not affect you negatively in any way whatsoever. Refusal to participate will involve no penalty or loss of benefits or reduction in the level of care to which you are otherwise entitled. You are also free to withdraw from the study at any point, even if you do agree to take part initially.

The Health Research Ethics Committee at Stellenbosch University has approved this study**.** The study will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, the South African Guidelines for Good Clinical Practice (2006), the Medical Research Council (MRC) Ethical Guidelines for Research (2002), and the Department of Health Ethics in Health Research: Principles, Processes and Studies (2015).

What is this research study all about?

- The study will be conducted in Khomas and Oshana regions.
    - The number of participants in this study will be as follows;
        - For the qualitative phase, at most **16** persons who received lower limb prosthetics devices in the two regions, Khomas and Oshana.

- For the quantitative phase, at most **367** persons who received lower limb prosthetic devices in the two regions, Khomas and Oshana. To be conducted at a later stage.
- At least **1-2** Prosthetist/Orthotists and **4-5** Orthopaedic Technologists who are all regarded as service providers, will be sampled at each of the mentioned two sites
- One (**1**) service manager per region

- The study aims to explore the status of lower limb prosthetics service delivery in Namibia, with an idea of developing a framework that might guide how these services could be delivered in future for the benefit of all persons in need of lower limb artificial legs.
- You will be interviewed on your own and in private. The conversation will be recorded through audio equipment. All information obtained will be treated with strict confidentiality and only used for study purposes. An interpreter will assist in case of any language barrier between me and you.
- No medicines of any form or medical devices will be used or tested in this study.

Why do we invite you to participate?

- You have been invited to participate because you have received a lower limb artificial leg from the government prosthetics workshop in Khomas or Oshana region. Your participation is very much appreciated.

What will your responsibilities be?

- Your responsibility is to answer the questions that you are asked, based on your own experiences, knowledge and understanding. You are also free to ask questions.

Will the Interview be recorded?

- Yes, the interview will be recorded and used only for the purpose of this study.

Where will the interview take place?

- The interview will take place at your most convenient place which can be either at your work place or home.

How long will it take?

- The interview will last somewhere between one (1) to two (2) hours.

What type of questions will be asked?

- Mostly open-ended questions which are related to lower limb prosthetics services/services for artificial legs that are provided to patients in Namibia.

Will you benefit from taking part in this research?

- There are no immediate benefits for you. But this study is anticipated to be of benefit to service managers, service providers and users of lower limb prosthetics services in future.

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

- There are no physical risks involved. As a service user, you may experience negative emotions if you have been struggling to access services or use your artificial leg. If these occur, we can talk about it, you can take a short break if you wish. I can also refer you to an appropriate service provider if that is your wish.

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

- Taking part in this study is voluntary. If you do not take part, it will not have any negative consequences for you.

Who will have access to your medical records/Information?

- Your medical records will not be accessed during the study. The information collected will be treated as confidential. When used in a publication or thesis, your identity will remain anonymous. Only I and my supervisors will have access to this information.

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

- No, you will not be paid to take part in the study but your time and inconvenience costs will be covered for each study visit. There will be no costs involved for you, if you do take part.
- Therefore, an amount of R50 will cover you time and inconvenience for each visit.

Is there anything else that you should know or do?

- You can contact me at (+264) 814147080 if you have any further queries or encounter any problems.
- You can phone the Health Research Ethics Committee at 021 938 9677/9819 if there still is something that your study investigator has not explained to you, or if you have a complaint.
- You will receive a copy of this information and consent form for your own records.

Declaration by participant

By signing below, I ……..…… agree to take part in a research study entitled *(insert title of study)*.

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 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 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 study investigator or 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*) ……...……. 2020.

....

Signature of participant **Signature of witness**

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 Afrikaans//Oshiwambo/Oshiherero/Rukavango or Other…….
- 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*) ……...…….2020

....

Signature of interpreter **Signature of witness**

Declaration by investigator

I *(name)* ……..…… 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 an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*

Signed at (*place*) .....…..…… on (*date*) ……...……. 2020.

....

Signature of investigator **Signature of witness**

Permission to have all anonymous data shared with journals:

Please carefully read the statements below (or have them read to you) and think about your choice. No matter what you decide, it will not affect whether you can be in the research study, or your routine health care

When this study is finished, we would like to publish results of the study in journals. Most journals require us to share your anonymous data with them before they publish the results. Therefore, we would like to obtain your permission to have your anonymous data shared with journals.

Permission for sharing samples and/or information with other investigators:

Please carefully read the statements below (or have them read to you) and think about your choice. No matter what you decide, it will not affect whether you can be in the research study, or your routine health care.

In order to do the research, we have discussed, we are not going to collect any blood/tissue/urine samples from you. We shall only collect health information related to the lower limb artificial leg from persons with disabilities like yourself. No tests will be carried out. Once we have done the research that we are planning for this research project, we would like to store your information. Other investigators from all over the world can ask to use this information in future research, but this information for now will only be available in Namibia and South Africa and will be securely stored and only persons who are involved or responsible for this study will have access to it. To protect your privacy, we will replace your name with a unique study number. We will only use this code for information about you. We will do our best to keep the code private. It is however always possible that someone could find out about your name but this is very unlikely to happen. Therefore, we would like to ask for your permission to share your information with other investigators.

Tick the Option you choose for anonymous data sharing with journals:

I agree to have my anonymous data shared with journals during publication of results of this study

☐ Signature_____

OR

I do not agree to have my anonymous data shared with journals during publication of results of this study

☐ Signature_____

Tick the Option you choose for sharing information with other investigators:

I do not want my information to be shared with other investigators

☐ Signature_____

OR

My information may be shared with other investigators for further analysis and future research in a field related to Rehabilitation Medicine/ Sciences and or Orthotics and Prosthetics.

☐ Signature_____

Appendix 11: Service Manager & Provider Consent Form, Quantitative Phase 2

SERVICE MANAGER/PROVIDER INFORMATION LEAFLET AND CONSENT FORM

Quantitative Phase 2:

TITLE OF RESEARCH PROJECT:	
An Exploration of Lower Limb Prosthetics Service Delivery in Namibia, In Comparison to Global Standards	
DETAILS OF PRINCIPAL INVESTIGATOR (PI):	
Name: Mr. Christopher Mubita Likando	**Ethics reference number: S20/04/090 (PhD)**
Full postal address: P.O. Box 24990, Windhoek, Namibia	**PI Contact number:** **+264 811432544**

I would like to invite you 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 me any questions about any part of this project that you do not fully understand. It is very important that you are completely 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 decline to participate. In other words, you may choose to take part, or you may choose not to take part. Nothing bad will come of it if you say no: it will not affect you negatively in any way whatsoever. Refusal to participate will involve no penalty or loss of benefits or reduction in the level of care to which you are otherwise entitled. You are also free to withdraw from the study at any point, even if you do agree to take part initially.

The Health Research Ethics Committee at Stellenbosch University has approved this study**.** The study will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, the South African Guidelines for Good Clinical Practice (2006), the Medical Research Council (MRC) Ethical Guidelines for Research (2002), and the Department of Health Ethics in Health Research: Principles, Processes and Studies (2015).

What is this research study all about?

- The study will be conducted in Khomas and Oshana regions.
    - The number of participants in this study will be as follows.

- For the qualitative phase, at most **16** persons who received lower limb prosthetics devices in the two regions, Khomas and Oshana
- For the quantitative phase, at most **367** persons who received lower limb prosthetic devices in the two regions, Khomas and Oshana. To be conducted at a later stage.
- At least **1-2** Prosthetist/Orthotists and **4-5** Orthopaedic Technologists who are all regarded as service providers, will be sampled at each of the mentioned two sites
- One (**1**) service manager per region

- The study aims to explore the status of lower limb prosthetics service delivery in Namibia, with an idea of developing a framework that might guide how these services could be delivered in future for the benefit of all persons in need of lower limb prosthetics services.
- You will be interviewed individually, and the conversation will be recorded through audio equipment. All information obtained will be treated with strict confidentiality and only used for study purposes.
- No medicines of any form or medical devices will be used or tested in this study.

Why do we invite you to participate?

- You have been invited to participate because you are a prosthetics service provider at a prosthetics facility in the Khomas or Oshana region and you hold information on lower limb prosthetics services. Your participation is very much appreciated.

What will your responsibilities be?

- Your responsibility is to answer the questions that you are asked, based on your own experiences, knowledge and understanding. You are also free to ask questions.

Will the Interview be recorded?

- It is a survey and will not be recorded. Information will be filled out on a form.

Where will the interview take place?

- The interview will take place at your most convenient place which can be either at your workplace or home.

How long will it take?

- The interview will last somewhere between 15 to 20 minutes to fill/complete.

What type of questions will be asked?

- Mostly close-ended questions with options to choose from. All questions are related to lower limb prosthetics services/services for artificial legs that are provided to patients in Namibia.

Will you benefit from taking part in this research?

- There are no immediate benefits for you. But this study is anticipated to be of benefit to service managers, service providers and users of lower limb prosthetics services in future.

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

- There are no physical risks involved.

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

- Taking part in this study is voluntary. If you do not take part, it will not have any negative consequences for you.

Who will have access to your medical records/Information?

- Your medical records will not be accessed during the study. The information collected will be treated as confidential. When used in a publication or thesis, your identity will remain anonymous. Only I and my study supervisors will have access to this information.

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

- No, you will not be paid to take part in the study, but your time and inconvenience will be covered for each study visit. There will be no costs involved for you if you do take part.
- Therefore, an amount of R50 will cover your time and inconvenience for each visit

Is there anything else that you should know or do?

- You can contact the principal investigator at (+264) 811432544 if you have any further queries or encounter any problems.
- You can phone the Health Research Ethics Committee at 021 938 9677/9819 if there still is something that the investigator has not explained to you, or if you have a complaint.
- You will receive a copy of this information and consent form for your own records

Declaration by participant

By signing below, I ……..……. agree to take part in a research study entitled *(An Exploration of Lower Limb Prosthetics Service Delivery in Namibia, in Comparison to Global Standards)*.

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 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 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 study investigator or 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*) ……..…… 2022.

....

Signature of participant **Signature of witness**

Declaration by investigator

I *(name)* …… 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 an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*

Signed at (*place*) .....…..…… on (*date*) ……..…… 2022.

....

Signature of investigator **Signature of witness**

Permission to have all anonymous data shared with journals:

Please carefully read the statements below (or have them read to you) and think about your choice. No matter what you decide, it will not affect whether you can be in the research study, or your routine health care

When this study is finished, we would like to publish results of the study in journals. Most journals require us to share your anonymous data with them before they publish the results. Therefore, we would like to obtain your permission to have your anonymous data shared with journals.

Permission for sharing samples and/or information with other investigators:

Please carefully read the statements below (or have them read to you) and think about your choice. No matter what you decide, it will not affect whether you can be in the research study, or your routine health care.

To do this research, we have discussed, we are not going to collect any blood/tissue/urine samples from you. We shall only collect health information related to lower limb prosthetics from professionals like yourself. No tests will be carried out. Once we have done the research that we are planning for this research project, we would like to store your information. Other investigators from all over the world can ask to use this information in future research, but this information for now will only be available in Namibia and South Africa and will be securely stored and only persons who are involved or responsible for this study will have access to it. To protect your privacy, we will replace your name with a unique study number. We will only use this code for information about you. We will do our best to keep the code private. It is however always possible that someone could find out about your name, but this is very unlikely to happen. Therefore, we would like to ask for your permission to share your information with other investigators.

Tick the Option you choose for anonymous data sharing with journals:

I agree to have my anonymous data shared with journals during publication of results of this study

☐ Signature_____

OR

I do not agree to have my anonymous data shared with journals during publication of results of this study

☐ Signature_____

Tick the Option you choose for sharing information with other investigators:

I do not want my information to be shared with other investigators

☐ Signature_____

OR

My information may be shared with other investigators for further analysis and future research in a field related to Rehabilitation Medicine/ Sciences and or Orthotics and Prosthetics.

☐ Signature_____

Appendix 12: Service User Consent Form, Quantitative Phase 2

SERVICE USER INFORMATION LEAFLET AND CONSENT FORM

Quantitative Phase 2:

TITLE OF RESEARCH PROJECT:	
An Exploration of Lower Limb Prosthetics Service Delivery in Namibia, In Comparison to Global Standards	
DETAILS OF PRINCIPAL INVESTIGATOR (PI):	
Name: Mr. Christopher Mubita Likando	**Ethics reference number: S20/04/090 (PhD)**
Full postal address: P.O. Box 24990, Windhoek, Namibia	**PI Contact number:** **+264 811432544**

I would like to invite you 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 me any questions about any part of this project that you do not fully understand. It is very important that you are completely 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 decline to participate. In other words, you may choose to take part, or you may choose not to take part. Nothing bad will come of it if you say no: it will not affect you negatively in any way whatsoever. Refusal to participate will involve no penalty or loss of benefits or reduction in the level of care to which you are otherwise entitled. You are also free to withdraw from the study at any point, even if you do agree to take part initially.

The Health Research Ethics Committee at Stellenbosch University has approved this study**.** The study will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, the South African Guidelines for Good Clinical Practice (2006), the Medical Research Council (MRC) Ethical Guidelines for Research (2002), and the Department of Health Ethics in Health Research: Principles, Processes and Studies (2015).

What is this research study all about?

- The study will be conducted in Khomas and Oshana regions.
    - The number of participants in this study will be as follows.
        - For the qualitative phase, at most **16** persons who received lower limb prosthetics devices in the two regions, Khomas and Oshana.

- For the quantitative phase, at most **367** persons who received lower limb prosthetic devices in the two regions, Khomas and Oshana. To be conducted at a later stage.
- At least **1-2** Prosthetist/Orthotists and **4-5** Orthopaedic Technologists who are all regarded as service providers, will be sampled at each of the mentioned two sites
- One (**1**) service manager per region

- The study aims to explore the status of lower limb prosthetics service delivery in Namibia, with an idea of developing a framework that might guide how these services could be delivered in future for the benefit of all persons in need of lower limb artificial legs.
- You will be interviewed on your own and in private. The conversation will be recorded through audio equipment. All information obtained will be treated with strict confidentiality and only used for study purposes. An interpreter will assist in case of any language barrier between me and you.
- No medicines of any form or medical devices will be used or tested in this study.

Why do we invite you to participate?

- You have been invited to participate because you have received a lower limb artificial leg from the government prosthetics workshop in Khomas or Oshana region. Your participation is very much appreciated.

What will your responsibilities be?

- Your responsibility is to answer the questions that you are asked, based on your own experiences, knowledge, and understanding. You are also free to ask questions.

Will the Interview be recorded?

- It is a survey and will not be recorded. Information will be filled out on a form.

Where will the interview take place?

- The interview will take place at your most convenient place which can be either at your workplace, home, or health facility.

How long will it take?

- The questionnaire will take 25 to 30 minutes to fill/complete.

What type of questions will be asked?

- Mostly close ended questions with options to choose from. All questions are related to lower limb prosthetics services/services for artificial legs that are provided to patients in Namibia.

Will you benefit from taking part in this research?

- There are no immediate benefits for you. But this study is anticipated to be of benefit to service managers, service providers and users of lower limb prosthetics services in future.

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

- There are no physical risks involved. As a service user, you may experience negative emotions if you have been struggling to access services or use your artificial leg. If these occur, we can talk about it, you can take a short break if you wish. I can also refer you to an appropriate service provider if that is your wish.

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

- Taking part in this study is voluntary. If you do not take part, it will not have any negative consequences for you.

Who will have access to your medical records/Information?

- Your medical records will not be accessed during the study. The information collected will be treated as confidential. When used in a publication or thesis, your identity will remain anonymous. Only I and my supervisors will have access to this information.

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

- No, you will not be paid to take part in the study, but your time and inconvenience costs will be covered for each study visit. There will be no costs involved for you if you do take part.
- Therefore, an amount of R50 will cover your time and inconvenience for each visit.

Is there anything else that you should know or do?

- You can contact me at (+264) 811432544 if you have any further queries or encounter any problems.
- You can phone the Health Research Ethics Committee at 021 938 9677/9819 if there still is something that your study investigator has not explained to you, or if you have a complaint.
- You will receive a copy of this information and consent form for your own records.

Declaration by participant

By signing below, I ……..……. agree to take part in a research study entitled *(An Exploration of Lower Limb Prosthetics Service Delivery in Namibia, in Comparison to Global Standards*.)

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 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 may choose to leave the study at any time and will not be penalized or prejudiced in any way.

- I may be asked to leave the study before it has finished if the study investigator or 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*) ……...…… 2022.

....

Signature of participant **Signature of witness**

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 Afrikaans//Oshiwambo/Oshiherero/Rukavango or Other……
- 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*) ……...…….2022

....

Signature of interpreter **Signature of witness**

Declaration by investigator

I *(name)* …… 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 understand all aspects of the research, as discussed above
- I did/did not use an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*

Signed at (*place*) .....…..…… on (*date*) ……...…… 2022.

....

Signature of investigator **Signature of witness**

Permission to have all anonymous data shared with journals:

Please carefully read the statements below (or have them read to you) and think about your choice. No matter what you decide, it will not affect whether you can be in the research study, or your routine health care

When this study is finished, we would like to publish results of the study in journals. Most journals require us to share your anonymous data with them before they publish the results. Therefore, we would like to obtain your permission to have your anonymous data shared with journals.

Permission for sharing samples and/or information with other investigators:

Please carefully read the statements below (or have them read to you) and think about your choice. No matter what you decide, it will not affect whether you can be in the research study, or your routine health care.

To do this research, we have discussed, we are not going to collect any blood/tissue/urine samples from you. We shall only collect health information related to the lower limb artificial leg from persons with disabilities like yourself. No tests will be carried out. Once we have done the research that we are planning for this research project, we would like to store your information. Other investigators from all over the world can ask to use this information in future research, but this information for now will only be available in Namibia and South Africa and will be securely stored and only persons who are involved or responsible for this study will have access to it. To protect your privacy, we will replace your name with a unique study number. We will only use this code for information about you. We will do our best to keep the code private. It is however always possible that someone could find out about your name, but this is very unlikely to happen. Therefore, we would like to ask for your permission to share your information with other investigators.

Tick the Option you choose for anonymous data sharing with journals:

I agree to have my anonymous data shared with journals during publication of results of this study

☐ Signature_____

OR

I do not agree to have my anonymous data shared with journals during publication of results of this study

☐ Signature_____

Tick the Option you choose for sharing information with other investigators:

I do not want my information to be shared with other investigators

☐ Signature_____

OR

My information may be shared with other investigators for further analysis and future research in a field related to Rehabilitation Medicine/ Sciences and or Orthotics and Prosthetics.

☐ Signature_____

Appendix 13: Stellenbosch Ethical Approval, Qualitative Phase

UNIVERSITEIT STELLENBOSCH UNIVERSITY

Approval Notice

New Application

17/12/2020

Project ID :14962

HREC Reference No: S20/04/090 (PhD)

Project Title: An Exploration of Lower Limb Prosthetics Service Delivery in Namibia, In Comparison to Global Standards

Dear Mr Christopher Likando

Your submission received on 15/10/2020 was reviewed and approved by members of **Health Research Ethics Committee** via **expedited** review procedures on 17/12/2020.

Please note the following information about your approved research protocol:

Protocol Approval Date: 17 December 2020

Protocol Expiry Date: 16 December 2021

Please remember to use your Project ID 14962 and Ethics Reference Number S20/04/090 (PhD) on any documents or correspondence with the HREC concerning your research protocol.

Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review

Translation of the informed consent document(s) to the language(s) applicable to your study participants should now be submitted to the HREC.

Please note you can submit your progress report through the online ethics application process, available at: Links Application Form Direct Link and the application should be submitted to the HREC before the year has expired. Please see *Forms and Instructions* on our HREC website (www.sun.ac.za/healthresearchethics) for guidance on how to submit a progress report.

The HREC will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

Please note that for studies involving the use of questionnaires, the final copy should be uploaded on Infonetica.

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility, permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Please consult the Western Cape Government website for access to the online Health Research Approval Process, see: https://www.westerncape.gov.za/general-publication/health-research-approval-process. Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.

For standard HREC forms and instructions, please visit: Forms and Instructions on our HREC website https://applyethics.sun.ac.za/ProjectView/Index/14962

If you have any questions or need further assistance, please contact the HREC office at 021 938 9677.

Yours sincerely,

Mrs. Melody Shana

Coordinator

HREC1

Appendix 14: Stellenbosch Ethical Approval, Quantitative Phase

UNIVERSITEIT
STELLENBOSCH
UNIVERSITY

Approval Letter
Amendment

25/11/2021

Project ID: 14962

Ethics Reference No: S20/04/090 (PhD)

Project Title: An Exploration of Lower Limb Prosthetics Service Delivery in Namibia, in Comparison to Global Standards

Dear Mr CM Likando

We refer to your amendment request received 04/11/2021.

The Health Research Ethics Committee (HREC) reviewed and **approved** the amendment as well as the following amended documentation through an expedited review process:

1. 3Phas2, Likando, ICF Service User. Final version dated 03/11/2021.
2. 4Phas2, Likando, ICF SM&SF. Final version dated 03/11/2021.
3. 1Phas2, Likando, TAPES for S-users. Final version dated 03/11/2021.
4. 2Phas2, Likando, SM & SP Questionnaire. Final version dated 03/11/2021.

Where to submit any documentation

Kindly note that the HREC uses an electronic ethics review management system, *Infonetica*, to manage ethics applications and ethics review process. To submit any documentation to HREC, please click on the following link: https://applyethics.sun.ac.za.

Please remember to use your project ID 14962 and ethics reference number S20/04/090 (PhD) on any documents or correspondence with the HREC concerning your research protocol.

Yours sincerely,

Melody E Shana
Coordinator: Health Research Ethics Committee 1

National Health Research Ethics Council (NHREC) Registration Number:

REC-130408-012 (HREC1)·REC-230208-010 (HREC2)

Federal Wide Assurance Number: 00001372
Office of Human Research Protections (OHRP) Institutional Review Board (IRB) Number:
IRB0005240 (HREC1)·IRB0005239 (HREC2)

The Health Research Ethics Committee (HREC) complies with the SA National Health Act No. 61 of 2003 as it pertains to health research. The HREC abides by the ethical norms and principles for research, established by the World Medical Association (2013). Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects,the South

Appendix 15: Ministry of Health and Social Services Ethical Approval

REPUBLIC OF NAMIBIA

Ministry of Health and Social Services

Private Bag 13198
Windhoek
Namibia

Ministerial Building
Harvey Street
Windhoek

Tel: 061 – 203 2507
Fax: 061 – 222558
E-mail: itashipu87@gmail.com

OFFICE OF THE EXECUTIVE DIRECTOR

Ref: 17/3/3 CML
Enquiries: Mr. A. Shipanga

Date: 22 June 2020

Mr. Christopher M. Likando
PO Box 24990
Windhoek
Namibia

Dear Mr. Likando

Re: An Exploration of lower limb prosthetics service delivery in Namibia, in comparison to global standards.

1. Reference is made to your application to conduct the above-mentioned study.

2. The proposal has been evaluated and found to have merit.

3. **Kindly be informed that permission to conduct the study has been granted under the following conditions:**

3.1 The data to be collected must only be used for academic purpose;

3.2 No other data should be collected other than the data stated in the proposal;

3.3 Stipulated ethical considerations in the protocol related to the protection of Human Subjects should be observed and adhered to, any violation thereof will lead to termination of the study at any stage;

3.4 A quarterly report to be submitted to the Ministry's Research Unit;

3.5 Preliminary findings to be submitted upon completion of the study;

3.6 Final report to be submitted upon completion of the study;

3.7 Separate permission should be sought from the Ministry for the publication of the findings.

4. All the cost implications that will result from this study will be the responsibility of the applicant and **not** of the MoHSS.

Yours sincerely,

BEN NANGOMBE
EXECUTIVE DIRECTOR

Appendix 16: Research Permission Letter, Oshana Region

REPUBLIC OF NAMIBIA

MINISTRY OF HEALTH AND SOCIAL SERVICES

OSHANA REGIONAL HEALTH DIRECTORATE

Oshana Region
Private Bag 5538
Oshakati
Namibia

TEL: 065 – 223 3119
FAX: 065 – 220 303
Email:ashipanga1@gmail.com

Enquires: Mr. A K Shipanga

Date: 07 May 2021

MR CHRISTOPHER M LIKANDO
CHIEF ORTHOTIST PROSTHETIST
WCH-OTS
WINDHOEK

SUBJECT: PERMISSION TO CONDUCT RESEARCH INTERVIEWS IN OSHANA REGION AT MULTI-REGIONAL ORTHOPAEDIC TECHNICAL SERVICES (MROTS)

Reference is made to your letter dated 22 April 2021.

Oshana Regional Health Directorate has granted you permission to conduct your PHD Research interviews with the mentioned Medical Orthotics and Prosthetics (MOP) professionals and patients, provided that ethics are complied to and all information shall be used for study purposes only.

Wish you all the best in your study.

MINISTRY OF HEALTH AND SOCIAL SERVICES
PRIVATE BAG 5538, OSHAKATI
07 MAY 2021
REGIONAL DIRECTOR
OSHANA REGION
REPUBLIC OF NAMIBIA

MRS JA HAIMENE
REGIONAL HEALTH DIRECTOR

Appendix 17: Research Permission Letter, Kavango East Region

REPUBLIC OF NAMIBIA

MINISTRY OF HEALTH AND SOCIAL SERVICES

RMT Kavango
Kavango East Region
RUNDU

Private Bag 2094
Rundu
Namibia

Tel: 066-265500 Ext: 551
Fax: 066-255037

Enq: Mr. Mpande

30 March 2021

OFFICE OF THE REGIONAL DIRECTOR

To: Mr. C.M. Likando
Windhoek Central Hospital

RE: PERMISSION TO CONDUCT PHD RESEARCH

This letter serves to inform you that your letter which was received on 17 March 2021 requesting permission to conduct a study research in our centre, in areas of lower limbs Prosthetics Services delivery in Kavango East Health Directorate as well as conduct interview with the professional staff who are working in Orthopaedic and some clients using prosthetic limbs..

You are hereby be informed that your request for research has been granted long as the information obtained is to be used for study purposes only.

We trust that your research and study will be fruitful.

Yours faithfully

MINISTRY OF HEALTH AND SOCIAL SERVICES
Kavango Regional Health Directorate
Regional Director
2021 -03- 30
Kavango Region
REPUBLIC OF NAMIBIA

Ms. Timea Ngwira
Regional Director