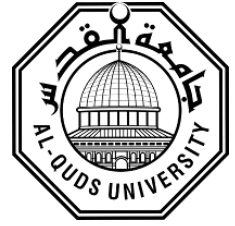


**Deanship of Graduate Studies
Al-Quds University**



Evaluation of Orthotic Services in the Gaza Strip

Saeda Mohammed Yaqub Albarawi

M. Sc. Thesis

Jerusalem – Palestine

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Prepared by
Saeda Mohammed Yaqub Albarawi

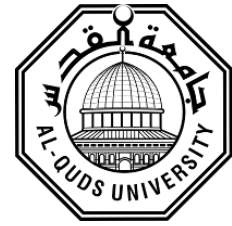
BSc of Physiotherapy–Islamic University of Gaza, Palestine

Supervisor: Dr. Bassam Abu Hamad
PhD, Associate Professor-School of Public Health - Al-Quds
University, Palestine

Thesis Submitted in Partial Fulfillment of Requirement for
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School of Public Health – Al-Quds University

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Al-Quds University
Deanship of Graduate Studies
School of Public Health



Thesis Approval

Evaluation of Orthotic Services in the Gaza Strip

Prepared by: Saeda Mohammed Yaqub Albarawi
Registration No: 21710738

Supervisor: Dr. Bassam Abu-Hamad

Master thesis submitted and accepted Date: 21/8/2021

The names of signatures of the examining committee members are as follows:

1. Head of committee: Dr. Bassam Abu Hamad

Signature

2. Internal examiner: Prof. Dr. Yehia Abed

Signature

3. External examiner: Dr. Tahani Mousa

Signature

Jerusalem – Palestine

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Dedication

To the souls of my MoM & Dad who drive me to this level. My Mum, you were always there for me, even after your death, your prayers and support have continued as if you were alive, I can always hear your voice.

To my husband who has been supporting me throughout all of my studies.

To my heart, my 5 kids (Dan, Dina, Abdullah, Ahmed & Adam), hope one day you make your own PhD report.

To my sisters and brothers who were patient to tolerate my absence from family gatherings due to my busy schedule of work and study.

To all my friends and colleagues who prayed for me and were trusting my abilities to ~~de~~ carry out this job.

To all who will read and will be benefitted from this study.

Saeda Mohammed Yaqub Albarawi

Declaration

I certify that this thesis is submitted for the degree of master is a result of my own work research, except where otherwise acknowledged and neither this thesis nor any of its parts had been submitted for a higher degree to any other University or institution.

Signed

Saeda Mohammed Yaqub Albarawi



Date: 21/8/2021

Acknowledgement

Without Allah's care, I would not have completed this study, الحمد لله رب العالمين

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Abstract

Background

Access to orthotic services is very important for people with disabilities to achieve mobility, independence and to fulfil human rights. The purpose of this study is to evaluate orthotic services provided at the Artificial Limb & Polio Center and Hamad Hospital in Gaza.

Methodology

A cross-sectional study was conducted using quantitative & qualitative methods including surveying 262 participants, and checking their records complemented with a facility checklist and 8 key informant interviews with service providers and policy makers, and 5 focus group discussions with beneficiaries and service providers. Data collection took place in July through August 2020 and was conducted by the researcher herself and a physiotherapist with a response rate 85.1%. Data entry model was designed for quantitative data using the Statistical Package for Social Sciences version 25 program for data entry and analysis and open coding thematic analysis was used to analyze the qualitative stuff.

Findings

Most of users of the orthotic services were children (83.1%), one third presented with foot problems, followed by Genu Varum/Valgum (19.5%) and cerebral palsy (13.7%). The main reason of disability they are encountered is idiopathic or congenital (71.3%), and they are provided mainly with a ready-made device (70%).

The mean satisfaction score about the services they received in general was 3.73/5 which is higher than the satisfaction about device itself (3.2/5). Among participants, 33.8% didn't show compliance in using their devices, with the highest reported mean score about device was durability (3.83/5), and the lowest mean satisfaction score was about the affordability domain (2.14/5). Regarding quality of life, only 11% elicited a score above 70%. There were no statistically significant variations in satisfaction among the participants in relation to demographic characteristics (gender, age, area of residence), as well as with regard to the number of orthosis received.

Only few files (7.6%) included orthotic assessment form, and only (17.6%) included progress notes. Although, 90.1% of referrals showed clear documentation of the request of devices; still records are lacking information and history of patients

Both facilities are properly equipped, had adequate stock of materials and tools required for the production of orthotics, and they produce wide range of orthotic devices that are relevant to population's needs. However, caveats include inadequate motivation, and lack of satisfaction about working status, salaries, recognition, and poor working conditions.

Conclusions

Orthotic services need further integration into the routine package of health services. Also, it is important to standardize orthotic service through development of guidelines and protocols and increasing coordination and continuity of care in service provision.

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List of Abbreviations

AFO	Ankle Foot Orthosis
ALPC	Artificial Limbs and Polio Center
CDC	Center of Disease and Control
CRPD	Convention on the Rights of Persons with Disabilities
DDH	Developmental Dislocation Hip
FGDs	Focused Group Discussions
FO	Foot Orthosis
GMR	Gaza March of Return
GVR/GVL	Genu Varum/Genu Valgum
ICF	International Classification of Functioning, Disability and Health
ICRC	The International Committee of the Red Cross
INGO	International Non-Governmental Organization
ISPO	International Society for Prosthetics and Orthotics
ISO	International Organization for Standardization
KAFO	Knee Ankle Foot Orthosis
KIIs	Key Informant Interviews
MoG	Municipality of Gaza
MoSD	Ministry of Social Development
MoH	Ministry of Health
NGO	Non-Governmental Organization
OPUS	Orthotic Prosthetic User Survey
PA	Palestinian Authority
PCBS	Palestinian Central Bureau of Statistics
P&O	Prosthetist and Orthotist
PRU	Physical Rehabilitation Unit
PwD	Persons with Disabilities
QoL	Quality of Life
SDGs	Sustainable Developmental Goals
TLSO	Thoracic Lumbo Sacral Orthosis
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
USAID	United States Agency for International Development
WHO	World Health Organization
WHO	Wrist Hand Orthosis

Chapter One

Introduction

Orthotic services play an essential role in promoting the Quality of Life (QoL) among People with Disabilities (PWDs) (Edmonds & Sumpio, 2019). Being able to access the right orthotic services, immediately, and with appropriate support, is very important to patients (England, NHS, 2015). Unfortunately, this doesn't always happen, and people might wait long time for devices and accordingly develop secondary complications (ibid).

Using the narrow definition of disability (Washington Group), PWDs in the Gaza Strip totaled 48,140 in 2017; representing 2.6% of total population; with mobility disability the highest in both urban and camps with 1.3%, 1.6%, respectively (Palestinian Central Bureau of Statistics, 2018). According to the World Health Organization (WHO), globally, there is around only 1 in 10 people with mobility disability; in need has access to assistive products, including orthoses (WHO, 2017). The reasons behind that are due to the high cost, lack of awareness, lack of service availability, shortage of trained personnel, policy and financing (ibid). In the Gaza Strip, the situation is not clear and total numbers of people requiring orthotic therapy are difficult to estimate due to the unmet need almost certainly existing, and significant numbers of people who receive off-the shelf devices from the pharmacy and private orthotic providers (ICRC, 2018). Moreover, there is lack of available data on orthotic service provision in Gaza, as no studies were conducted in this regard.

1.1 Research Problem

Access to orthotic services is very important for PWDs to achieve mobility and independence, as well as, it is very important to enjoy their human rights as others in the community (Borg & et al., 2011).

PwDs, who need prosthetics/orthotics and related rehabilitation services in Gaza, represent 0.5% of the population as estimated globally (WHO, 2017). The estimate of 0.5% of the Gaza population (of around 2 million), would correspond to 10,000 people who require prosthetic and orthotic (P&O) services. At least 2 to 4 times more people attend services for orthotic treatment than for prosthetic treatment (ibid).

There is information gap, as almost nothing is known about orthotic services due to the lack of studies on this topic. Therefore, the need for this evaluation is particularly acute. This study attempts to tackle this vague area and to analyze its current status in the rehabilitation sector. The study explores the gaps and challenges in the provision of orthotic services in Gaza and to identify what works well and provide recommendations. This evaluation tries to answer unanswered questions about the status of orthotic services including structure, processes, outputs and outcomes.

1.2 Justification

As aforementioned, this is the first study of its kind that handles this topic in Gaza. It will be of value to the researcher herself as being involved in this field and having experience working with an international organization supporting the main provider, the Artificial Limbs and Polio Center (ALPC); since 2007. This research will hopefully provide clearer picture about the reality of orthotic services from different sources and different perspectives.

By searching the literature, it is evident that the literature to date have focused globally more on discrete components of an orthosis/prosthesis (e.g. a microprocessor controlled prosthetic knee joint) rather than the broader service provided by orthotist/prosthetists (Clarke & et al., 2019).

The results of this study will hopefully provide insights for policy makers, donors, service providers thus formulate basis for better planning, better implementation, inform and guide decision making to the provision of effective orthotic services thus improving the QoL of PWDs. Therefore, this study might provide a framework for monitoring and evaluating the orthotic services locally and internationally, which will facilitate discussions on how it can be operationalized at the country level and how global partners can work together to support the implementation.

This study has the potential to be the baseline for people involved in the orthotic field. Hopefully, it will improve the system and will improve accessibility, quality, effectiveness, efficiency as well as the satisfaction and the quality of life of PWDs. It is expected that this study will also help the Ministry of Health (MoH), Ministry of Social Development (MoSD), both facilities, International Non-Governmental Organization (INGOs) and Non-

Governmental Organizations (NGOs) to better coordinate efforts and improve systems. In addition, it will be a ground stone for further studies and research.

The World Health Organization (WHO) recommends investing and conducting research in the field of prosthetics and orthotics to obtain better data and identify areas to improve and allow comparisons and meta-analysis studies (WHO, 2017). It also encourages to collect feedback from service users and caregivers through surveys covering all aspects of their experience and service provision which is an essential part of quality management (WHO, 2017). This will improve the device and service provided to users which will improve their quality of life.

Practitioners might benefit from this study to better respond to the feedback collected from users and caregivers to improve practice. While donors also should align their support based on the results.

1.3 Aim & Objectives

Aim

The overall aim of this thesis was to evaluate the orthotic services (structure, process and output/outcomes) in the Gaza Strip, with the view of identifying areas for improvements contributing to promoting orthotic services towards enhancing wellbeing among PWDs who need orthotic services.

Objectives

- To appraise the status of orthotic services (structure, processes and output/outcomes) in Gaza.
- To assess clients and providers perspectives about the provided orthotic services.
- To identify areas of strengths, weaknesses and challenges related to orthotic services provision in Gaza.
- To explore variations in services provided and perceptions about these services in reference to characteristic and disability related variables.
- To suggest recommendations for improving the quality of orthotic services.

1.4 Research Questions

1. What is the setup of the orthotic service in Gaza?
2. To what extent the inputs required for orthotic services are appropriately available?
3. What is the capacity of orthotic services in Gaza?
4. How is the orthotic services functioning?
5. What are the strengths, weaknesses and challenges related to orthotic services?
6. What are the access barriers that might limit PWDs access to orthotic services?
7. How do clients and service providers perceive the orthotic services in Gaza?
8. How much do the orthotic services contribute to the quality of clients' life and wellbeing?
9. Do orthotic services have an impact on the wellbeing and QoL of PWDs?
10. To what extent the orthotic service is sustainable?
11. What can be done to improve orthotic services delivery?

1.5 Study Context

The Gaza Strip is a narrow piece of land with a total area of 365 square kilometers with high population density; 5204 Person per Square km (PCBS, 2018). Its total population is 1,899,291 with around 48% of them are under 18 years with 3% illiterate (Palestinian Central Bureau of Statistics, 2018).

The population in Gaza is distributed by locality type into 86.6% of them living in urban areas, and 13.4% living in refugee camps and suffer economically with a 48.2% unemployment rate of the total economically active population aged 15 years and over (Palestinian Central Bureau of Statistics, 2018).

Gaza has experienced four major escalations (in 2008-9, 2010, 2012 & 2014) over the past decade, where civilians have overwhelmingly borne the brunt of the violence (ICRC, 2019). People are still living with long-term effects of these escalations, especially the 2014 conflict which was more protracted and resulted in more deceased and injured than those in the past. Besides that, the recent great March of Return (GMR) events, have also resulted in many people killed and many seriously injured, many of them remained with permanent disability (*United Nations, 2020*) and required orthotics and assistive devices. The international organizations have tried to support, but the real needs are beyond the

capacity of humanitarian organisations with severe structural and economic limitations due to the restrictions imposed on Gaza.

The continued restrictions of movements of people and goods imposed by Israel dramatically affect the daily lives of the majority of Gazans and have led to a de-development of Gaza (*UNRWA, 2019b*). This is in addition to the isolation of Gaza which has been deteriorated since the movement restrictions on Rafah border imposed by the Egyptian authorities, as well as by the internal Palestinian divide (*OCHA, 2019*). Gaza struggles with severe power shortages, meaning severe inconvenience and expensive alternatives in the form of generators and batteries that are beyond the means of most. The chronic power shortage has severely impacted the availability to essential services mainly health, water and sanitation (*OCHA, 2021*). Besides that, Gaza also suffer from lack of salaries for which has become a chronic problem (*UNCTAD, 2019*). Tens of thousands of employees across all sectors, including health, are affected.

The political division between Fatah (who controls the West Bank) and Hamas (who controls the Gaza Strip) complicates all aspects of Health and Physical Rehabilitation in Gaza (*OCHA, 2017*).

1.5.1 Health context

Governance

In Gaza, the de facto governing authority is responsible for the administrative governmental functions, including the administration of health services. However, public healthcare provision shared with Palestinian Authority (PA) continues to fund a significant proportion of public healthcare; and the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) provides a large proportion of primary healthcare, while non-governmental (NGOs) and private sector account for a significant proportion of secondary and tertiary healthcare provision (*WHO, 2018*). Through its 22-primary health centres, UNRWA provides health-care services to the vast majority of over 1.2 million Palestine refugees in Gaza (*UNRWA, 2019b*).

Finance

Almost 78% of Palestinians in the West Bank and the Gaza Strip are covered by some form of prepayment for healthcare and 41.8% of health financing comes from out-of-pocket payments with around 1% of the population have encountered catastrophic financial payments (WHO, 2018). This might be happened due to the chronic blockade placed on the Gaza Strip and the successive escalations, which have led to de-development of the health sector, with priority given to emergency humanitarian interventions over developmental efforts (WHO, 2018). Additionally to the mass casualties resulted from the GMR demonstrations in 2018 which has pushed the health system to collapse (WHO, 2018) and the socioeconomic indicators including healthcare to deteriorate (UN, 2018). It has also left the health sector lacking of adequate physical infrastructure and training opportunities, with facilities are overstretched, and service is frequently interrupted by power cuts, which further threaten the health of the population (UNRWA, 2019b). There is no financial data for orthotic services in Gaza exist in the literature, however, in 2017, 3,889,000 USD were spent on rehabilitation services out of 1,471,253.1 total health spending representing only 0.26% (PCBS and MOH, 2020).

Human Resources

Besides all of those mentioned issues, there is also a protection concerns of patients, health staff and facilities in Gaza with attacks placed on healthcare in the context of the GMR; where in only 2018, WHO recorded 369 attacks against healthcare which resulted in the killing of three health workers and 570 injuries among health staff, 41 of them were injuries with live ammunition (WHO, 2018). Besides that, psychological trauma, poverty and environmental degradation have had a negative impact on residents' physical and mental health; many, including children, suffer from anxiety, distress and depression (UNRWA, 2019a).

Outcomes

Palestine is experiencing a rapid epidemiological transition, with increasing burden of chronic diseases; of them heart diseases followed by cancer are the major diseases burden in the healthcare sector in both Gaza and West bank (Mosleh & et al., 2016). This is due to the remarkable change in lifestyles, nutritional behaviors and environmental conditions

that contribute to a substantial proportion of total mortality among Palestinian population (ibid). Adding to that, the restrictions imposed on movement makes the PWDs as others in Gaza, face more burden in accessing healthcare, specially services related to their disabilities designed to minimize and prevent further disabilities (Human Rights Watch, 2020).

1.5.2 Disability framework and situation

Palestine is one of more than 170 countries who have ratified the Convention on the Rights of Persons with Disabilities (CRPD) in 2014, obliging to ensure access for PWDs to high-quality affordable orthotic services (UN, 2015). Historically, a legal Palestinian framework (Palestinian Law NO.4, 1999) citing the rights of the PWDs based on equity principles came into force in the Palestinian territories; however, it has not been updated after ratifying the CRPD. The Ministry of Social Development, with support of UNICEF, is currently reviewing the 1999 Law No. 4 in order to align Palestinian legislation with the CRPD (Lee & et al., 2019).

There are many barriers facing PWDs in accessing services and realising their rights, including transport cost, inaccessible infrastructure, lack of awareness of services, stigma and discrimination, limited resources and funding, coordination as well as limited engagement and representation of PWDs. These barriers are exacerbated by the extreme poverty (Lee, H & et al, 2019). This is because the rehabilitation services are not systematically supported or paid by the PA in Gaza or the West Bank. As the PA takes responsibility for curative and preventative medicine only (with various international support), the rehabilitation, however, is variously provided by private companies, local NGO`s and INGO`s with local and international funding.

Ministry of Social Development (MoSD) is mandated by law to oversee the protection of PWDs, while other ministries (health, education, labour, etc.) are required to ensure the provision of relevant services (Articles 7 and 10 in the Disability Law). In Practice, MoSD pays pensions to people according to the percentage of disability and takes on an advocacy role with other ministries as per the key informant interview (KII) with head of disability file of MoSD. Lack of resources and of political will explains why rehabilitation services are offered by NGO`s and other non-state actors as per the consensus of the interviewed key informants. Despite the legislative framework for inclusion, the majority of PWDs

remains socially and economically excluded. It is clear, from the results of the interviews with the key informants, that the distinction of responsibilities, roles and guidelines for implementation is often unclear among various Palestinian ministries including the MoSD, Ministry of Education, Labour, Health and even the office of the President.

Children and adolescent girls with disabilities are more vulnerable, where some children suffer from particular risk, especially those who living in the rural areas are suffering less access to services because of the transportation costs. Bedouin children appear particularly more vulnerable due to access issues from their families to services, and due to the lack of awareness about disability rights and the needed care. Adolescent girls with disability are also at high risk of neglect and abuse. The restrictive and conservative norms of the Gaza community on girls limit their rights to education and health. Their disability places extreme stigma on them and often hidden even within the family (Jones & et al, 2016).

Away from the private sector, the orthotic services have been provided through the ALPC since 1976 and from Hamad Hospital since 2019. ALPC is a semi-governmental, nonprofit organization and it serves people from all governorates. Its mother organization is the municipality of Gaza (MoG) which is employing and managing the resources of the ALPC. The ALPC has been providing prosthetics, orthotics, wheelchair services, orthopedic shoes, diabetic shoes, physiotherapy services, Mental Health and Psychosocial Support Services (MHPSS), social inclusion activities and club foot management clinic as per observation and as the information collected from the facility checklist. Its main partner has been the International Committee of the Red Cross (ICRC) since 2007 supporting four domains: access, quality, sustainability and social inclusion (ICRC, 2019).

Hamad Hospital is an INGO, which is run by Qatar Fund for Development, was established as a rehabilitation hospital and has in-patient and out-patient departments. It has a Prosthetic & Orthotic unit which is connected with other services of the hospital such as physiotherapy, mental health, occupational therapy etc.

1.6 Operational Definitions

- Orthotics: The International Society for Prosthetics and Orthotics (ISPO) defines Orthotics as "a specialty within the field of health care technology concerned with the design, manufacture, and application of orthoses (braces)" (ISPO, 2020).
- Orthosis, /orthotic device: Externally applied device used to modify the structural and functional characteristics of the neuromuscular and skeletal systems. They are applied to the body to improve posture, function, and mobility or reduce pain (ISO, 1989). Functional orthoses apply mechanical forces on joint/s creating moments that reduce pressure, shearing or rate of translational forces that would normally be exerted in their absence. Sensory orthoses utilize the body's proprioceptive feedback from muscles and joints in order to harness primary postural correction mechanisms.
- Prefabricated/ready-made/off the shelf orthosis: such as certain ankle-foot, knee orthoses and many spinal and cervical orthoses are usually available in different sizes and can be selected according to clinical criteria and measures of the user's limb or trunk with many of them are designed for temporary, single use (WHO, 2017).
- The custom-made orthosis: the custom-made approach to orthotic therapy is based on the premise that by manufacturing foot orthoses with patient-specific design features and selected aspects of foot function can be modified in a therapeutically beneficial manner, including different shell materials, degrees of cast correction, shell modifications such as cut-outs, skives, grooves and apertures, and a range of covering materials (Menz & et al., 2017).

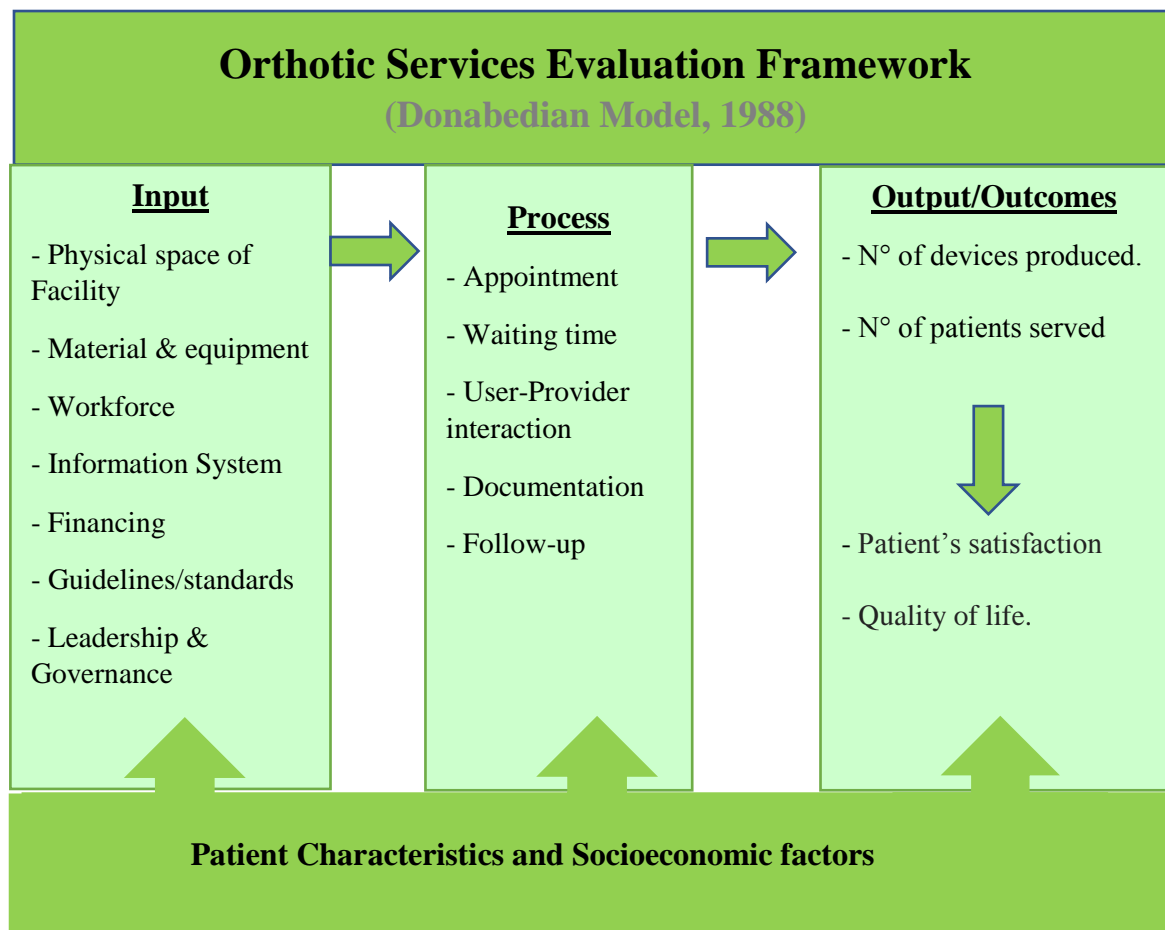
Chapter Two

Conceptual frame-work

The conceptual framework of the study is adopted from Donabedian quality of care framework linking structure, process and output/outcomes (*Donabedian, 1988*), using program evaluation theory and the six WHO building blocks framework, they are explained from 2.1 to 2.3.

The main domains of the study framework are the structure, process and output/outcomes that shows linear relations as well as interlocking relations. There are other factors besides the main domains which have influential effects.

(The study conceptual framework)



Self-developed based on the literature

2.1 Input/structure

Input/structure includes main requirements for proper performance of orthotic services.

Here the researcher focused more on the facilities level and the context in which care is delivered. These factors affect how providers and patients in a healthcare system act and are measures of the average quality of care within a facility or system. Structure is often easy to observe and measure. It may be the upstream cause of problems identified in process.

Input/structure includes physical space of facility, material and equipment, workforce information system, financing system, guidelines & standards, and leadership & governance.

2.1.1 Physical space of facilities

To explore the availability of facilities, their space for staff and users to interact. . To explore if accessibility is ensured including physical building and informational accessibility, if enough space is allocated for manufacturing workshop, fitting rooms, training areas, waiting areas, store space, accessible toilets& washrooms, and water. And to examine if privacy and confidentiality are ensured, the cleanness, and furniture. The facilities should be properly and appropriately equipped and provide safe environment for staff and users so that all processes are performed effectively and efficiently (WHO, 2017).

2.1.2 Material and Equipment

It is the availability of material and technologies. And if they are of accepted quality, safety, efficacy, and cost-effective use. As well as the order mechanism. Check availability of readymade/off the shelf devices. Check which technology is in use and if it is a cost effective one. Explore if a national list of priority orthotic products exists and if it is updated regularly. Equipment: If the equipment required for manufacture are available.

2.1.3 Workforce

Orthotic workforce: numbers, distributions, their qualifications, and if they are well paid, and if the profession is regulated by the state and if they are aligned for health professionals.

2.1.4 Information system

The researcher explored the availability of established database; If there is infrastructure in place (soft or hardware format), if it is valid, reliable, timely produced and if it is able to produce, analyze, disseminate and use information. Assess if there is standardized tools and instruments exist. Gather information on how many people require services, and what type and where they live.

2.1.5 Financing system

The researcher explored the financing mechanism, if it ensures sustainable orthotic services. Moreover, the researcher assessed if orthotic services are included in national health and social insurance systems or not. And if there is available financing system which raises adequate funds for orthotic services in ways that ensure people in need can use orthotic services well and if they are protected from financial catastrophe or impoverishment associated with having to pay for them.

2.1.6 Guidelines/standards

All steps in the delivery of orthotic services should be based on best available evidence and should adhere to local, national and international standards and practice. The researcher checked if there are available agreed guidelines, protocols, standards in place and if they are being implemented or not.

2.1.7 Leadership and Governance

The researcher explored who and how the orthotic services were governed. If governments have a leading role in development and coordination of orthotic service provision or not. The researcher explored if strategic policy frameworks exist and are combined with effective oversight, regulation, attention to system-design and accountability or not. Also, the researcher appraised if there is a body to regulate the orthotic services in Gaza and if there are monitoring and evaluation in place to monitor and evaluate the effectiveness, sustainability and quality of services.

2.2 Process

Process is the conversion actions that make up the healthcare, it shows how care is delivered, or interpersonal processes, which all encompass the manner in which care is delivered. According to Donabedian (1988), the measurement of process is nearly equivalent to the measurement of quality of care because process contains all acts of healthcare delivery.

Process include access, appointment system, waiting time, guidelines/protocols, user-provider interaction, records/documentation, and follow up.

2.2.1 Appointment system/Waiting Time

Appointment system ensures attendance and compliance to the planned appointment to ensure no patient is left behind. Appointment for assessment session, measurement session, fitting, training on use and delivery appointments.

Timely orthotic service provision is important to restore functioning and to prevent secondary deformities. Including time from registration to assessment, to first fitting, and to delivery. In addition to that is the waiting time during the visits, sessions in the facility, and the waiting lists which reflect the information required to measure this factor.

2.2.2 User-provider Interaction

It is the communication behavior between patients and providers. If the respect by provider is ensured, if providers introduce themselves to patients. if objectives are agreed together, if staff is committed to treatments and sessions. If dignity, confidentiality and privacy of patients are respected, as well as communication style, and awareness of roles of staff. If the staff provides proper information on management process, including instructions, advices, plans and pathway.

2.2.3 Records/Documentation

System for documentation to monitor progress and follow up patients, written and documented clearly in patient's files and check if records are kept for all appointments. Also, the researcher will assess if clinical records are kept secure. The researcher will check if there is communication system in place between the referrer and the orthotic provider.

2.2.4 Follow-up

Follow up is required at agreed intervals to review outcomes and ensure that there are no problems with the comfort, fit, function or durability of the orthosis. Follow-up improves outcomes and is an important part of service delivery. It will also include who does the follow up, the referrer or the provider etc.

2.3 Output/ Outcomes

Output and Outcomes are influenced by inputs and processes. Outcomes refer to the effects of orthotic services on the patient's satisfaction on both device and the services provided.

Here the subdomains are the number of the produced devices and the patients served, additionally to patients' satisfaction and quality of life.

Outputs

2.3.1 Number of devices

Number of devices produced in a specific period of time might reflect the capacity of the service.

2.3.2 Number of patients accessed and/or received orthotic devices

Number of people accessed and/ or benefited from orthotic services reflects the capacity of the system.

Outcomes

2.3.3 Patients' satisfaction

The researcher explored patient satisfaction of device and services, additionally to the feedback on device including the use, comfort, fit, function, cosmetic and durability of the device. The researcher also discovered patient experience with the services provided, whether they met their expectations or not including appointment, waiting, management pathway, staff interaction, responsiveness of the service and patient involvement.

2.3.4 Quality of life

According to WHO definition, the quality of life is "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (WHO, 2012).

The researcher assessed patient's feedback on the impact of the services on their QoL including their perspectives on their disability, health, how they feel in life, self-image/appearance, how they value themselves, and social relationships.

2.4 Influencing factors

2.4.1 Patients Characteristics

Other factors that might have an influence on the service provided are patients characteristics, which is referred to person related characteristics (including age, sex, area of residence and refugee status) and health-related characteristics including (diagnosis, medical and health condition, any associated illness, cause and complexity of disability and functional status).

2.4.2 Socioeconomic Status

Socioeconomic status is the social standing or class of an individual or group. It is often measured as a combination of education, income and occupation. It can affect opportunities for individuals to improve their health. This includes education level, wealth, income, occupation, poverty.

Chapter Three

Literature Review

Definition of Disability

3.1 Disability: Prevalence and Magnitude

About 15% of the world's population live with some form of disability, 2-4% of them experience significant difficulties in functioning (WHO & World Bank, 2011). As said, PwDs in Palestine constitute 2.1% of the total population; 48% in the West Bank and 52% in the Gaza Strip (PCBS Census, Population, Housing and Establishment Census, 2018). Moreover, about 85% of people with disabilities live in urban areas in the Gaza Strip. Among other types of disability, the mobility disability comprised the highest proportion of disabilities; 47,109 persons with mobility disabilities constituted 51% of the total persons with disabilities (PCBS, 2017b). As for the illiteracy rate in Gaza Strip, there was 29% illiterate among persons with disabilities aged 10 years and over, and about 43% of children with disabilities aged 6-17 years were not enrolled in education. As all population in Gaza, people with disabilities suffer from an unemployment, this is as indicated in the 2017 Census where the unemployment rate; among people with disabilities participating in labor force who are aged 15 years and over, reached about 54% in 2017 (PCBS, 2017b).

Disability is a global public health problem as PWD face widespread barriers in accessing health and related services, such as rehabilitation, and has worse health outcomes than people without disability (Rastogi, 2017). The International Classification of Functioning, Disability and Health (ICF) defines disability as an umbrella term for impairments, activity limitations and participation restrictions (ICF, 2001). It denotes the negative aspects of the interaction between an individual (with a health condition) and that individual's contextual factors, environmental and personal factors. ICF covers six functional domains (activities), namely, vision, hearing, mobility, cognition, self-care, and communication (ICF, 2001). While Disabled World (2019) defines mobility impairment as a category of disability that includes people with varying types of physical disabilities, which includes upper or lower limb loss or disability, manual dexterity and disability in co-ordination with different organs of the body that may be either congenital, or a result of injury, or other diseases/reasons. Persons with physical impairment/ disabilities often use assistive devices and/or mobility aids such as crutches, canes, wheelchairs and artificial limbs to obtain mobility. Besides, Center of Disease and Control (CDC), (2019) classifies types of

disabilities which affects persons to: Vision, Movement (Physical/mobility), Thinking, Remembering, Learning, Communicating, Hearing, Mental health and Social relationships.

Having a disability does not mean a person is not healthy or cannot be healthy. Getting and staying well can lead to full, active lives. That means to acquire the tools and information to make healthy choices and knowing how to prevent illness (CDC, 2019). Orthotics and assistive technology can help enhance functional independence and make daily life activities easier through the use of aids that help people travel, work, communicate, move, learn and participate in social life activities, thus promoting the QoL of persons with disabilities (Edmonds & Sumpio, 2019).

Regarding Laws and International Conventions, many documents have highlighted that disability is a human rights issue, such as the World Programme of Action Concerning Disabled People (1982), the Convention on the Rights of the Child (1989), and the Standard Rules on the Equalization of Opportunities for PWDs (1993). More than 40 nations adopted disability discrimination legislation during the 1990s. And the most recent is the CRPD which outlines the civil, cultural, political, social, and economic rights of persons with disabilities (WHO & World Bank, 2011). Palestine is one of more than 170 countries who have ratified the CRPD in 2014, obliging to ensure access for PWDs to high-quality affordable orthotic services (UN, 2015).

A legal framework Palestinian Law No.4 (1999) citing the rights of the PWDs based on equity principles came into force in the Palestinian territories; however, it hasn't been updated after ratifying the CRPD and few steps have been taken for its implementation. A legal conflict exists between legislation governing the rights of persons with disabilities with the civil service law. For instance, the civil service law states that people to work, should be free of sickness and disability. On the other hand, the disability law article number 10 states that "In the rehabilitation and occupational sphere: to compel government and non-government organizations to absorb a number of disabled individuals provided that the number is not less than 5% the number of staff in each organization. The absorption shall be consistent with the nature of work of these institutions, and the workplace shall be suitable for the employment of these individuals". Many debates and conflicts have been raised; therefore, the Ministry of Social Development, with support of UNICEF, is currently reviewing the 1999 Law No. 4 in order to align Palestinian legislation with the CRPD (Lee & et al., 2019).

3.2 Physical space of the facility

An orthotics and prosthetics unit should provide space for staff and patients for the design, manufacture, fitting, training in use, delivery, repair, adjustments, and should be appropriately equipped. Moreover, it allows safe environment for both patients and staff so that all processes are performed effectively and efficiently (WHO, 2017). Whereas, the design and layout, size, spaces of the orthotic and prosthetic workshop should be done carefully to suit the workload, types of services, needs (ICRC, 2015). This is confirmed with WHO standard N° 47 for the year (2017) which states that ‘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’. Having a well-organized and stocked orthotic area is of great benefits to the therapists, who make decisions for orthotic designs and construct the orthosis in timely manner (Coppard & Lohman, 2019).

Access is related to the timely use of services according to the need (Campbell & et al., 2000). Utilization of health services includes access to health care that has four dimensions: Availability, geographic accessibility, affordability and acceptability (O'Donnell , 2007). Access to orthotic services is very important for PWDs to achieve mobility and independence, as well as, it is very important to enjoy their human rights as others in the community (Borg & et al., 2011). Sustainable Development Goal (SDG) number 3 is to ensure good health and well-being for everyone. Orthotic services play an essential role in achieving this goal and other SDGs: escaping poverty and hunger, access to education and jobs, equal access to opportunities and services and participation in society on an equal basis. These services are a precondition for achieving those goals and rights for the PWDs (Borg & et al., 2011). Without access to orthoses, people who need them are often excluded, isolated and locked into poverty, which increases the burden of morbidity and disability (WHO, 2017).

Jacobs and his colleagues suggest that a combination of interventions is required to tackle specific access barriers, but their effectiveness can be influenced by contextual factors (Jacobs & et al., 2012). The study also necessitates to address demand-side and supply-side barriers concurrently. The WHO standard on prosthetic and orthotics N° 45 (2017) stresses on the need to establish prosthetic and orthotic services within or linked to health and rehabilitation facilities.

3.3 Material & Equipment

The International Society for Prosthetics and Orthotics (ISPO) defines Orthosis/orthotic device as externally applied device used to modify the structural and functional characteristics of the neuromuscular and skeletal systems (ISPO, 2020). Orthotics has an important effect in people's lives, it also saves money and avoids burden of disability (Hutton & Hurry, 2009). "Orthotics services" is an umbrella term for the combination of inputs, such as policy (financing), products (components and material), personnel, that required to deliver the appropriate prostheses, orthoses and related therapy (WHO, 2017). Considering types of orthosis, some orthoses are ready made ('off the shelf/prefabricated), but many are specifically made to the patient's individual needs and requirements. These are then 'custom made'. A prefabricated orthosis is a device which is pre-made and is subsequently customized to meet the specific needs of the client, and are often prescribed for short-term use (The Australian Orthotic Prosthetic Association, 2019). While a custom-made orthosis is a highly specialized device that is manufactured from a cast or mould of the individual client. It is not possible to be fitted to another person as it has been designed and manufactured to meet the specific needs of the individual (The Australian Orthotic Prosthetic Association, 2019). As these are health products, there should be product standards existed and regulated by the government, this is to ensure safe, effective and high-quality orthoses (WHO, 2014).

Establishment of a national list of priority orthotic products helps governments to fulfil their commitment to ensure access to high-quality assistive products at an affordable cost, as mandated by the CRPD. The list should also include the classification of orthoses based on the classification of the ISO that will ensure proper prescription practices (WHO, 2017). Orthotic service facilities must be properly equipped with cost effective, quality, reliable tools, machines and other equipment to ensure high quality. There should be regular maintenance of tools, machines and other equipment guarantees their proper functioning at all times. This is as stated in the standard number 48 of WHO, (2017) 'Prosthetics and orthotics service providers should define and adhere to a plan for equipment maintenance and replacement'.

3.4 Workforce

ISO 8549-1:1989 (ISO, 1989) defines orthotist as a "person, who having completed an approved course of education and training, is authorized by an appropriate national authority to design, measure and fit orthoses". There is a need to transform this profession

to respond to the expanding needs of PwDs and aging population, additionally to protect people and provide quality services. Therefore, the ISPO education committee (ISPO, 2018) has established an education's standards, 15 standards, to ensure that adequate training infrastructure/material, procedures are in place. It has classified the profession into three categories: Prosthetist/Orthotist, Associate Prosthetist/Orthotist, Prosthetic/Orthotic Technician defined as the following:

Prosthetist/Orthotist – A health care professional who uses evidence-based practice to provide clinical assessment, prescription, technical design, and fabrication of prosthetic and/or orthotic devices. Prosthetists/Orthotists work independently or as part of the health professional team. They set goals and establish rehabilitation plans that include prosthetic/orthotic services and clinical outcome measures. The profession aims at enabling service recipients, so that they could have equal opportunities to fully participate in society.

Associate Prosthetist/Orthotist – a health care professional who uses evidence-based practice to provide clinical assessment, technical design, fabrication of prosthetic/orthotic devices, and implement the clinical treatment plan. Associate Prosthetist/Orthotists work as part of the health care team under the supervision of the Prosthetist/Orthotist. They set goals for the use of prosthetic/orthotic devices and deliver services to achieve desired outcomes. This occupation aims at enabling service recipients, so that they could have equal opportunities to fully participate in society.

Prosthetic/Orthotic Technicians – Non-clinical service providers that support technical design of prosthetic/orthotic devices and are competent in the fabrication of prosthetic/orthotic devices. Prosthetic/Orthotic Technicians work as part of the health care team. This occupation aims at enabling service recipients, so that they could have equal opportunities to fully participate in society.

This is in consistent with WHO standards of Prosthetic and orthotics standard number 27 which states that 'Training in prosthetics and orthotics should be aligned with national and international educational standards', and standard number 28 'Training in prosthetics and orthotics should be available at various levels to fully meet national needs'. Other health and social care personnel also require knowledge of orthotics (WHO, 2017).

There is a limited number of locally trained prosthetists/orthotists in developing countries to be able to provide prosthetic and orthotic devices to all of the persons in need of services (Magnusson., 2014). Developed countries, also can face such challenges; for example, the situation in England is not too far as, historically, there has been a low number of applications to undergraduate places to study P&O, and there has been a reduction in the numbers of these applying and accepting offers to study P&O (NHS UK, 2017).

Countries should ensure the right number of orthotic professionals with the appropriate competencies at all health care levels; otherwise, access to this service will remain inadequate (WHO, 2017). An average country can be expected to require 5–10 prosthetics and orthotics clinicians per million population and each clinician should be supported by 2 non-clinicians according to WHO P&O standards (WHO, 2017).

3.5 Information System

Without information-based decisions, a mess will be the result of any system. A well-functioning information system is that which ensures the production, analysis, dissemination and use of reliable, valid and timely information on health determinants, health system performance and health status (WHO, 2007).

Government and relevant stakeholders and community must have access to reliable, timely data on how many people require services, the type of orthotic device and the unmet needs of orthotics; this helps to plan and monitor the service adequately (WHO, 2017).

Collecting patient-reported outcome data is required for monitoring and essential to improve conceptual the quality of services and should be as part of the routine patient's care (Heinemann & et al., 2016).

Standard number 13 of WHO standards of prosthetics and orthotics (2017) recommends that 'Data on prosthetics and orthotics service provision should be collected periodically, analyzed at service level and shared at national level'; whereas standard number 14 recommends that 'A national prosthetics and orthotics database should be established to identify total need, types of need and unmet need'.

3.6 Financing

Universal health coverage ensures that people can access all health services, including orthotics, without suffering from financial issues and there must be efforts in place to manage external funds for specific programmes in a way to ensure sustainable financing system for all in need (WHO, 2014). There are valuable benefits for the community when money is spent on orthotics like in UK, for every £1 spent on orthotics, the National Health System saves £4, also, around £220 million is spent on assistive technologies per year (UK NHS Orthotic Managers Group, 2019). Patients who receive orthotics services have less health care utilization, lower social benefits, and potentially fewer negative outcomes compared to patients who are not receiving these services (Dobson & et al, 2016). Hence, generally there is no agreed mechanism to relate changing in funding to the increased demand on orthotic services while having less priority in health systems (NHS UK, 2019).

Planning and budgeting should be based on a comprehensive analysis of costs and benefits (WHO, 2017). Strategic planning of any project is a necessity to ensure sustainability, and this includes securing long-term funding or support (Harkins & et al., 2013).

3.7 Guidelines/Standards

Standards are very important for each organization as it provides a basis for mutual understanding to facilitate communication, measurement, commerce and manufacturing (CENELEC, 2019). They influence the quality of services provided (Ebrahim & et al., 2018), and also ensure that the international organizations better prevent patient complications and ensuing impairment as well as continuum of care before closing their programs in the country (WHO, 2016). The standards should be documented and be available to the professionals as it helps improve the lives of PwDs (Lemaire & et al., 2018). However, there is a gap in the literature on how to measure the impact of guidelines and standards on the service delivery outcomes and this is confirmed by a scoping review found in the literature (Sadeghi-Demneh & et al., 2018). It aimed at exploring the impact of standards and guidelines on service delivery outcomes in prosthetics and orthotics, it concludes that the literature is not sufficiently well developed to warrant the cost and effort of a systematic review.

WHO estimates that, only 1 in 10 people in need has access to assistive products, including prostheses and orthoses because of their high cost and lack of awareness, availability, trained personnel, policy and financing (WHO, 2017). To improve access to prosthetics and orthotics services, WHO, in partnership with the ISPO and the United States Agency for International Development (USAID), has prepared global standards to assist Member States in setting up, and improving or transforming their systems for delivering these services. The document covers four areas of the health system: policy (governance, financing and information); products (prostheses and orthoses); personnel (workforce); and provision of services (WHO, 2017).

3.8 Governance and Leadership

There is generally low governments' awareness and low prioritization of rehabilitation services including orthotics in the low and lower middle-income countries with the need to further integrate prosthetic and orthotic services in the regular health system (Magnusson, 2019). WHO standards (2017) standards number 1, 2 and 3 recommends the governments to have a leading role in the development and coordination of national prosthetics and orthotics service provision, with involvement of all relevant stakeholders, in addition to the establishment of national prosthetics and orthotics committee. That is to ensure better coordination and development of national service provision.

Monitoring and evaluating the service provisions and programs inform strategy development and target setting; it can ensure that services meet the goals set in national policies and strategic plans (Twersky & Lindblom, 2012). However, successful monitoring requires establishing appropriate procedures, using the right tools, defining measurable goals, benchmarks and performance indicators and collecting data systematically (WHO, 2017).

3.9 Appointment /Waiting Time

Orthotics services play a vital role in the rehabilitation pathway for many people and as such must offer effective, quality and timely interventions to ensure people reach their maximum potential (NHS-England, 2015). Waiting times for an initial clinic appointment, the manufacture, fitting and delivery of orthoses are clearly important (Rehabilitation Technology Services Advisory Group, 2005). Without proper schedule, the facility will

quickly become a chaotic and unorganized mess. This leads to stress not only to the staff, but also to patients (Harper & Gamlin, 2003).

Proper appointment system will ensure proper contact time given to each patient, which contributes to patients' satisfaction (Green, 2019). And this is preferred by both patients and providers and they are in favor of an appointment system which has many advantages such as saving time, reduction of crowds and guarantee of time slot (Al-Haqwi & Al-Shehri, 2007).

3.10 User-Provider Interaction

Every orthotics service user has the right to be treated with respect and dignity and should receive effective, efficient services in a user-friendly, safe environment, in which their privacy and confidentiality are guaranteed (WHO, 2017). User-centered orthotics services should ensure that every user with a physical disability can make informed decisions about her or his care, services and service providers and the services should respond to her or his needs and preferences, respecting their dignity, choices and rights (American Geriatrics Society Expert Panel on Person-centered Care, 2016).

The professionals need to assess each service user's needs as well preferences and consider how these can be met and relational continuity is needed to maintain the service users' challenges and goals throughout the services and to promote health behavior changes (Sagsveen & et al., 2019). In addition to that, improved care experiences for patients, service users, their families and care providers should be offered through embedding a human rights-based approach into service delivery, which can improve experiences for everybody (Equality and human right commission, 2019).

Providers when they provide orthotic services must ensure people's dignity and respect at all times. This can be done through ensuring privacy when they need and want it, treating them as equals and providing any support they might need to be autonomous, independent and involved in their local community. Care quality commission in England, Regulation 10 on Dignity and respect states that ‘‘The intention of this regulation is to make sure that people using the service are treated with respect and dignity at all times while they are receiving care and treatment’’ (Care Quality Commission, 2014).

3.11 Documentation/Records

Documentation including therapists, orthotists, physicians' notes must be accepted and accorded a high level of status and must be part of the patient's total medical record for clinical, medical necessity determinations and reimbursement purposes (*Fisk & et al, 2016*). However, the prescribers and their staff are often frustrated at the required paper work and the additional documents needed for the orthotists to produce the devices (*Lanoy, 2018*). And this means that the patient will have to go back and forth delaying the delivery of the services and might develop complications and more burden.

In America, since Feb. 2018, the P&O notes have been officially part of the medical record for purposes of Medicare medical necessity and claims audits and that came after President Trump have signed that legislation related to P&O provision into law as the following: 'Orthotist's and Prosthetist's Clinical Notes as Part of the Patient's Medical Record' (American Prosthetic and Orthotic Association, 2018).

3.12 Follow-up

There are many articles in the literature highlighting the importance and need for follow up like in the scoping literature review conducted by Ikeda & et al (2014), and by (Peaco & et al., 2011) and in (WHO, 2017), this reflect its importance and being very essential and required at certain intervals to review outcomes and ensure no complications develop with the fit, comfort, function or durability of the device. Evaluation of treatment outcome at the time of product delivery and in follow-up sessions will allow verification that the orthosis has the intended effect and the treatment goals have been met (WHO, 2017). In standard number 58, WHO states that 'Prosthetics and orthotics service users should be followed up regularly' (WHO, 2017).

3.13 Number of Devices Produced/ Patients Served

The number of devices produced, and the number of patients served might reflect the picture and the capacity of the services and the accessibility as the numbers may only be used as a guide (NHS Orthotic Manager Group, 2019). However, the number of people requiring orthotic services is often difficult to estimate and it is very hard to capture the numbers to reflect the capacity of a country (Chockalingam & et al, 2019).

The WHO, ISPO standards states that a clinician (supported by nonclinical personnel) can be expected to provide complete services to 300–600 users per year (WHO, 2017).

As mentioned, numbers are important. However it has to be meaningful and this is can only be achieved if they take into account the patient classification, which help define different types of patients or health care products, not only that but also quantify differences in complexity, which enables several useful comparisons of costs and needs (Quentin & et al, 2016).

3.14 Satisfaction

Patient satisfaction is a measure of which extent a patient is content with the health care they received from their health care provider; it is one of the most important factors that determine the success of a health care facility (Manzoor & et al, 2019).

(Peaco & et al., 2011) conducted a systematic literature review to assess satisfaction with orthotic devices and services. Seventeen subdomains of satisfaction were identified within the reviewed outcome measures whereby eight subdomains pertained to device satisfaction (e.g., cosmesis or comfort), eight subdomains contributed to satisfaction with services (e.g., competence or communication), and one (i.e., overall satisfaction) was applicable to both device and service domains. Another research studies satisfaction of 222 people using assistive devices in low income countries. The study reported that these patients high levels of satisfaction and mobility while using assistive devices, although third of patients experienced pain and more than half had difficulties when walking on uneven surfaces and limitations to the effectiveness of assistive devices, poor comfort, and limited access to follow-up services and repairs were issues (Magnusson., 2014).

In summary many factors contribute to the patients' satisfaction/dissatisfaction of services such as location of residence, severity of disability, types of orthoses and duration of usage (Chen, et al. 2014).

3.15 Quality of life

PWDs often have lower QoL than people without disabilities and this was confirmed by (Magnusson, & et al., 2019) who studied 277 participants from India; the study concludes that PWDs using orthoses and prosthesis experience lower QoL in terms of the physical

health, psychological, and environmental domains than people without disability did. Similarly, in Palestine, children with disabilities suffer from lack of access to health which have had significant implications for their QoL (Jones & et al, 2016).

The provision of orthotics has a beneficial impact on a range of clinical conditions by relieving pain, increasing mobility, protecting tissues and promoting healing along with a whole host of other benefits including improved independence and self-image (NHS-Scotland, 2005). A scoping literature review concludes that there are many gaps in the evidence base, in measuring inclusion, participation, and QoL for orthosis and prosthesis users in resource-limited environments by Ikeda & et al. (2014). Therefore, there is a need for future structured evaluation of orthotic interventions/services to inform policy development and this is confirmed in the literature review aiming to assess effectiveness of prosthetic and orthotic services by (Healy & et al., 2020).

3.16 Effect of Clients' Characteristics/Socioeconomic Factors

Clients characteristics might have an influence on the services such as age, which is linked to increasing difficulties in functioning; as for populations age, the prevalence of disability will increase (WHO & World Bank, 2011). Also, children with disabilities suffer from access issues. According to UNESCO, 90% of children with disabilities in developing countries do not attend school. Moreover, the age of the service user has also the potential to influence success with orthotic intervention (Tan & et al., 2018). The other factor is gender where women with disabilities are recognized to be multiply disadvantaged, experiencing exclusion on account of their gender and their disability (Disabled World, 2019).

The disability differs from one person to another as some patients have severe, some others have mild disabilities. The severity of disability, living area, types of orthoses and duration of usage might affect the satisfaction of patients (Chen & et al, 2014). However, in other studies it is different where the assessed clinical and demographic features are detected as they are unimportant risk factors for not using orthoses (Koyuncu & et al, 2016). Moreover, prescriptions of foot orthoses are influenced by patient factors, including age, sex, and clinicians' factors as confirmed by (Menz, & et al, 2017).

Genu valgum and genu varum are typical and physiological for a given age group and are usually corrected spontaneously; children do not normally need braces until about the age of six years (Fabry, 2010; Rerucha & et al, 2017; Foot Levelers Staff, 2018), Other studies find that the long-term treatment of arch support foot orthoses (FOs) is effective to improve lower limb kinematics and kinetics during walking in the children with flat foot (Jafarnezhadgero & et al., 2018).

Economically, PWDs are more likely to be unemployed and generally earn less even when employed (WHO & World Bank, 2011). Another factor is the client education on the orthotic device, which is very important in order to avoid negative outcomes and complications such as skin breakdown and progressive worsening of joint stiffness (Mahle & Ward, 2019). Generally, across the world, PWDs have poorer health outcomes, lower education achievements, less economic participation and higher rates of poverty than people without disabilities (WHO & World Bank, 2011). Therefore, demographic and socioeconomic differences among the PWDs should be taken into consideration while setting policies and practices to improve their health and wellbeing (Harsha & et al, 2019).

Chapter Four

Methodology

This Chapter presents information about the methods used to conduct this study. It illustrates the study design, study population, study setting, study period, and study sampling. It also presents the instruments and procedures used for data collection, data entry and analysis, scientific rigor, pilot study and ethical considerations.

4.1 Study Design

This study adopted a mixed methods design, in which triangulation provided combination between quantitative and qualitative methods. Quantitative data was collected first, through interviewing questionnaire with service users and their caregivers. The qualitative method was then used after analyzing the quantitative data in order to explore issues that emerged from the quantitative study. Qualitative study included in-depth interviews, focus group discussions (FGD) and facility checklist. Both methods were used to assure the validity of findings from one method to another, and also to capture different dimensions related to orthotic services (Johnson, 2017).

Records were also checked to obtain information from the medical files such as referral form, prescription, assessment form, type of orthosis received and discharge notes and also to check documentation practices.

4.2 Study population

The study populations included quantitative and qualitative as the following:

Quantitative

- The service users/caregivers who received orthotic devices in the year, between mid-2019 to mid-2020 from the main orthotic service providers in both ALPC and Hamad Hospital to capture the recent service. At ALPC, the total number of clients who received custom made orthotic devices in that specific period was 883 beneficiaries registered in the patient management system (PMS); while at Hamad hospital, the number was 40 beneficiaries.

- Records checks of the respondents' files equal the same number of service users as above for both ALPC and Hamad hospital.

Qualitative

- Service users who received orthotics between mid-2019 to mid-2020 to capture one-year period, same target as of the quantitative part (883 beneficiaries from ALPC and 40 beneficiaries from Hamad hospital).
- Decision makers at the national level including authorities (MoH & MoSD), the management of both ALPC and Hamad Hospital, and the UNRWA Health department. Their number is around 8 persons. The technical staff of both facilities including the orthotic staff (clinicians and non-clinicians) working at both ALPC and Hamad hospital total 16 additionally to the orthopedic consultant and technical coordinator of ALPC.

4.3 Study Setting

Both the ALPC and Hamad Hospital, the main and only orthotic service providers in the Gaza Strip. Both are located in Gaza City.

4.4 Study Period

The study began in June 2020 and was completed in August 2021. Annex (1) describes the activities of the research and duration for each activity.

4.5 Eligibility Criteria

4.5.1 Inclusion

For quantitative and qualitative: Clients/caregivers who received custom-made and ready-made orthotic services from ALPC and Hamad hospital between mid-2019 to mid-2020 and do not have any cognitive/communication difficulty regardless of any other differences (such as age, gender, diagnosis level of education etc).

4.5.2 Exclusion

For quantitative and qualitative, the excluded persons were the clients who received orthotics before or after the pre-mentioned specified period (mid-2019 to mid-2020). Any

beneficiary who received device before or after the specified period was excluded. Also any beneficiary who has cognitive or communication difficulty.

4.6 Sampling

4.6.1 Sampling Process

In order to calculate sample from ALPC target population, the researcher used an online survey system sample size statistical calculator at <https://www.surveysystem.com/sscalc.htm> (see annex 2). The results indicated that a representative sample should be at least 268 participants. The researcher used the following parameters for the sample calculation:

- Confidence level at 95%
- Confidence interval at 5%
- Total eligible beneficiaries of orthotic service at ALPC 883

Quantitative

- At ALPC: The selected sample was 268 and a probability systematic selection for clients was done depending on their listed files number at the registry, every third name was selected from the list. The respondents of ALPC were 229 out of 268 which represents 85.5%.
- At Hamad hospital, all beneficiaries who received orthotics of the same period (mid-2019 to mid-2020) were selected as the number was few (40 clients). The respondents of Hammad hospital were 33 out of 40 which represents 82.5%. Therefore, the total selected sample of both ALPC and Hamad samples were $268 + 40 = 308$. Respondents were $229 + 33 = 262$ (response rate is 85.1%).

Qualitative

Policy Makers

A non-probability purposive sample of 8 key informants was selected. The key informants sample included the director of ALPC, director of Hamad hospital, Physical Therapy Unit (PRU), director and MoSD responsible of disability file, the orthopedic consultant of ALPC and the technical coordinator of ALPC and UNRWA staff (deputy of Chief Field

Health Programme and Admin Officer). The idea of including this sample was to dig deeply and understand in-depth the perspectives about the orthotic service delivery in Gaza from the main actors.

Staff

Census approach was used to recruit participants of orthotic staff (clinicians and non-clinicians) working at both Hamad hospital and ALPC for the FGDs. All P&O staff producing orthotics were invited. From the ALPC ten staff and from Hamad hospital 2 staff participated in 2 FGDs at both facilities (12 in total).

Beneficiaries

A non-probability purposive sample of orthotic users and their caregivers through 3 FGDs. The researcher chose variety of different patient profiles (one group of 4 children with spinal deformities of different causes: idiopathic and congenital, 2 girls with their mothers and 2 boys with their fathers). Another group of 5 users with lower limb orthosis readymade and custom made, which included conventional and non-conventional devices, it included Ankle Foot Orthosis (AFOs) and Knee Ankle Foot Orthosis (KAFOs), third FGDs with 3 users of ready-made devices.

This qualitative component was carried out after the quantitative one in order to explore issues that emerge from the quantitative study.

4.7 Study Instruments

This study utilized different instruments, which are given in the following summary table 4.1. It illustrates the study instruments of both quantitative and qualitative parts with numbers and focus.

Table (4.1): Study Instruments

Tool	sample size	Focus
Clients		
Questionnaire (annex 3)	262	<ul style="list-style-type: none"> • Demographic characteristics • Disability related variables • Processes and dynamics • Impact of the program. • A structured questionnaire was used for clients who received orthotic devices. • The researcher used the five modules of the Orthotic Prosthetic User Survey which included (OPUS) (Jarl & et al., Validity Evidence for a Modified Version of the Orthotics and Prosthetics Users' Survey, 2012). • Satisfaction with Device, Satisfaction with Services, Lower Extremity Functional Status, Upper extremity Functional Status, Health Related Quality of Life • Other items were also added in the questionnaire.
Records check	262	Respondents records were checked which consisted their demographic data, diagnosis, affected parts, cause of disability/problem, referral components, financial note, progress notes and discharge notes.
FGDs with service users (annex 4)	3	<p>Three FGDs were conducted with service users and their caregivers. The researcher chose variety of different patient profiles:</p> <ul style="list-style-type: none"> • One group consists of 4 children with spinal deformities of different causes: idiopathic and congenital, 2 girls with their mothers and 2 boys with their fathers). • Another group consists of 5 users with lower limb orthosis readymade and custom made, which included conventional and non-conventional devices, it included AFOs and KAFOs. • Third FGDs was with 3 users of ready-made devices. <p>A semi-structured schedule consisted of open-ended questions, to triangulate with findings of the quantitative data going in-depth discussions to obtain explanations from the participants.</p> <ul style="list-style-type: none"> • To reflect on the services that users received from the orthotic facility, • and to seek participants' views and opinions about both service and device, • appropriateness of service, • concerns, obstacles/barriers, and recommendations.

Providers and policy makers		
FGD with orthotic technicians (Annex 5)	2 FGDs (12 P&Os)	2 FGDs with orthotic staff (12 persons) of both facilities participated to discuss program processes and dynamics. A semi-structured schedule consisted of open-ended questions was used. It included their perspectives about orthotic services and their facility.
Interviews	4	4 interviews with MoH licensing department were conducted to collect information about how MoH licensing department provides license for P&O personnel and facilities, and information about the private sector.
KII with policy makers (Annex 6)	8	2 Directors of both facilities, the orthopedic consultant & the technical coordinator of ALPC, who represented the views of orthotic care providers. 2 staff from government, MoH director of physical rehabilitation unit, and MoSD responsible of disability file. In addition to 2 UNRWA staff, deputy of Chief Field Health Programme and Admin Officer. A semi-structured schedule which included open-ended questions was used.
Facility		
Facility checklist Annex 7	2 (ALPC and Hamad Hospital)	The facility checklist includes: Facility accessibility information, Infrastructure/Physical setting, Available equipment & tools, Available material, Human resources (HR) set up, Protocols, Statistics, Types of services and devices and Records /documentations

OPUS Scales: Orthotic Prosthetic User Survey (OPUS) (Jarl & et al., Validity Evidence for a Modified Version of the Orthotics and Prosthetics Users' Survey, 2012)

- Satisfaction With Device and Services (21 item survey). The response to each item should be scored as follows: 5=Strongly Agree 4=Agree 3=Neither agree nor disagree 2=Disagree 1=Strongly disagree. Satisfaction with Device Score is the sum of the scores for items 1-11 (11 – 55), while satisfaction with services score is the sum of the scores for items 12-21 (10 – 50). A higher score indicates a better outcome for both measures.
- OPUS Upper Extremity Score (23 item survey): the response to each item should be score as follows: 4=Very Easy, 3= Easy, 2=Slightly difficult, 1=Very difficult, 0=Cannot do this activity. Total score is the sum of the scores for 23 items (0 – 92). A higher score indicates greater function.

- OPUS Lower Extremity Functional Status Measure (20 items): the response to each item should be scored as follows: 4=Very Easy, 3= Easy, 2=Slightly difficult, 1=Very difficult, 0=Cannot do this activity. Total Score is the sum of the scores for the 20 items (0 – 80). A higher score indicates a better outcome.
- OPUS Health Quality of Life Index (23 items):
 - The response to items 1-12 should be scored as follows: 4=Not at all, 3= A little, 2=A fair amount, 1=A great deal, 0=Excessively. The response to items 13-16 should be scored as follows: 4=All of the time, 3=Most of the time, 2=Some of the time, 1=A little of the time, 0=None of the time.
 - The response to items 17-23 should be scored as follows: 0=All of the time, 1=Most of the time, 2=Some of the time, 3=A little of the time, 4=None of the time.
 - The OPUS Health Quality of Life Score is the sum of the scores for the 23 items (0 – 92). A higher score indicates a better outcome.

4.8 Ethical Considerations

The researcher followed the modified international code of ethics principles (1975), known as the declaration of Helsinki; an official letter from Helsinki committee to conduct this current study was obtained (Annex 8).

Administrative approval from both ALPC and Hamad hospital were also obtained (Annex 9).

To guarantee participants rights, an informed consent was verbally presented to all respondents indicating that the participation was voluntary, and confidentiality was assured for all of them. All respondents from ALPC and Hamad hospital were asked for their agreement for participation in the study. The key informants were also asked verbally for their permission to record the in-depth interviews.

All participants of FGDs and interviews were asked verbally for their permission to participate in the study (consenting) and to record the discussions.

4.9 Pilot Study

A pilot study on 20 clients was conducted to explore the appropriateness of the study instruments and let the researcher train in data collection. This allowed further improvement of the study validity and reliability. The pilot has been useful where the questionnaire was adapted and modified. However, the pilot study was included in the study.

4.10 Data Collection

- The researcher and one data collector (physiotherapist) conducted the phone interviews with the orthotic users of ALPC and Hamad Hospital. Most of them have responded, while the rest had their phones closed or changed and couldn't be reached. This took place in 2 months between July and August 2020. Response rate was 85.1%.
- The second component of the data collection was 8 KII. Semi-structured questions were designed and questioned by the researcher for director of ALPC, director of Hamad hospital, PRU director, MoSD responsible of disability file, the orthopedic consultants of ALPC and the technical coordinator of ALPC, and the 2 UNRWA staff. Notes were taken through the interviews, which were recorded to allow further capturing of information. Interviews were conducted after the initial findings of the quantitative data. The researcher also interviewed 4 staffs from MoH licensing department.
- The third component the FGD with service users of both Hamad and ALPC (3 FGDs) and P&Os staff (2 FGDs) were conducted by the researcher, semi-structured questions were designed, the FGDs were recorded to ensure capture of all information.
- The fourth component was the facility checklist which was conducted by the researcher who filled it with many staffs of both facilities and through observations conducted by the researcher for both facilities.

4.11 Scientific Rigor

4.11.1 Quantitative Part (questionnaire)

Reliability

The following steps were done to assure reliability of the instruments.

- Training of data collector on the interviewing steps, including awareness on the purpose of the study and the way of asking questions. This step assured standardization of filling up the questionnaire.
- The researcher first filled the questionnaire together with the data collector to ensure reliability and standardization of filling.
- Then, the data entry was mostly done in the same day of data collection which allowed to check the data quality and completion. Re-entry of 5% of the data after finishing data entry to assure correct entry procedure and decrease entry errors.
- The researcher used Cronbach's alpha to assess reliability of the questionnaire items of the OPUS scales as table 4.2 shows.

Table (4.2): Reliability tool (Cronbach's alpha) for the 5 Scales of OPUS.

	Reliability Statistics	Cronbach's Alpha	N of Items
1.	Satisfaction with device- OPUS scale	.756	11
2.	Satisfaction with service- OPUS scale	.713	10
3.	Quality of life – OPUS scale	.943	23
4.	Lower extremity functional scale - OPUS	.971	20
5.	Upper extremity functional scale - OPUS	.990	28

Validity

The questionnaire was evaluated by a group of experts (see annex 10), to assess its relevance and their comments was incorporated. Also, a pilot study was conducted before the actual data collection to examine clients' responses to the questionnaire and how they understand it. That was to enhance the validity of the questionnaire after modifying it to be better understood.

4.11.2 Qualitative Part (In-depth Interviews)

The following steps were done to assure the trustworthiness of the qualitative part in this study.

First, a peer check was done through experts to revise the in-depth interview questions to assure that they cover all the required dimensions. Prolonged engagement was done as the researcher tried to probe for answers and cover all the interview dimensions properly. In addition, recording all interviews were done to enhance tracking up facts and re-check the accuracy of the transcripts. All the transcripts and recordings were kept for tracking the information by others at any time (Audit trail).

4.12 Data Entry and Analysis

4.12.1 Quantitative Part

- During data collection, the researcher reviewed the questionnaires continuously and before entering them to ensure valid information and correct immediately if required. The Statistical Package for Social Sciences version, SPSS version 25 programme has been used for data entry and analysis. The questions and variables were coded and entered. Re-entry test was performed with 5% of the data. Then data cleaning was performed to check illogical values.
- Frequency tables were done to show sample characteristics and plot differences between various variables of participants' characteristics.
- Descriptive statistics was conducted to analyze numerical data which helped to describe, depict or summarize data in a meaningful manner, and it helped in calculation of central tendency of mean, median, and mode.
- Moreover, cross tabulation for main findings and advanced statistical tests such as Chi square test to compare categorical variables, and T-test or One-way ANOVA test to compare means of numeric variables were done when required to analyze data followed by (when significant difference was found), post hoc test to show significant different from one another.

4.12.2 Qualitative Part

- Debriefing reports was done immediately after FGDs, this included non-verbal reactions and group dynamics. Open coding thematic analysis method was used to analyze the transcripts of the in-depth Interviews and FGDs. The researcher obtained the main findings from the transcripts of the interviews. Then, categorization of related ideas, and comparison and integration between the quantitative and the qualitative findings were done to create rich items for discussion and representation.

4.13 Limitations of the Study

- The study didn't include the private sector due to its availability in many scattered providers including pharmacies. However, some information was collected in order to capture a general picture.
- The study included only users who received services between mid-2019 to mid-2020, while the opinions of people who haven't yet received (waiting to receive) or didn't receive could be important to reflect better image for reality.
- COVID-19 restrictions have delayed the approval of this study for two months due to inability of Helsinki committee to meet and review the proposal. COVID-19 also affected the data collection process as it was planned to do face to face interviews which was not possible. Instead phone interviews were conducted. This approach did not affect the collection of data.

Chapter Five

Results and Discussion

The following section provides an overview of both quantitative and qualitative results of the status of orthotic services in Gaza arranged as per Donabedian Model illustrating the respondents' demographic, economic & health related characteristics, input/structure of orthotic service (physical space & infrastructure, workforce, material & equipment, information and guidelines), process (orthotic experience, documentation & accessibility) and outcome (range of services provided, respondents' satisfaction about device & service, QoL status & functional status).

Moreover, this section provides an analytical inferential analysis which highlights variances of satisfaction about device and services as well as QoL amongst respondents. The descriptive tables illustrate the results compiled from the total respondents (n=262) unless otherwise indicated.

5.1 Respondents Characteristics

5.1.1 Demographic Characteristics and Socioeconomic Factors

The surveyed population consisted of 262 individuals who were served at both ALPC and Hamad Hospital; 87.4% and 12.6% respectively, 35 of service users personally responded and they represent 13.4%, while 227 caregivers who represent 86.6% responded on behalf of their children.

Table (5.1): Distribution of beneficiaries by demographic characteristics and socioeconomic factors (N=262)

Item	Category	N	%
Gender	Male	151	57.6
	Female	111	42.4
Age in years	Up to 2 years	48	18.3
	More than 2 up to 5	107	40.8
	More than 5 to 17	63	24
	More than 17	44	16.8
	Mean= 10.5 SD=14.5, min=0.6, max=70, median=4		
Family size	Up to 5 members	113	43.1
	6 to 8 members	105	40.1
	9 and above	44	16.8
	Mean= 6.22, median=6		
Refugee status	Refugee	183	69.8
	Non-refugee	79	30.2
Governorate	North	77	29,4
	Gaza	97	37
	Middle	50	19,1
	Khan-Younis	29	11,1
	Rafah	9	3,4
Place of residency	Urban	168	64.1
	Rural	94	35.9
Education level completed N=107 (6 years old and above)	Illiterate	8	7,5
	Primary	45	42,1
	Preparatory	21	19,6
	Secondary	18	16,8
	Diploma	6	5,6
	BSc	9	8,4
Current marital status N=52 (15 years old and above)	Married	28	53.8
	Not married	24	46.2
Working status N=52 (15 years and above)	Household	5	9.6
	Working	2	3.8
	Unable to work	25	48.1
	Retired (male)	3	5.8
	Receive pension (male)	1	1.9
	Doesn't work	16	30.8
Family monthly income from all sources	0 ILS	66	25.2
	40 to 500 ILS	61	23.3
	501 to 1000 ILS	78	29.8
	1001 to 2000 ILS	50	19.1
	2000 ILS and above	7	2.7
	Mean= 665.7, Median= 600, SD= 707, Min=0, Max=4550		
Receiving support from family	Yes, a lot	244	93,1
	Yes, moderate	16	6,1
	Not at all	2	0,8

As table 5.1 shows, regarding the place of residency, 64.1% of the respondents reported residing in urban communities while the rest were residing in rural areas. This is important for the service providers to consider when designing devices for people who reside in rural areas due to its challenging environment to accommodate the different surfaces to move around the uneven surfaces, such as durability of the device, weight, etc, additionally to the reachability to the facilities and number of visits.

The study found that the people who are closer to the facility, mostly attend as 29.4% of the respondents were from the North, 37% from Gaza city, 19.1% from the middle, 11.1% from Khan Younis and 3.4% from Rafah. These figures don't match the distribution of the universal population in Gaza (PCBS, 2018). It seems that the south is underserved, and this might be related to the study findings about accessibility to the service, including distance to reach the facility, cost of transportation, location of facility ..etc as presented in table 5.3.3. This was confirmed in the FGD with orthotic users who requested to have another branch in the south to improve accessibility to the service, one male user who has poliomyelitis and uses long leg brace said, *'We wish if there is a second branch for the ALPC in Rafah or Khan Younis to make the service close to the people'*.

Refugees represented 69.8% of the study sample, which is slightly greater than the total reported refugees which is 66.1% of the total population of the Gaza Strip (PCBS, 2020). This might be due to UNRWA coverage of the cost of devices to refugees which contributes to better access to orthotic services, as presented in section 5.2.5

Results shows that 83.1% of the participants were in the age group (0-17) years at the time of the data collection, and it was greater than what was being reported by PCBS (2017), which was 48% for the same age group. On the other hand, 16.8% of the participants are above 17 years, which is less than what was being reported by PCBS about this age category, which was 52% (PCBS, 2017b). The mean age of the beneficiaries was 10.5 years, and this means that most of the beneficiaries of orthotics were young people, and this may be referred to the over prescription of orthosis for the children below the age of 6 years as mentioned in 5.3.1 in details.

Male respondents represented 57.6% of the study sample. This is not strange as males are more exposed to conflicts; in this study 100% of conflict related participants were male. In addition, females and males are not the same in anatomic structure and function of the lower extremities, which can be an explanation for certain conditions affecting lower extremities, hence, affecting the need for orthotics (Foot & Ankle Specialists of the Mid-Atlantic, 2021).

As table 5.1 indicates that 53.8% of the participants aged 15 years and above were married at the time of the data collection, while the rest were single or divorced. In the FGD with the service users, the person with poliomyelitis who is 50 years old and user of long leg brace shared the difficulties of getting married due to many challenges from community , and when they plan to marry, they are being stigmatized due to their disability as many ladies thought that PWDs are infertile. He said, *‘When I got married, things were very difficult, very difficult, very difficult, I mean they say look he wears a device, he will not be able to have children’*, he added *‘I tried to marry a girl, and that girl until god gave me a good girl and things went well’*.

The average family size of the study group was 6.2 members, which is consistent with the figure 5.7 reported by PCBS (2018). It was found that the study group were extremely likely to be poor, as around quarter of the respondents had 0 income (from all sources), and the average income was 665.7 NIS. Table 5.1 indicates that only 3.8% of the respondents who were 15 years and above (N= 52) have work, while 30.8% don’t work and 48.1% are unable to work.

Results indicate that most of the study participants were poor and consistent with a study conducted in 2016: the study suggested that nearly 40% of families who have children with disabilities had monthly income about half of the extreme poverty line (Jones & et al, 2016). In general, PWDs are more likely to be unemployed and, generally, earn less even when employed (WHO & World Bank, 2011). This is also consistent with the focus group conducted with service users who reported that PWDs are very poor and they rely on little money from the MoSD, which is not enough to cover their basic needs; in addition, they

receive it every 5 to 6 months. One user angrily said, *‘there is no money, as you all know, I only receive cheque from MoSD every 5 to 6 months’* and added *‘I swear to god, I have in my house two boys, a girl, a boy who has 4 kids, a boy who has 2 kids, and a divorced girl with two kids; all don’t work, and when I want to replace the device or the shoes, they ask me to afford, from where I should bring money!’*

They also mentioned that by having this money from MoSD, it prevents them from applying to or having other opportunities such as the 100 USD, which is given to around 100,000 needy families in Gaza donated by Qatar. This is consistent with what is being published by different agencies (Ram, 2019). Regarding to the level of education, 14% attained diploma/BSc, while 42,1% currently enrolled in primary level, 19.6% in preparatory level and 16,8% in secondary level, while 7.5% are illiterate.

About 0.09% of children in the age group (5 to 17 years) had never been enrolled in education which is much less than of what reported by PCBS (2017), it stated that about 43% of children out of the total number of children with disabilities in the age group (6-17 years) were not being enrolled in education. Last but not least, 93% of the study participants reported that they received social support from families; this is positive because people who are living with a physical disability and receive more support from family and friends are less likely to have low mood (Jensen, & et al., 2014).

5.1.2 Health related variables

Respondents have different health conditions where foot problems represented the highest reaching 33.2% as shown in table 5.2. This is consistent with other studies where foot problems were found to be a common condition especially among children (Jordan & et al, 2010).

Table (5.2): Distribution of beneficiaries by health-related Variables (N=262)

Item	Category		N°	%
Medical condition (diagnosis)	Foot problems		87	33.2
	Genu Varum/Genu Valgum		51	19.5
	Cerebral palsy		36	13.7
	Drop foot		24	9.2
	Luxation (all DDH, 1 Erbs)		18	6.9
	Clubfoot		11	4.2
	Fracture		10	3.8
	Paraplegia/ Spina bifida		8	3.0
	Hemiplegia		7	2.7
	Scoliosis		5	1.9
	Others (1 MD)		5	1.9
Affected parts	Lower extremity		227	86.6
	Upper extremity		1	0.4
	Upper and lower extremity		28	10.7
	Spinal		6	2.3
N° of affected extremity among those with extremity problem N= 256 (spinal cases are excluded)	Bilateral		161	62.9
	Unilateral		81	31.6
	All extremities		9	3.5
	Three extremities		3	1.2
	Diagonal		2	0.8
Cause of disability	Idiopathic		112	42.7
	Congenital		75	28.6
		Traumatic	32	12.2
		Metabolic	26	9.9
		Vascular	7	2.7
		Neurologic	6	2.3
		Infectious/Inflammatory	3	1.2
		Neoplasm	1	0.4
Acquired				
Other health conditions (other than disability)	Yes		46	17.6
	No		216	82.4
Use of assistive devices	Don't use		220	84.0
	Walker		13	5.0
	Forearm/ Axillary crutches		16	6.1
	WC/Scooter		8	3.1
	Cane		4	1.5
	2 types		1	0.4
Having other family members with disability /problem	Yes		51	19.5
	No		211	80.5

The next highest condition was Genu Varum/Genu Valgum (GVR/GVL) which represented 19.5%, followed by cerebral palsy representing 13.7%. Foot problems in this study include different foot conditions: in-toeing was 46.4%, flat foot was 31% while the rest includes bone heel spur and injury of foot soft tissue. A previous study reported that 4% of children aged 10 years suffer from flat feet (Ozonoff, 1992) and children with flexible flat feet are more likely to suffer from pain or discomfort at the knee, hip, or trunk (Kothari & et al., 2016).

Lower extremity was the most affected part of the body with 86.6% of the study group, while respondents with both lower and upper extremity represented 10.7%. This is consistent with the literature as lower limb orthoses are the most commonly prescribed type of orthoses (Fox & Lovegreen, 2019). On the other hand, the spine was affected by 2.3% and upper extremity is the least, which represented only 0.4%. Bilateral extremities were affected by 62.9% of respondents whose their extremities affected (N=256), while unilateral represented 31.6%.

The main cause of disability or problem recorded in the respondents' files was idiopathic cause represents 42.7% of all reviewed files, followed by congenital anomalies (28.6%). Among the idiopathic cases, 71.4% were manifested with foot problems including in-toeing, flat feet and bone spur, while 23.2% with Genu Varum/Genu Valgum and 4.5% with idiopathic scoliosis.

Among the diagnosed cases with GVR/GVL (N=51,19.5%), 80% were due to idiopathic cause and the other were congenital, metabolic and traumatic causes. Moreover, among the beneficiaries with traumatic cause (N=32, 12.2%), 72% were due to conflict. All conflict related cases were males: 56.5% have drop foot, 30.4% have fractures, 8.6% have hemi/paraplegia and 4.3% have foot problem.

The respondents who reported having other health condition (17.6%) along with their primary disability; 32.6% suffered from respiratory/renal disease, while 32.6% suffered from Diabetes Meletus &/or Hypertension (DM &/or Hypertension) or cardiac disease, 8.7% suffered from hearing/visual disability, and 10.9% suffered from epilepsy. This is consistent with the evidence that persons with disabilities are more likely to have poorer health than the general population (Bright & Kuper, 2018).

As table 5.2 shows 84% of respondents reported that they were not using any assistive device (other than orthotics), while the rest were using different devices such as forearm/axillary crutches, walkers and wheelchairs. This is understandable due to the nature of the disability itself.

Around 19.5% of respondents reported that they were having at least one person with disability/health problem in their family. Of those having family members with disabilities, 72.5 % have only 1 member, while the rest have 2 to 3 members (mean=1.3). In a study conducted by (Jones & et al, 2016), it was found that it was very common for families to have more than one PWD and found that 41.4% of all the households included in the study had at least one PWD.

5.2 Input

5.2.1 Physical Space and Infrastructure of Facilities

Based on the facility checklist, findings are summarized below:

The observation checklist shows that generally, both facilities are well designed and suits the size for the intended workload and types of services provided. Both had an accessible and barrier-free environment that provides privacy for individuals during service. This is consistent with WHO standard No 47, page number 60 (WHO, 2017), which states that *‘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’*.

Both facilities provide means to maintain privacy with available separated training halls for male and female beneficiaries. The service users move freely from entrances which have a well-constructed safe ramp to all floors using the elevator. The toilets also are of allowed access.

Regarding safety measures, the observation checklist shows that personnel were trained in safety and use of tools and machines; however, it was noticed that not all staff wear the protective tools such as goggles, masks, etc. This practice might expose them to potential risks (WHO, 2017). Another observed concern was the slippery ground at Hamad Hospital, which could be harmful and might expose service users and staff to falls and injuries; however, there is a plan in place to solve this problem as stated by the head of the P&O

workshop during the observation visit while filling the facility checklist, he said *'we do have a plan to solve this issue as we receive many complaints from beneficiaries'*

5.2.2 Material and Equipment

According to the findings of facility checklist and the interviews with service providers, both facilities were properly equipped and had adequate stock of material and tools required for the production of orthotics, as said by both directors, ALPC and Hammad. The ICRC had been supporting the ALPC in donation of material for the production of custom-made prosthesis and orthosis as said by the director of the ALPC during the KII *'we don't buy material for the custom-made orthosis, the ICRC does'*, while ALPC had been purchasing ready-made devices from local market and importing other material from Israel, as mentioned by the director of the ALPC director during the KII. On the other hand, Hammad hospital had been purchasing material from external providers focusing on prosthetic components, as the management of Hamad hospital showed more interest on prosthetics as said during the KII, *'to be honest, I am not very well aware about orthotics'* and head of prosthetic and orthotic department of Hamad Hospital who said in the FGD, *'orthotic services doesn't getting interest as it supposed to have, where prosthetics have more interest, knowing that the number of orthotics is significantly greater than the number of prosthetic limbs'*. The ALPC P&O staff raised many points related to materials during the FGD, mentioned that not all types of ankle and knee joints were available, and pointed out to the issue of delay to purchase some material, additionally to the lack of material used for cosmetic appearance for children; this point was also raised by the ALPC director during the KII. A senior P&O said *'We the ALPC cannot cover all devices required at Gaza level, there are devices with joints that we can produce at the ALPC if the material are made available for us'* and one said *'Why don't we do everything, ICRC can bring raw material and we can produce spinal corsets'*.

The director of the ALPC pointed out to the lack of specific material that he wishes to resolve. He said, *'I wish to solve the cosmetic appearance of orthosis as most of users are children, and this doesn't cost, we the ALPC don't purchase but ICRC does and they should put it in the list'*. Other topic was also raised by the director of the ALPC, which is the production of foot insoles. He added, *'we should have a shoemaker unit at the ALPC as the ALPC serves a large number of people'*.

As stated by the head of P&O department at Hamad Hospital, they suffered delay of delivery of material in 2019 and 2020 which affected the production level, waiting list and waiting time. He said, *‘This resulted in returning clients without providing them with services they came to receive in that specific period, specially the children with cerebral palsy who attended for AFOs’*. Also, ALPC experienced shortage of funds and coverage for refugees mainly for ready-made orthotics, which delayed the delivery of service, as mentioned by both ALPC director, and technical coordinator and P&O staff during interviews and FGD. The other constraints mentioned was the delay of coordination of material to access Gaza through Israel due to Israeli restriction on plastic; however, they try to have stock and monitoring plans to avoid reaching zero stock. The closure of Gaza has impacted the availability of material in many times, which affected accessibility and production level. This is not surprising as the continued restrictions of movements of people and goods imposed by Israel dramatically affects the daily lives of the majority of Gazans and have led to a de-development of Gaza (UNRWA, 2019b).

The equipment and material required for user training, were adequate in both facilities as per the observation and what was being mentioned by the staff of both facilities. However, plans existed to have specific tools and space for spinal management at Hamad hospital, as mentioned during the FGD with Hamad hospital P&O staff and director. The director said, *‘We have a big gap in management of patients with spinal deformities, We will work on it once we have enough time’*; he added, *‘People who suffer from scoliosis or kyphosis are maltreated in Gaza, we don’t know their numbers or their distributions or where they are, their gender distribution or geographical distribution or the protocol of treatment’*.

There was no available national list of priority orthotic products, as recommended by WHO (2017) standards number 17. Although, prosthetic and orthotic products, components and material are not integral part of the national health care regulatory system, but both ALPC and Hamad had been supervised by MoH licensing department in addition to also being supervised and supported by INGOs as mentioned during the FGDs and KII of both facilities and MoH. Workforce

As summarized in table 5.3, at the time of the data collection, the Gaza Strip had ten ISPO CAT-II technologists, eight full P&O and two prosthetic discipline, mostly trained by the ICRC; and three on the job trained P&Os that had various load of training at short courses and through mentoring (through ICRC and other donors). Those have been recognized as

CAT-II by the ministry of higher education considering their years of experience. One also completed spinal training supported by ICRC. Totally, 13 P&O staff in both facilities were working as clinicians, additionally to 4 non-clinicians who assist the clinicians.

Table (5.3): Distribution of P&O Workforce by specialty (RECORD based)

Speciality	Available Number	Recommended by WHO (2017)	Comments
Prosthetist and Orthotist (ISPO CAT I)	0	Should be responsible for the quality of the services delivered by supervising and mentoring associate professionals, technicians and support staff.	Two were enrolled in study program and would be graduated in two years
ISPO CAT II P&O (Clinicians)	10	5–10 prosthetics and orthotics clinicians per million population i.e. 10 - 20 per 2 million	10 (8 full P&O + 2 prosthetist) of them 2 females in one facility. 2 senior P&Os will be retiring in 2021
P&O (Clinicians)	3		3 (2 P&O + 1 orthotist)
P&O technicians (Non-Clinicians)	4	each clinician should be supported by 2 non-clinicians	There should be 20 to 40 non-clinicians in Gaza

With 2 million people, Gaza had 13 clinicians at the time of the data collection who were providing prosthetics and orthotics services in both main facilities. This figure is aligned with WHO P&O standards (WHO, 2017), which states that an average country can be expected to require 5–10 prosthetics and orthotics clinicians per million population i.e. 10 – 20 per 2 million.

Besides, each clinician should be supported by 2 non-clinicians as per WHO P&O standards, but it is not the case in Gaza, where only 4 non-clinicians support the 13 clinicians, where WHO standards indicated that it should be 20-40 non-clinicians with a population of 2 million people taking into account that Gaza has a high number of war wounded; therefore, the number maybe even bigger. Even adding more than the mentioned number allows more users to be treated, and this is important in settings like Gaza where there are few trained professionals (WHO, 2017).

In Gaza, it was found that Prosthetics and orthotics service units don't have any prosthetist and orthotist with CATI i.e. with Bachelor degree, two were enrolled in a study program and would be graduated in two years), and they should be responsible for improving the

quality of the services by supervising and mentoring associate professionals, technicians and support staff, as stated and recommended by WHO standard number 32 (WHO, 2017). However, in both facilities, the orthopedic consultants have been doing this role as per mentioned by the staff of ALPC and Hamad hospital. To specify and reflect on orthotics in workforce planning, the fact that at least two to four times more people require orthotic treatment than prosthetic treatment should be considered (WHO, 2017). It was found that the focus is put more on prosthetics at Hamad hospital, as mentioned during the FGD with P&O and the KII with the director in the hospital; who stated that, *'I am honestly not familiar with orthotics'*.

Projections of human resources should be made for the short and the long term. For example (5, 10, 15 years ahead), so the future development is adequately considered as recommended by WHO (2017). At ALPC, two senior P&Os would be retiring in 2021 at age of 60 years and another senior will be retiring in 5 years. As mentioned by the ALPC director in the KII that he had an idea of establishing a college in Gaza for P&O due to the fact that one will have master in P&O and another will have Bachelor degree; otherwise, more people have to be sent outside Gaza to study. He said, *'I will suggest to the center's board of director or to the Mayor that next year we should have a college and we will cooperate with the ICRC for the ISPO certificate'*.

All P&O staffs were employed by MoG except two employed by Hammad hospital. However, of the contracted by MoG, two have been assigned to work at Hammad for few months in agreement with MoG, as mentioned by the FGD of P&Os. Hamad hospital had 8 trainees who were under training for 6 months, and the plan was to choose 4 from them and then contract with them for full time to increase HR at Hamad. One P&O staff of Hamad hospital said, *'We as an area of conflict and poverty, we should have enough staff, we should have more P&O staff, and this is the main problem that we have at Hamad hospital'*.

HR working in the private sector were not evaluated. However, as mentioned by the FGDs and KIIs, limited number of people manufactures orthoses. As mentioned and licensed by Ministry of economics it is considered as a craft, without any supervision and follow up, they even didn't have official academic background. One of the MoH licensing department said, *'We do not ask about them, neither from near nor from a far'*

To summarize, the right number of prosthetic and orthotic professionals with the appropriate competencies should be ensured at all health care levels; otherwise, access to this service will remain inadequate (WHO, 2017).

Qualifications/Education

At the time of data collection, there was no qualified educational P&O institution in Gaza; however, one college in the past was providing diploma in P&O for only one time, and had closed as per said by the ALPC senior P&O staff during the FGDs; one said, *‘The College had a big mistake when we proposed to them to do the practical training at the ALPC, however, they didn’t do so and they went to somebody else who is not qualified’*.

According to ICRC annual report 2019, the formal training have been accessed only through ICRC scholarship opportunities, as the ICRC have been supporting the training of P&O since its partnership with ALPC in 2007 and sponsored 12 people to study CATII in P&O, who had ISPO certification, followed up by on the job training by ICRC external P&O experts (ICRC, 2019). Moreover, three senior staff had short P&O courses by multiple INGOs. At the time of the data collection, three of the clinicians were enrolled in education (1 travelled to Thailand for Master’s degree in P&O, and two were in the plan to travel as well to have Bachelor degree (CATI certificate) as said by the ALPC director during the KII, WHO said, *‘We have currently two of our staff enrolled in education’*. Professional qualifications recognition falls under the MoH and Ministry of Higher Education. Most of the staffs at both facilities had their recognition from MoH and MoHE, while few were in the process to get it as mentioned during the FGDs with the P&Os.

Training gaps and challenges raised during the FGD with P&Os of Hammad hospital were the 3D printing for spine and physiotherapy training for spinal deformities (in combination with orthotics), on the job training for the trainees, and internal and external evaluation. While during FGD with ALPC P&Os and KII with ALPC director, short courses on foot insoles, orthopedic shoes, spinal corsets and training on physiotherapy management of orthotic users were the topics raised.

Job Descriptions/Job Titles and P&O Status

Regarding to job description, it was found during the facility checklist that although roles at ALPC were somehow clear, but there was no official organizational chart exist, nor does

job description of the staff at the ALPC. While at Hammad hospital, each staff have a clear job description. During the FGD, most of the P&Os expressed their anger and complaint about their status and job titles. One clinician, who had 3 years full study in India (full CATII P&O) said angrily, *'Despite I only have 40 to 50% of my salary, they put the title as assistant, and when I go with an official letter asking to change that, they feel that you hold a gun and you want to shoot them'*. Another one said, *'They are marginalizing us'*. Another one said, *'up to date my job title is even a trainee, I wish even technical assistant'*.

Besides, ALPC P&Os during FGD complaint about the appraisal system as it was a generic appraisal for all employees of MoG regardless of profession, which didn't appraise technical work. They mentioned that they don't even know the result of their appraisal. One said, *'I personally don't know the results of my appraisal, they don't discuss it with me and I don't know what the items that they appraise me of, they send it to the MoG and I don't know about it'*. Another one said laughing, *'This comes top secret'*.

During the FGD with the ALPC P&Os, the salary issue was mentioned many times and it formed a big issue. One said *'Bring me work with 10 ILS a day and I will leave ALPC'*. Another staff said, *'I am in a financial crisis and I want my money from the MoG and this should be in the top of this study.'* Another point was raised that there was no fairness for the amount of salaries between P&O professionals. Salary issue was reflected on staff motivation to work which affects the production, as mentioned by the group. This was also mentioned by the technical coordinator, as she is the one who distributes cases between P&O staff.

As mentioned, the status of P&O staff is inadequate, and efforts should be made to resolve this issue. The recognition of the P&O staff as other health professionals with clear career structure, professional titles and profiles increases motivation, retention and personnel professional development, which in turn enhances service provision.

In regard to retention of P&O staff, three P&O staffs who completed their study CATII sponsored by ICRC have left Gaza. The reasons mentioned by the ALPC director during the KII were due to issues related to selection of candidates for the sponsorship. Other reason was due to the absence of agreement or contract to oblige graduates to stay; more reasons were due to MoG didn't provide permanent contract to graduates as agreed. He added that, with the financial crises of the MoG, there was no reported strategy in place to

retain personnel and this is not consistent with standard number 33 of WHO standards (2017), which is '*A strategy to retain prosthetics and orthotics personnel should be in place*'..

For gender considerations, at the time of data collection, out of the 13 clinicians, only 2 of them were female and work at one facility (ALPC), while in Hammad hospital there was no permanent female staff. In Gaza, people prefer female to be treated by female and vice versa and in many situations, male might prevent female to access services if female staffs are not available. Orthotic management requires assessment, and casting which require physical touch of sensitive areas, e.g. in spinal orthotics and in KAFO etc. We should keep in mind that the workforce should be gender-balanced and ensuring that girls, boys, women and men treated separately which makes services accessible to all (WHO, 2017).

5.2.3 Information System

The ALPC has a well-established database system, the system has been supported by the ICRC since 2013/2014. The researcher easily collected the full list including a lot of details and extracted the sample. The data base had been frequently used for monthly discussions and for reports and shared regularly with MoG. It had been also used for research purpose from different universities and researchers.

At Hamad Hospital, there is a database system; however, it was still under development as mentioned by the head of the P&O. It, in addition, requires improvement and the researcher faced difficulty to obtain the list and the statistics to evaluate the production level.

The database at both facilities are not coordinated and there is no available data at the national level on how many people require services, what are their types, and what are the unmet needs of orthotics. This was confirmed by the director of Hamad hospital who said, '*the people with scoliosis and kyphosis are underserved here in Gaza, we don't know their numbers, their distribution, where they are, their gender distribution, or geographical distribution, we don't have protocols or programs for them*'. Without data, it is difficult to plan and monitor the services adequately (WHO, 2017).

5.2.4 Financing System

The following information has been collected through a record check of all financial documents of the respondent's records (N=262 records), which is 100% of respondents.

The table illustrates those who covered the cost of the device and noted that the expensive devices were covered by two or more organizations; in addition to out-of-pocket expenses paid by participants.

Table (5.4): Distribution of Results Regarding Financing/covering the Cost of Orthotic Devices (N= 262) (Records based)

Good to add how much value oop from total and how much organizations provided in NIS

Item	Category	N°	Percent
Out-of-pocket expenses paid by participants (NIS)	0 to 35 NIS	174	66.4
	36 to 100	56	21.4
	More than 100 NIS	32	12.2
	Mean= 44.72, median=14, SD=68, min=0, max=310		
Contribution of organizations to the cost of orthotic devices of respondents beside out of pocket			
		N°	Percent
Contribution of UNRWA		128	48.9
Norway fund		79	30.2
Hammad hospital		33	12.6
ICRC		32	12.2
Olive kids		19	7.3
Japanese funds		17	6.5
ALPC		14	5.3
NGO		10	3.8
Other organizations		6	2.3
Health insurance		0	0

According to the records' check, 45% of respondents didn't pay any out-of-pocket expenses, while 55% spent averagely 81 NIS to the cost of the orthotic devices (min=6, max 310 NIS). The mean of out-of-pocket expenses for all study groups were around 45 NIS. Moreover, 66.4% respondents contributed by 0 to 35 NIS, while the rest contributed by 40 NIS and above. For users who continued using their devices for the rest of their lives, the devices could be difficult to replace or repair due to the out-of-pocket expenses and that was also reported in section 5.1.7 when the users being asked about the affordability to replace or repair. This scenario is similar to the situation in both Iran and

Sierra Leone, which suffer from socioeconomic challenges, and catastrophic expenditures (Shahabi, et al. 2020, Aenishänslin, et al., 2020).

Many complaints were raised by the users expressing their anger from paying expenses related to health and rehabilitation. They mentioned that even to acquire a report from MoH for their condition to present it for service providers costed them 30 ILS, namely, the PWDs cannot pay and might not access the service due to this reason; one said, *‘I swear God I don’t have 30 NIS for the hospital, see this has stopped the service’*. The users in the FGD stressed on the pressing need to have free service for the PWDs and to activate the MoSD card. One said, *‘we, PWDs, cerebral palsy, mental retardation etc, appeal for the MoH to provide us free service, why should we pay 30 NIS to issue a report for us’*.

This point was also mentioned by the MoSD responsible of disability file, who reported the challenges and efforts made with MoH to try to have agreement; he also mentioned and showed the researcher the MoU draft between MoSD and MoH, which includes free service for PWD, starting from some specific categories. Not only that, but he also mentioned that he plans a request for expanding the categories in the future, saying that *‘requesting all categories at once is not practical due to its financial requirements’*. He, in addition, pointed out the lack of government's awareness on the disability file in regard to employment, health needs, social needs etc.

One user in the focus group reported his inability to pay the out-of-pocket expenses and this has resulted in not attending to replace his broken device. He said, *‘a week ago, I phoned the ALPC to change my broken shoes of my long-leg brace; they told me that UNRWA now is not covering the cost, so I ended the call, I swear I cannot walk with the device, UNRWA is not covering the cost, that is not covering the cost, and that is not, where shall we go’*. Another person added, *‘the coverage of the cost of the device is a challenge’*.

In contrast, from the focus group conducted with spinal orthotic users, who don’t contribute to the device; parents reported their willingness to contribute into the cost of device aiming at improving its design, effectiveness or the material used, and that would be based on each one's financial abilities. A mother of a female adolescent with idiopathic scoliosis said, *‘If there is new material, if there is new device present abroad, we can help bring it, or if they have new ideas of a new device, we can also help make the material*

available, what if Qatar Funds stops? What shall we do? Wait the funds? This will not work'

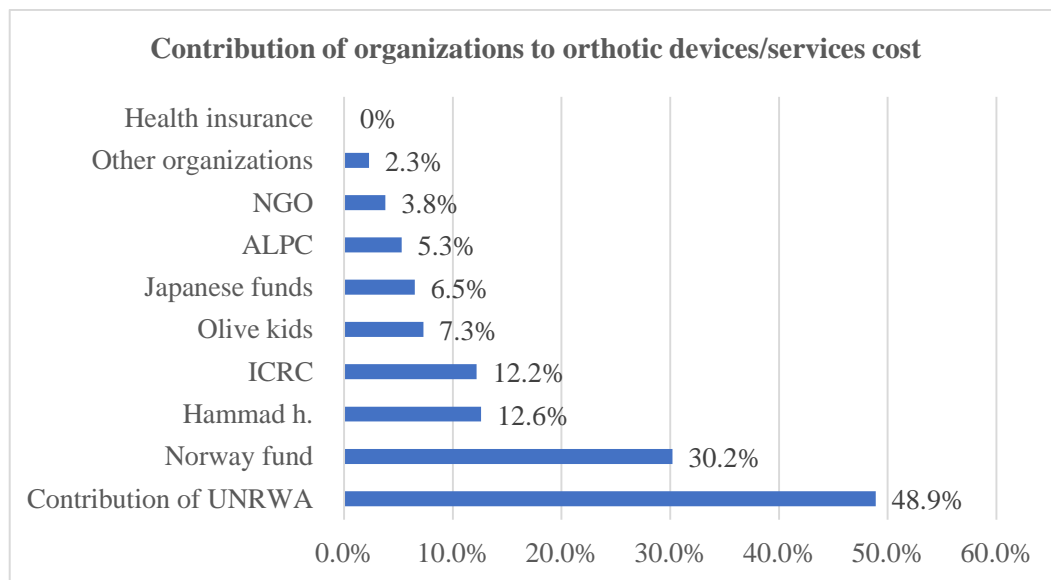


Figure (5.1): Contribution of organizations to orthotic devices/services cost

As shown in figure 5.1 and table 5.4, the devices' cost were covered by UNRWA who contributed into the cost of orthoses to 48,9% of the respondents, while Norway funds contributed to 30%, Hammad hospital contributed to 12.6%, ICRC to 12.2%, Olive kids to 7.3%, Japanese Fund to 6.5% and the rest is contributed by different organizations.

Regarding to KII with both directors of ALPC and Hamad hospital, they sought funds to cover the cost of material and orthotic devices; however, both had different strategies in regard to out-of-pocket expenses. As for ALPC, patients contributed to the cost of device by 20 to 30%, while at Hammad, users didn't pay any expenses and the service is totally free of charge.

It was mentioned that the service was delayed for some time in 2020 due to UNRWA's delay to cover the cost for the refugees, particularly at the ALPC. This delay was because of the short funding, as mentioned by UNRWA staff during the FGD. They added that there is a gap and planning issues from the service providers; one said, *'Me as a service provider should have plan B, in case UNRWA has suddenly stopped fund by 50% of this service, me as a service provider, will I shut down the service? I should have other sources that I can rely on in agreement with the donor'*. It was also mentioned and referred to the issue that there is no body to regulate the service provision in Gaza.

Findings show that neither health insurance, nor did MoSD cover the cost of orthoses. This is very far from the WHO recommended standard number 11 and 12 which states that ‘Prosthetics and orthotics services should be an integral part of universal health coverage’, and ‘Prosthetics and orthotics services should be included in national health and social insurance systems, like other health interventions’ (WHO, 2017). These results are consistent with the information collected from KII with MoH, MoSD, ALPC and Hamad hospital as there is no specified budget allocated by the government for orthotics or prosthetics since the government relies on service providers; this was mentioned by the Head of the MoH PRU during the KII saying that *‘There is a coverage from MoH for these devices as the MoH is aware that there are international organizations supporting these organizations, {he means both ALPC and Hamad hospital} and any thing comes we directly refer to them’*.

Findings are similar to the situation in Iran, where there are different stakeholders financing physical rehabilitation; however, some stakeholders like the Ministry of Health and the Parliament, who have the highest level of power and position, have lack sufficient interest in participating in physical rehabilitation financing-policies (Shabaninejad & et al., 2020). Other results are also varied with particularly low coverage of assistive devices found in Tanzania (0-4%) and rehabilitation in Brazil (18%), and the high coverage is found in Rwanda (87%) for physical therapy (Bright & Kuper, 2018).

During the FGD, service users expressed their concerns about the sustainability of the services and the devices' cost coverage from organizations, one of them said, *‘Today ICRC covers, UNRWA covers, after tomorrow UNRWA stops, the most important thing is the cost coverage’*.

Although, there is limited literature appraising the existing orthotic health economics making it difficult to inform orthotic policy and investment decisions, (Clarke & et al, 2019). It is worth mentioning that investment in orthotic services generates financial returns to individuals, their families, caregivers and the wider society as people would become healthier, needing less support and many of them could return to work (WHO, 2017).

5.2.5 Guidelines/Standards

Findings from facility checklist indicate that there were no available written protocols/guidelines for the delivery of orthotic services in both facilities; neither at the

national level nor at the orthotic services are standardized in Gaza. Some issues raised in this study, including referrals, wrong prescriptions etc, explain that all interviewed respondents from KII with both directors of facilities, UNRWA FGD, FGD of both ALPC and Hammad P&O Staff, MoH PRU had the same recommendation *‘To have a national guideline and policy to regulate the service’*. And as mentioned by UNRWA staff in the FGD, *‘this system is not integrated in the health care, and we should all work to integrate this into service’*.

Moreover, as mentioned by the director of the ALPC that a committee of guidelines for amputee management was established in 2019, but it was not active at the time of the data collection, he said *‘the committee has been established since 2019 but it is not active’*.

It is worth mentioning that the establishment of documented procedures and protocols helps ensure that orthotic services are consistent, effective and efficient in all phases of delivery (WHO, 2017). Additionally, WHO standard number 3 states that ‘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’ (WHO, 2017).

5.2.6 Leadership and Governance

Stakeholders and Coordination

It was found from the KII with all participants that both MoH and MoSD have a very poor role in orthotic services. The government relies on international support; it does not have any specific budget for orthotic service. Recently, MoH has started to have a leading role in coordination between the two facilities since the establishment of Hamad hospital; this was especially in prosthetics, but nothing is related to orthotics. This was confirmed in all FGDs and KIIs of both facilities and KII with MoH PRU. The MoH PRU director said, *‘We have the desire to coordinate services through a unified national program to regulate the service and to coordinate the service provision’*.

Although ALPC and Hammad hospital have an agreement for the distribution of work, but there is no practical coordination between them at a general level, specifically, in orthotics. There were discussions on formulating a committee for P&Os, as mentioned by the director of Hamad hospital who said, *‘we proposed a suggestion to the Deputy Minister of Health to formulate a rehabilitation committee and P&O committee’*.

Licensing Facilities and Professional Regulation of the Profession

Limited number of private facilities producing custom made devices exists, but the exact number is unknown. They produce mainly orthotic devices, and few numbers of prosthesis. However, the orthotic service is not properly regulated with the practice of many private sectors lacking certified staff as per FGDs and KIIs with the staff of both facilities. Most of the interviewed staff of both facilities have commented on the issues related to the private sector and their ethical issues when producing devices and managing people without supervision or formal education, one of the P&O staff said, *'for instance we have torsional splints we use Aluminium bars which is expensive while in the private they use metal which is heavy in weight but cheap in price and consume more energy for the beneficiaries, people don't that, the problem exists with the doctor who has benefit from the private orthotic providers and don't care about beneficiaries'*.

Meanwhile, *'MoH had nothing to do with the private orthotic providers'*, as said by MoH licensing department staff. Surprisingly, the private usually had been acquiring license from Ministry of Economy, as mentioned in the KII by MoH PRU and by MoH licensing department. The director of PRU said, *'They consider the private P&O workshops as a craft and therefore making a commercial register taking a license from the Ministry of Economy and the municipality'*. This was confirmed when the MoH licensing staff being asked, they said that *'We do not ask about them, neither from near nor from afar'* and *'as it is the responsibility of Ministry of Economy, we cannot bypass them'*. The staff at licensing department added, *'as long as we don't receive complaints from the community of those private providers, we don't act'*. In fact, people are less likely to complain because they simply do not know where to complain or do not even know about the role of licensing department and the less complaints reach the department, the less acts will be conducted.

Moreover, even though both Hammad and ALPC have license from Ministry of health, they only check the physiotherapy department at ALPC without checking P&O workshop. The same is occurred in Hamad hospital as they check the whole departments except P&O workshop, and as mentioned by MoH licensing staff, *'we just pass by P&O staff to say hi''*. However, they expressed their trust on both Hamad and ALPC since they are supported and supervised by international organizations.

Unfortunately, it was clear that the MoH licensing department staff had lack of information regarding of what is happening with prosthetic and orthotic services in Gaza. They only supervise ALPC and Hamad hospital for licensing procedures and don't have any policy or procedures in place for the private providers. This issue was raised by UNRWA admin

officer during the FGD, who said, *'I have been to the MoH licensing department before we contract the private medical shoes providers and prosthesis whom we deal with, I asked them if they have license like a doctor who opens a private clinic? As a hospital? No one answered me, and everyone referred me to the other'* The researcher herself suffered to meet someone from the licensing department to get the required information for this study and each one was referring her to the other.

There is no available pricing and cost calculations of products i.e. no protection of customers from the cost of services run by the private sector; this reflects the poor regulation of the profession. A prosthetic and orthotic association has been established recently in West Bank, yet it but still in the development phase and haven't received the license yet.

It was found from the interviews with service providers that NGOs and INGOs buy orthotic devices considering the low cost not the quality, and even do not take license of private facility or professional accreditation into consideration. And as said by the ALPC orthopedic consultant during the interview, *'If I am in a position of responsibility, even the institutions that buy services must be held accountable and know whether they are at all, I mean, if they are operating in a way that is not transparent, placing a question mark on this same institution'*.

Again, and as mentioned by policy makers through FGD with UNRWA, KII with both directors of facilities, MoH and MoSD that all issues occur due to the absence of policy and regulations by the government. All mentioned issues are not in line with WHO standards, in which prosthetics and orthotics service provision should be regulated by the State, according to standards number 5 (WHO,2017). Establishing policy and system for licensing services and accreditation of orthotic and prosthetic professionals contributes into making services more accessible, affordable, safe, effective, efficient and of higher quality (ibid).

5.3 Process

5.3.1 Orthotic Experience

Concerning with the type of devices in use at the time of the data collection, 29% were custom-made devices and 71% were ready-made devices and as table 5.5 shows the types of orthosis used by participants: 24% were using Dennis-Brown devices, 22.9% AFOs, 18,7% GVR/GVL braces, 14.9 % foot orthosis, 6.5% hip orthosis (for DDH), and 5.7%. KAFOs.

Table (5.5): Distribution of Responses Regarding Orthotic Experience (N=262)

Item	Category	N°	Percent
Type of device in use	Ready made	186	71
	Custom made	76	29
Orthosis currently in use	Dennis brown	63	24
	GVR/GVL brace	49	18,7
	Custom made AFO	40	15,3
	Foot orthosis	39	14,9
	Ready-made AFO	20	7,6
	Hip orthosis	17	6,5
	Knee ankle foot orthosis (KAFO)	15	5,7
	Torsional splint	8	3,1
	Thoracic Lumbo Sacral Orthosis (TLSO)	6	2,3
	Wrist hand orthosis (WHO)	3	1,1
	Knee orthosis	2	0.8
Duration since receiving current orthosis	Up to 6 months	100	38.1
	7 to 10 months	79	30.2
	11 months and above	83	31.7
	Mean=7.9, median= 8, min=1, max=14, SD=3.4		
Utilization/use of orthosis	Yes	137	52.3
	No	125	47.7
Reasons for not using orthosis (n= 125)	No need	55	44
	Not comfortable	58	46.4
	Other like cosmetic, fitting, etc	12	9.6
Wearing duration (N=141) (hours per day)	0.25 to 2 hours	34	24,1
	3 to 6 hours	46	32,6
	7 to 11 hours	38	27
	12 hours and above	23	16,3
	Mean=6.8 median=6, min=0.25, max=24, SD=5		
N° of orthoses to date users fitted before	1	155	59.2
	2	82	31.3
	3 and more	25	9.6
	Mean=1.6, median=1 SD=1.01, min=1 Max=10		
If respondents regularly receive physiotherapy from the orthotic facility	Yes	24	9.2
	No	238	90.8
If respondents regularly receive MHPSS from the orthotic facility	Yes	5	1.9
	No	257	98.1
If respondents regularly receive occupational therapy from the orthotic facility	Yes	8	3.1
	No	254	96.9
Services respondent they need from the orthotic service and didn't receive	Orthosis	12	4.6
	Physiotherapy	11	4.2
	Consultation by MDT, Dr led	3	1.1
	Assistive device	5	1.9
	Transportation	3	1.1
	Other	2	.8
	Nothing	226	86.3

It was found that most of the cases fitted with GVR/GVL braces were between 2 years and 6 years old with the majority of them are between 3 and 4 years. This is not consistent with the literature, which say that Genu valgum and genu varum are typical and physiological for a given age group, and corrected usually spontaneously and children do not normally need braces until about the age of six years (Fabry, 2010) & (Rerucha & et al., 2017) & (Foot Levelers Staff, 2018). It was also observed that many cases where prescribed foot abduction braces or orthopedic shoes to correct in-toeing by external doctors, whereby in-

toeing are mainly cosmetic problems and can be caused by tibial or femoral rotation, very rarely by a foot deformity (Fabry, 2010) & (Rerucha & et al., 2017). It means that foot abduction braces or orthopedic shoes are not effective and will not improve the rotational deformities. This issue is consistent with what was mentioned by the ALPC orthopedic consultant, who attributed it to the lack of knowledge of the referrers, saying *'sometimes I have to change the prescription for the patient; referring to the external doctor/referrer, he said that they should understand and know our capacity and the need of the patient. From these two points we can reach what is suitable for the patient'*.

Almost all respondents (99 %) received their orthosis at least before 3 months since the time of the data collection, with a mean duration of 8 months. This means that respondents have experiences with their devices before the interview, which make them more able to reflect on the device and service.

The results show that only 52.3% of respondents reported that they are using their devices, while 47.7% reported that they do not use their devices because of many reasons: 44% of those who don't use their devices (N=125) stated that there was no need to continue using the orthosis due to recovery, while 46.4% discontinued using the devices due to discomfort, and 9.6% are not using their devices for other reasons such as cosmetic, fitting, and weight, etc. In other words, 33.8% of these participants had a compliance issue, which led to not wearing their devices. This means that the waste of resources might be attributed to the lack of follow-up system, which should be in place to address any possible non-compliance.

Cosmetic reason was also pointed out during the FGD with the P&O staff who reported the need to have available material relevant for cosmetic appearance of devices especially for children. One P&O staff said, *'The available material is all brown, children need nice colors, the P&O staff have done it before and they wanted to change the color, but it doesn't work with the brown plastic, we need white color material to do so'*. Another one said, *'young children like small pictures as micky mouse printed on device, but this plastic sheet equals in price 10 of the available plastic that we use currently'*. Another one said, *'If we produce insoles customized to the foot, then users can use any shoes without having to use the shoes that we provide'*. This means that many factors contribute into the noncompliance including user's factors and service's factors, which should be both addressed. These results are consistent with the literature as found by a previous systematic

review, in which several reasons for not using the orthotic device were described including pain, discomfort and cosmetic factors (Swinnen & et al, 2015).

Besides, the respondents who reported compliance to their devices (N=141), 56.7% of them reported that they were wearing it up to 6 hours during the day, while the rest reported using it for more than 6 hours; the mean was 6.8 hours per day.

User training, including physiotherapy and occupational therapy, is critical to the outcome of orthotics treatment and helps maximize the benefits of the products; and users who have insufficient training may be at risk for injury (WHO, 2017). In this study, results find that only 9.2% of the study respondents received physiotherapy treatment jointly with the orthotic devices, and very few respondents received occupational therapy (1.9%). In addition to that, physiotherapy treatment was reported as needed and wasn't received by 4.2% of the study respondents. This was evident in the focus group conducted with users of spinal orthotics who insisted on having physiotherapy management in parallel with spinal orthotics. However, they complained that the physiotherapy sessions were not enough and not coordinated with orthotic department. A mother was complaining that the staff discontinued the physiotherapy sessions of her child, saying that *'they told us that the physiotherapy sessions should be together with the spinal device and we shouldn't only use the device'*.

User training should be part of the process. After identification and referral, the delivery of orthotics services should consist of assessment, fabrication and fitting, user training and product delivery as well as follow-up. This was recommended by WHO in the Standards for Prosthetics and Orthotics: Part 1 (WHO, 2017). Only 1.9% of the respondents reported that they received mental health intervention, and no one reported a need for it.

5.3.2 Documentation

As mentioned in the methodology, 262 records of the study sample were assessed, the results showed that 94.3% of the records have available referral form, whereas 5.3% didn't have any referral form. A problem in documenting patients' history was detected as shown in table 5.6, as only 20.6% of the files had their history documented. The diagnosis was documented in 89.3% of the referrals, while 10.7% of the referrals didn't have any diagnosis documented. The lack of information and history of patients affected the quality of orthotic intervention as mentioned by the ALPC orthopedic consultant, who said that *'by*

the time, the orthosis is ready for fitting, the patient might be cured, and this is due to the lack of proper history and the lack of information in the referral’. He stressed on the need to have a full-documented history that allows for proper management.

Table (5.6): Documentation status of the files reviewed (N=262)

Item	N	%
Availability of the following forms		
Referral from	247	94.3
Orthotic assessment form	20	7.6
Progress notes	46	17.6
Financial document	237	90.5
Discharge notes	260	99.2
Documentations related to Referral form		
Patient's history notes	54	20.6
Clear diagnosis documented	234	89.3
Notes of interventions	43	16.4
Notes of investigations	23	8.8
Device request	236	90.1

In both facilities, self-referral was mainly accepted for people with amputations. On the other hand, the referral of orthotics could be accepted as long as it is prescribed by a doctor regardless of any institution, then the assessment and evaluation of orthotics are done through the MDT, which is led by orthopedic consultant through the biweekly clinic, in which the referrals and prescriptions are reviewed.

Clear written request of devices from external organizations, including MoH, NGOs and private doctors was documented in 90.1% of the files, while 9.9% were not included. Only few files (7.6%) included orthotic assessment form, and only 17.6% included progress notes. Although, 90.1% of referrals documented clear request of devices, but not all were a correct prescription as it was raised in the KII with ALPC director, FGD with both P&O staff of ALPC and Hamad hospital. This was also raised in the FGD with UNRWA, who mentioned that UNRWA have general practitioner and relies on MoH orthopedic doctors for the order of needed devices; as described by UNRWA staff, *‘they just copy paste the prescription’*, *‘when the case attends, we don’t reconfirm’*. This issue was excused by the orthopedic consultant of the ALPC who justified that by saying *‘UNRWA doctors rely on the prescription of the specialized doctors and they cannot change the prescription’*. Another issue was raised during the FGD with UNRWA, which as it is said *‘there is no specialized clinics inside MoH to deal with those cases* stressing on the need to train UNRWA doctors on the basics of orthotics, which could cover this gap. This point goes in

line with WHO recommendations as when prosthetics and orthotics services are mainstreamed into health care systems, training should also be provided for primary health care personnel, who are often the best source of referrals and follow-up (WHO, 2017).

Another issue was raised about the conflict of opinions' difference among doctors on the prescriptions, which makes it difficult for the ALPC to deal with those cases. UNRWA also stressed the need to regulate this service saying that '*there is no father for this service*'.

However, both facilities have one orthopedic consultant who assesses users together with the P&O and physiotherapist, additionally to decide the proper intervention including devices, related PT, etc. From the FGD with P&O professionals of both facilities to KII with UNRWA, all reported that they receive referrals from the community including MoH, NGOs, and private. However, they raise issue with the referrals such as incorrect prescriptions and over prescription, which is difficult to change due to the people's insistence on the prescription or the conflict of deference of opinions among doctors. This creates a challenge for providers whether to accept or to refuse. The ALPC orthopedic consultant attributed this issue to the lack of knowledge and experience and recommended doctors to have advice and contact him for recommendations.

Moreover, financial document was found in 90.5% of the files and discharge notes were almost documented in all files (99.2%). Documentation including therapists, orthotists, physicians' notes must be accepted and accorded a high level of status as well it must be part of the patient's total medical record for clinical, medical necessity determinations and reimbursement purposes (Fisk & et al, 2016). In America, since Feb. 2018, the Orthotist and Prosthetist notes have been officially part of the medical record for purposes of Medicare medical necessity and claims audits. And that came after the former President Trump have signed that legislation related to the orthotic and prosthetic provision into law as the following: SEC. 50402. Orthotist's and Prosthetist's Clinical Notes as Part of the Patient's Medical Record (American Prosthetic and Orthotic Asssociation, 2018).

In USA, Centers for Medicare and Medicaid Services have very specific documentation requirements that apply to typical off-the-shelf and custom orthotics, as whenever a Medicare provider supplies and bills, the documentation must include specific detailed written order and proof of delivery, which must be retained for at least seven years (Medicare, 2020). The detailed written order must include patient name, Physician name, Date of order, Detailed description of item(s), Physician signature and signature date.

5.3.3 Accessibility

This study highlights many areas related to transportation, location, distance, etc according to respondents' feedback as presented in table 5.7 .

Table (5.7): Distribution of Responses by Accessibility Related Variables (N=262)

Item	Category	N°	Percent
Easy accessibility of orthotic facility	Strongly agree	10	3.8
	Agree	159	60.7
	Neither agree nor disagree	13	5.0
	Disagree	80	30.5
Type of transportation used to reach facility	Public	231	88.2
	Private	29	11.1
	Walking	2	0.8
Availability of public transportation	Regularly available	145	55.3
	Sometimes available	103	39.3
	Rarely available	14	5.3
Affordability of transportation cost	Affordable	84	32.1
	Reasonably affordable	118	45.0
	Not affordable	57	21.8
	NA	3	1.1
Distance to reach the facility	Short	9	3.4
	Reasonable	97	37.0
	Relatively long	104	39.7
	Very long	52	19.8
Location of facility	Good	113	43.1
	Moderate	112	42.7
	Bad	37	14.1

Table 5.7 shows that 30.5% of users disagreed that the orthotic facility is easy to access, whereas 59.5% reported that the distance to reach the facility is long, while 37% said it is reasonable, only 3.4% mentioned that it is short. The users used different ways to reach the facility, in which 88.2% used public transportation, 11.1% used private transportation and 0.8% walk to reach the facility. More than half of the users said that the transportation was regularly available, while 39.3% said it was sometimes available and 5.3% said it was

rarely available. The transportation cost was reported affordable by 32.1%, while 45% mentioned that it was reasonably affordable and 21.8% said it was not affordable. As previously mentioned, most of users were poor and do not have income. Therefore, transportation cost might affect their ability to access the orthotic facilities, and this was more difficult for those who require custom-made devices that require many visits for assessment, casting, fitting, training, follow up, repair, and replacement etc. These challenges might hinder the abilities of PWDs to access orthotic workshops or rehabilitation services due to distance, costs, availability of transport, or lack of personal assistance (Magnusson & et al, 2014).

On the other hand, the location of the facility was reported as good by 43.1% of users, while 42.7% reported it as moderate and 14.1% reported it as bad location. On average, a country will require one to three prosthetics and orthotics service units per 1 million population; however more precise figures are still not studied well (WHO standards, 2017). This means that in Gaza there should be two to six service units to cover the needs of 2 million population, while we have only two main facilities, which are located in the North and Gaza city. This might be the explanation of the low number of people who are served from Rafah. In the FGD with ALPC service users, one user with poliomyelitis mentioned that since he started to receive his device from ALPC, he feels happy and comfortable as he, in the past, had to travel to Jerusalem to receive devices, but currently whenever he needs a repair of his device, he goes immediately to ALPC. He said, *‘My device was broken 3 to 4 times a year, so I had to travel to Jerusalem, since ALPC has been established, it is very good, very good, it comforts me as it is very close to me and the system is better’*. However, in the same FGD the service users recommended to have another branch in the south for the people who have difficulty to reach ALPC due to expenses. A person said, *‘if there is a second branch for the ALPC in Rafah or Khanyounis, this will make the service near to the people’*.

WHO stated that there is a substantial morbidity and functioning information gap and inadequate data on service access and coverage; this is due in part to the lack of, missing, and comparable data’ (WHO, 2017). However, commonly reported barriers, including geographic accessibility (distance to service, lack or cost of transport), affordability (of services, treatment, lack of insurance), availability of services, and acceptability-related factors (including perceived need, fear, and lack of awareness about the service), additionally to the quality of services, were resulted from (22) conducted studies that evaluated barriers to accessing rehabilitation (Shakespeare & et al, 2018).

5.4 Outcomes/Output

5.4.1 Range of Services Provided

Wide range of orthotic products are available in Gaza which almost suits local needs and realities. Despite that and as said by the ALPC Orthopedic Consultant, *‘there is no place in the world provides all services, but is it satisfactory or not? I envision our services above satisfactory, especially considering the situation in Gaza regarding security aspects, borders, economic aspects. The status is above good. Of course, sometimes mistakes and excesses happen, but in general the service is good’*.

According to the interviews with service providers, since its establishment, ALPC provides a wide variety of prosthetic services and orthotic services both custom and ready-made devices for upper and lower limbs and spinal braces. That offered until the Hamad hospital established and has had an agreement together with ALPC to distribute work, mainly, for prosthetics, yet in orthotics, both should produce all types, except the spinal orthotics; it was agreed to be produced at Hamad hospital only. At the time of the data collection, the Hamad hospital was not providing ready-made devices or orthopedic shoes but was mainly producing AFOs.

ALPC also have been producing conventional devices such as torsional splint, GVR/GVL braces, and long-leg brace. Apart from that, ALPC had different types of readymade devices such as AFOs, foot orthosis, abduction brace, hip orthosis, foot abduction braces, spinal corsets and orthopedic shoes. All these services target all age groups, both male and females.

The ALPC P&O staff during the FGD and the ALPC director through the KII, suggested producing ready-made devices such as foot insoles, orthopedic shoes, spinal corsets, knee brace, elbow brace at the ALPC instead of purchasing them from the local and external markets.

5.4.2 Production Level

The total numbers of people requiring orthotic service is difficult to estimate due to the unmet need that almost existing and the significant numbers of people that receive the shelf devices from the pharmacy as well as other assistive device providers. As table 5.8 shows, in 2019, there were 2121 orthotic devices supplied to 1482 people, while there were 1771 orthotic devices supplied to 1228 in 2020 from the ALPC.

Table (5.8): Statistics from Both Facilities

Facility/year	No. of people served with orthosis	No. of orthosis produced	Source	Available P&O human resources	WHO recommendations (2017)
ALPC 2019	1482	2121	PMS system, ALPC	13 clinicians and 4 non-clinicians work at both Hamad and ALPC.	a clinician (supported by non-clinical personnel) can be expected to provide complete services to 300–600 users per year.
ALPC 2020	1228	1771			
Hamad 2019	26	40	Head of P&O department, Hamad hospital		
Hamad 2020	48	86			

These statistics are lower than of what expected by WHO standard, in which (13) P&O clinicians working at both Hamad and ALPC are expected to provide complete services to (3900 to 7800) users per year according to WHO standards- implementation manual pg 57 (WHO, 2017), which states that 'In a standard prosthetics and orthotics service unit, a clinician, supported by nonclinical personnel, can be expected to provide complete services to 300–600 users per year, including first provision, renewals, follow-up and maintenance and repairs'. Bear in mind that the number of users who can be assisted depends on the type and complexity of treatments. Another reason could be attributed to the impact of COVID-19 restrictions during 2020.

Moreover, the production could be affected by the staff motivation, as mentioned during the FGD with ALPC P&Os who showed dissatisfaction about their work situation and the salary issues; one said, *'my psyche is tired because we don't take full salary, so we cannot work with our full energy'*. Another said, *'give me my right then hold me accountable'*. Another complaint from the unfair salary scale said, *'when I find one who started working yesterday and takes 3000 NIS and myself a specialist and act as a doctor, how I will work'*.

5.4.3 Satisfaction about Device and Services

The researcher used OPUS questionnaire to measure the satisfaction about both the device and the services (Jarl & et al., Validity Evidence for a Modified Version of the Orthotics and Prosthetics Users' Survey, 2012). It was found that the total user satisfaction about the device was 3.2 out of 5 as shown in table 5.9 & table 5.10.

Table (5.9): Distribution of User's Responses Regrading Satisfaction about the Device Itself - OPUS – Satisfaction about Device Scale.

Item description		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Mean
Fitting well (n=262)	N	10	75	7	164	6	3.31
	%	3.8	28.6	2.7	62.6	2.3	
Manageability of device weight (n=262)	N	4	42	16	194	6	3.6
	%	1.5	16	6.1	74	2.3	
Comfortability (n=260)	N	9	108	18	122	3	3.01
	%	3.4	41.2	6.9	46.6	1.1	
Easiness to put on orthosis (n=262)	N	9	59	24	166	4	3.37
	%	3.4	22.5	9.2	63.4	1.5	
Looks good (n=262)	N	6	27	15	210	4	3.68
	%	2.3	10.3	5.7	80.2	1.5	
Durability of the device (n=261)	N	1	20	7	227	6	3.83
	%	0.4	7.6	2.7	86.6	2.3	
Clothes free of wear and tear from orthosis (n=260)	N	1	36	8	211	4	3.7
	%	0.4	13.7	3.1	80.5	1.5	
Skin is free of abrasions and irritations (n=261)	N	7	65	7	180	2	3.4
	%	2.7	24.8	2.7	68.7	0.8	
Orthosis is pain free to wear (n=261)	N	6	90	19	144	2	3.18
	%	2.3	34.4	7.3	55	0.8	
Affordability of out-of-pocket expenses to purchase and maintain orthosis (n=209)	N	25	140	30	14	0	2.16
	%	9.5	53.4	11.5	5.3	0	
Affordability to repair or replace orthosis as soon as needed (n=210)	N	24	147	25	14	0	2.14
	%	9.2	56.1	9.5	5.3	0	
Overall							3.22/5

The highest score was for the durability of the device (with a mean score of 3.83), where 88.9% of the study group agreed that their devices were durable while only 8% disagreed. On the other hand, the lowest satisfaction about the device was the affordability to repair or replace the device (with a mean score of 2.14) as only 5.3% agreed their ability to

afford repairing or replacing orthosis as soon as needed, while 65.3% disagreed. Only 5.3% agreed on the affordability of out-of-pocket expenses to purchase and maintain orthosis (N=209), while 62.9% disagreed. This was also pointed out in the focus group with orthotic users, who complaint from out-of-pocket expenses that might stop the access to service.

The results are different from a previous study which reported that the highest satisfaction with well-fitting of device was (2.6 ± 0.8), and the lowest satisfaction was for the appearance of the device (1.6 ± 1.4) (Kamir & Hooman, 2011). Well-fitting of the device was reported by 64.9% of the study group, while 32.4% disagreed and 2.7% neither agreed nor disagreed. Manageability of device weight was agreed by 76.3%. On the other hand, it was not agreed by 17.5%. Many points related to the device were raised during the FGD with orthotic users of ALPC. One person who uses KAFO commented on the fitting, *'The device is good, light weight, comfortable, I walk around here and there with the device comfortably'*. Another female participant who uses AFO and has a drop foot said, *'The device improved my foot and my walking, I cannot walk without it, it is comfortable'*. Another participant of the FGD of Hamad users who is a mother of female adolescent with idiopathic scoliosis, said, *'There was skin issue similar to burn and this is due to the force applied to correct the deformity, it is good as it is a sign of effectiveness of the device, of course we used skin ointment'*. These side effects can be mostly controlled by meticulous modifications of the brace and skin hygiene (Kuroki, 2018).

Comfortability of device was reported by 47.7%, while 44.6% of the study group reported concerns about the comfortability of devices. This could be due to pain, which was reported by 36.7% of the study group, or perhaps due to skin irritation and abrasions resulted from the use of orthosis as reported by 27.5% of the study group. This was also raised in the focus group of spinal orthotic users, who reported skin irritation and change of skin color; however, it was accepted and understood as a normal reaction to the force of the device to correct the deformity.

Putting on orthosis was reported as easy by 64.9% of the study group, while 25.9% disagreed. Of respondents, 82% agreed that their clothes were free of wear and tear from orthosis, while 14.1% disagreed and 81.7% of the study group agreed that their devices look good, whereas 12.6% disagreed. In the focus group with users, one female user said, *'I don't want to change my broken AFO as I am afraid that they produce for me a big size*

AFO'. She was concerned about the appearance of the device as she was not confident if they can produce the same as the broken one or not. This is understood especially with young adult female user aged 23. Another related issue was raised during the FGD with P&O staff, who proposed that there should be available material for ensuring the nice look of devices, especially for children, as well as, to try to fit other devices to ensure adherence such as producing custom-made insoles so that service user can then use whatever shoes they prefer instead of having to use orthopedic shoes.

On the other hand, for service satisfaction, the highest score was with the proper level of courtesy and respect by the staff, with a mean score of 4.11; and this was confirmed through the service user FGD, who expressed their satisfaction and respect by the staff. The least satisfaction was about the appointment with orthotist, with a mean score of 3.15. This is consistent with what was said by one parent, who was disappointed and said, *'I have waited one year to have appointment for my child'*'. And another parent said, *'I was calling asking them for around two months to bring my daughter to check up what happened with her, but they did not respond, they didn't give appointment, then I contacted a doctor that I know, she knows a colleague at this facility, she spoke to her about my daughter's situation, and asked for appointment for reevaluation of my child, so it was by a mediator to come here and then they produce for her the spinal device'*. People who receive timely orthotic care has comparable or lower total health care costs than a comparison group of untreated people (Dobson & et al, Economic value of orthotic and prosthetic services among medicare beneficiaries: a claims-based retrospective cohort study, 2011-2014., 2018).

The mean of the other variables of satisfaction of service were all above the score 3.5. The results are different from a previous study as the highest satisfaction was for showing an appropriate level of courtesy and respect by staff, and the lowest satisfaction was for coordination between O & P staff and the users' therapists and doctors (Kamir & Hooman, 2011).

**Table (5.10): Distribution of User's Responses Regarding Satisfaction about Services-
(N=262)**

Item description		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Mean
Appointment with orthotist was within a reasonable amount of time	N	21	77	13	144	7	3.15
	%	8	29.4	5	55	2.7	
Proper level of courtesy and respect by the staff	N	2	2	1	216	41	4.11
	%	0.8	0.8	0.4	82.4	15.6	
Waiting a reasonable amount of time to be seen	N	3	11	9	229	10	3.89
	%	1.1	4.2	3.4	87.4	3.8	
Clinic staff fully informed SU about equipment choices	N	1	11	102	146	2	3.52
	%	0.4	4.2	38.9	55.7	0.8	
Opportunity to express concerns regarding equipment (was given by orthotist)	N	3	15	21	221	2	3.78
	%	1.1	5.7	8	84.4	0.8	
Responsiveness of orthotist was responsive to SU's concerns and questions	N	2	5	19	234	2	3.78
	%	0.8	1.9	7.3	89.3	0.8	
Satisfaction with the training received in the use and maintenance of orthosis	N	2	17	23	219	1	3.76
	%	0.8	6.5	8.8	83.6	0.4	
The orthotist discussed problems SU might encounter with their equipment	N	2	18	24	217	1	3.75
	%	0.8	6.9	9.2	82.8	0.4	
Staff coordination of SU's services with therapists and doctors	N	0	6	18	232	6	3.91
	%	0	2.3	6.9	88.5	2.3	
SU was a partner in decision-making with clinic staff regarding care and equipment	N	0	6	81	175	0	3.65
	%	0	2.3	30.9	66.8	0	
Overall							3.73/5

Among the respondents, 85.2% reported that the staff gave them the opportunity to express concerns regarding equipment; similar results with slightly lower satisfaction (80%) were reported by Magnusson & et al (2014). On the other hand, 83.2% agreed that the orthotist discussed problems service user might encounter with their equipment. Responsiveness of orthotist to SU's concerns and questions were agreed by 90.1% of the study group and was disagreed by 2.7%. The results were consistent with the FGDs, in which service users expressed the responsiveness of orthotists to their concerns and questions. A mother of a spinal orthotic user said, *'I had some comments on the spinal orthotic of my daughter, as I can see things that the orthotist doesn't see. I requested adjustments and suggested a strap to connect the device with the shoulder as I saw that in the internet; and that wasn't*

available in the orthotic facility. I bought it and brought it to the orthotist, and he made it and responded. If someone else, he wouldn't respond'.

Most of the respondents (91.2%) agreed that they waited a reasonable amount of time to be seen, while only 5.3% disagreed. This result is consistent with the FGD conducted with service users, who were satisfied and didn't complain about the waiting time to be seen. A mother said, *'there is no waiting time, it doesn't take long to be seen'*. Another parent said, *'there might be delay 15 minutes, 30 minutes, 10 minutes only'*.

Most of the study group (90.8%) reported that there was staff coordination of SU's services with therapists and doctors, while 2.3% disagreed. In the FGD conducted with spinal orthotic users/parents, they complained about the poor coordination between physiotherapists, orthotists and the external doctors. One of the parents complained about the difficulties they experienced when the family discovered that there was a problem with the spine of the child, child with congenital spinal deformity. They expressed that they had to go to many doctors who had different opinions related with his child case, whether to go for surgery or physiotherapy or orthotic intervention. Another parent complaint about her concerning with her daughter prognosis, saying *'We don't know for how long she will be using her spinal device; we want something quick and guaranteed, means give us hope and avoid fear'*. One other point was raised by parents in the focus group of spinal orthotic users, who complaint about follow-up schedule, requesting clear follow up system. It was also clear that parents were confused about doing x-rays for their children. One said, *'they told us not to do more than two times. And another mother was asking parents 'from time to time, how long should we do x-ray? as now we haven't done for one year'*. Another parent said *'we do every two to three months'*. From the discussions, it was clear that parents didn't receive proper information from the orthotic staff.

Of the study group, 66.8% agreed that they were partner in decision-making with clinic staff regarding with care and equipment, while 2.3% disagreed. Satisfaction with the training received in the use and maintenance of orthosis was agreed on by 84% of the study group and was not agreed by 7.3%, with a mean score of 3.76.

The average score satisfaction of services was 3.73 out of 5. which was higher than that of satisfaction of device that was 3.2/5. The study results were different to the results in Taiwan where satisfaction of the device was 3.74, which is higher than services that was

3.56/5 (Chen & et al, 2014). in opposite, in Malawi people were quite satisfied with their device, with a mean of 3.9/5; and very satisfied with the service provided, with a mean of 4.4/5, despite reporting the pain associated with the use of device and difficulties ambulating on challenging surfaces (Magnusson & et al, 2013).

In summary and as shown in the summary table 5.11, the majority of respondents (79%) scored their satisfaction level about device (between 41% to 50%), while only 7.6% of respondents scored it above 50% and 13.4% scored it up to 40%. On the other hand, satisfaction about service was scored above 50% by around 30% of respondents, while the rest scored it below 50%. Satisfaction in the orthotic and prosthetic field depends on how well patients' experiences met their expectations for both the devices and the services provided by practitioners and facilities (Peaco & et all, 2011).

Table (5.11): Summary of users' satisfaction about device and service According to OPUS Criteria n=262

Respondents' satisfaction about device -11 items OPUS scale		
Satisfaction Level	Frequency	%
Score is 11 to 29.9 (Up to 40%)	35	13.4
Score is 30 to 41 (41% to 50%)	207	79
Score is 41.1 to 55 (above 50%)	20	7.6
Mean= 35.37 out of 55 (45%), minimum score is 13, maximum score is 47		
Respondents' satisfaction about service -10 items OPUS scale		
Satisfaction Level	Frequency	%
Score is 21 to 36 (33 to 45%)	75	28.6
Score is 36.1 to 39 (46 to 50%)	108	41.2
Score is 39.1 to 46 (51 to 70%)	78	29.8
Score is 46.1 to 50 (above 70%)	1	0.4
Mean= 37.4 out of 50 (45%), minimum score is 21, maximum score is 48		

The overall mean score of satisfaction about services was 37.4 out of 50 (i.e. 45% based on OPUS table of measure) and the overall mean score of satisfaction about device was 35.4 out of 55 (i.e. 45% based on OPUS table of measure). These results are lower average and require attention and efforts to be exerted to improve satisfaction about both the device and the service.

These results could be happened due to the previously mentioned multiple issues related to the comfortability of device, cosmetic issues, fitting, affordability, distance to travel, location, accessibility etc.

5.4.4 Users' Perception about Quality of Life

Users were asked 23 questions (OPUS scale) about their perception about their quality of life, some of the questions reflects how often they feel during a week since the time of the data collection.

As table 5.12 shows, 15.2% of the study group had problems in the amount keeping self to avoid people's reactions to a need for a device. In addition, the extent users found people's attitudes toward their physical condition were insulting was rated excessively by 13.7% of the users and a great deal by 9.5%.

Table (5.12): Distribution of Users' Responses by Quality of Life - OPUS scale (N=262)

	Item		Excessively 0	A great deal 1	A fair amount 2	A little 3	Not at all4	NA	Mean
1	Amount keeping self to avoid people's reactions to a need for a device	N	15	25	29	24	158	11	3.14
		%	5.7	9.5	11.1	9.2	60.3	4.2	
2	Extent users find people's attitudes toward their physical condition are insulting	N	36	25	28	28	134	11	2.79
		%	13.7	9.5	10.7	10.7	51.1	4.2	
3	Extent users prevented from doing what they want because of the social attitudes, the law, or the environmental barriers	N	31	28	28	19	146	10	2.88
		%	11.8	10.7	10.7	7.3	55.7	3.8	
4	Amount of pain interferes with user activities (including both work outside the home and household duties)	N	29	24	20	24	145	20	2.96
		%	11.1	9.2	7.6	9.2	55.3	7.6	
5	Extent user accomplishes less than they would like because of their physical condition	N	33	27	28	19	144	11	2.85
		%	12.6	10.3	10.7	7.3	55	4.2	
6	Extent user accomplish less than they would like because of emotional problems	N	25	13	28	28	157	11	3.11
		%	9.5	5	10.7	10.7	59.9	4.2	
7	Amount physical condition restrict user ability to run errands N = 52 (13 years and above)	N	20	5	8	4	15	0	1.79
		%	38.5	9.6	15.4	7.7	28.8	0	
8	Amount of physical condition restrict user ability to pursue a hobby	N	40	25	31	21	133	12	2.73
		%	15.3	9.5	11.8	8	50.8	4.6	
9	Amount of physical condition restrict user ability to do chores	N	36	26	24	18	145	13	2.84
		%	13.7	9.9	9.2	6.9	55.3	5	

	Item		Excessively 0	A great deal 1	A fair amount 2	A little 3	Not at all 4	NA	Mean
10	Amount of physical condition restrict user ability to do paid work N = 52 (13 years and above)	N	21	8	1	4	18	0	1.81
		%	40.4	15.4	1.9	7.7	34.6	0	
11	Extent user have cut down on work or other activities because of physical condition	N	39	21	13	16	158	15	2.94
		%	14.9	8	5	6.1	60.3	5.7	
12	Extent user have cut down on work or other activities because of emotional problems	N	23	21	19	16	172	11	3.17
		%	8.8	8	7.3	6.1	65.6	4.2	
	During the past week, how often have you...		All the time	Most of the time	Some of the time	A little of the time	None of the time		Mean
13	Feeling full of life	N	5	26	84	83	64		2.67
		%	1.9	9.9	32.1	31.7	24.4		
14	Feeling calm and peaceful	N	7	22	81	88	64		2.69
		%	2.7	8.4	30.9	33.6	24.4		
15	Having a lot of energy	N	4	16	36	100	106		3.1
		%	1.5	6.1	13.7	38.2	40.5		
16	Being happy	N	7	23	79	90	63		2.68
		%	2.7	8.8	30.2	34.4	24		
17	Being very nervous	N	48	54	84	57	19		2.21
		%	18.3	20.6	32.1	21.8	7.3		
18	Feeling so down in dumps that nothing could cheer user up	N	99	45	63	42	13		2.67
		%	37.8	17.2	24	16	5		
19	Feeling downhearted and depressed	N	164	33	35	20	10		3.23
		%	62.6	12.6	13.4	7.6	3.8		
20	Feeling worn out	N	171	20	40	21	10		3.23
		%	65.3	7.6	15.3	8	3.8		
21	Feeling tired	N	170	22	40	19	11		3.23
		%	64.9	8.4	15.3	7.3	4.2		
22	Being easily bothered or upset	N	76	53	67	49	17		2.47
		%	29	20.2	25.6	18.7	6.5		
23	Had difficulty concentrating or paying attention	N	181	24	27	19	11		3.32
		%	69.1	9.2	10.3	7.3	4.2		
	Overall								2.8

There were issues found with the amount physical condition restrict user's ability to run errands with a mean score of 1.79/4 (using the rating scale from 0 'extremely' to 4 'not at all'); and the amount physical condition restrict user ability to do paid work with a mean score of 1.81/4.

Other questions (using the rating scale from 0 ‘none of the time’ to 4 ‘all of the time’) were asked to users about how often they were very nervous/ being easily bothered during the past week, the response mean score was 2.21/4 & 2.47 respectively. The rest of the variable scores found, were between the mean score of 2.73 and 3.17 in the first part from question 1 to 12 (using the rating scale from 0 ‘extremely’ to 4 ‘not at all’), while it was between 2.68 and 3.32 in the second part from question 13 to 23 (using the rating scale from 0 ‘none of the time’ to 4 ‘all of the time’). As for the amount of pain interferes with user activities (including both work outside home and household duties), it was rated excessively by 11.1% of the study group, and a great deal by 9.2%.

While the extent that users were prevented from doing what they wanted because of the social attitudes, the law, or the environmental barriers, was rated excessively by 11.8% of the study group and a great deal by 10.7%. This point was raised in the FGD conducted with service users; they suffered from being stigmatized in terms of getting married as they complaint about the lack of awareness on the institutions' policy of employing PWDs. This also was raised by the MoSD head of disability file, who reported the lack of awareness, which found not only in NGOs and private, but also in the government itself. One user said, ‘*The government is against the PWDs*’. Users also complained about the neglecton of the PWDs, one said, ‘*The government is against us*’ complaining about the cost of health services and the issue of losing these services due its cost, requesting thereby to have free health services for all PWDs. It was interesting, during the FGD with SUs, where they encouraged each other to participate in the upcoming elections, hoping to change the status of PWDs and to have better quality of life.

Users reported many reasons that had cut down work or other activities. The first reason is because of their physical condition, which was rated excessively by 39% of them, with a great deal by 21%. The second reason found is because of the emotional problem, which was excessively rated by 8.8% of users, with a great deal by 8%. When asked about feeling full of life, 11.8% of respondents answered 'non' or little of the time, while 24.4% answered all of the time. Moreover, being very nervous, 7.3% and 21.8% answered all of the time and most of the time, respectively, but 18.3% answered none of the time and 20.6% answered a little of the time.

PWDs often have lower QoL than people without disabilities and this was confirmed by (Magnusson, L, & et al., 2019), who studied (277) participants from India; the study concluded that PWD using orthoses and prosthesis experienced lower QoL in terms of the physical health, psychological, and environmental domains than did people without disability. Similarly, in Palestine, children with disabilities suffer from lack of access to health care, which had significant implications for their QoL (Jones & et al, 2016).

A scoping literature review was conducted and concluded that there were many gaps in the evidence base, in measuring inclusion, participation, and QoL for orthosis and prosthesis users in resource-limited environments; it recommended doing a future structured evaluation of orthotic interventions/services to inform policy development (Ikeda, 2014). This also was confirmed by (Healy & et al., 2020), in their literature review aiming at assessing the effectiveness of prosthetic and orthotic services.

Generally, as shown in table 5.13, which shows according to OPUS scale classification, that the OoL scores were low, which reflected a poor quality of life for the study group. The raw scores were converted to Rasch Measure (0-100 scale) as shown in table 5.13. It was found that 21% of the study group have their level of QoL up to 50%, while 68% experience a level between 51% - 70%; only 11% experience a level above 70%.

Table (5.13): Summary of users' quality of life -23 Items OPUS Scale N=262

Level of QoL	Frequency	Percent
0 to 41%	18	6.9
42 to 50%	37	14.1
51 to 60%	72	27.5
61 to 70%	106	40.5
71 to 100%	29	11.1
Mean= 65, Median=72, Min=4, Max=88		

5.4.5 Lower Extremity Functional Status of the Study Group

As table 5.14 shows, the lower extremity functional status of the study group (aged above 3 years), 6% have their level of function 0%, 44.1% have 8% to 50%, while 49.8% have their functional level above 50%. The mean score was 40.2, which is between 41% to 50% level of function as shown in table 5.15. The lowest score was 1.08 walking up for two hours with 82.9% had difficulties followed by the score 1.2, which was putting on and taking off orthosis with 71.8% had difficulties.

Around two-third of users (65%) had the ability to move around indoors and on level surfaces, but 58.9% had difficulties walking outside on uneven ground and walking up a steep ramp 60.1%.

Table (5.14): Distribution of Responses by Lower Extremity Functional Status (above 3-year-old, N=163)

Item		Cannot do this activity 0	Very difficult 1	Slightly difficult 2	Easy 3	Very easy 4	Mean
Getting into and out of the tub or shower	N	21	21	39	64	18	2.23
	%	12.7	12.7	23.6	38.8	10.9	
Dressing their lower body	N	20	23	39	64	17	2.21
	%	12.3	14.1	23.9	39.3	10.4	
Getting on and off the toilet	N	19	18	24	84	18	2.39
	%	11.5	11	14.7	51.5	11	
Getting up from the floor	N	21	24	28	72	18	2.26
	%	12.9	14.7	17.2	44.2	11	
Balance while standing	N	18	30	29	68	18	2.23
	%	11	18.4	17.8	41.7	11	
Standing for one-half hour	N	38	30	24	55	16	1.88
	%	23.3	18.4	14.7	33.7	9.8	
Picking up an object from floor while standing	N	22	21	29	74	17	2.26
	%	13.5	12.9	17.8	45.4	10.4	
Getting up from a chair	N	17	12	22	94	18	2.52
	%	10.4	7.4	13.5	57.7	11	
Getting into and out of a car	N	18	26	29	72	18	2.28
	%	11	16	17.8	44.2	11	
Walking around indoors	N	25	6	26	86	20	2.43
	%	15.3	3.7	16	52.8	12.3	
Walking outside on uneven ground	N	30	37	29	55	12	1.89
	%	18.4	22.7	17.8	33.7	7.4	
Walking in bad weather (e.g., rain, snow, wind)	N	34	33	31	53	12	1.85
	%	20.9	20.2	19	32.5	7.4	
Walking up for two hours	N	65	56	14	20	8	1.08
	%	39.9	34.4	8.6	12.3	4.9	
Walking up a steep ramp	N	29	22	47	52	13	1.99
	%	17.8	13.5	28.8	31.9	8	
Getting on and off an escalator	N	21	3	12	111	16	2.6
	%	12.9	1.8	7.4	68.1	9.8	
Climbing one flight of stairs with a rail	N	26	19	32	71	15	2.18
	%	16	11.7	19.6	43.6	9.2	
Climbing one flight of stairs without a rail	N	46	34	26	45	12	1.65
	%	28.2	20.9	16	27.6	7.4	
Running one block	N	62	23	33	36	9	1.43
	%	38	14.1	20.2	22.1	5.5	
Carrying a plate of food while walking	N	53	22	33	44	11	1.62
	%	32.5	13.5	20.2	27	6.7	
Putting on and taking off orthosis	N	80	20	17	39	7	1.22
	%	49.1	12.3	10.4	23.9	4.3	
Total or overall mean		2.01					

More than half of the users (52.8%) had no difficulty in climbing one flight of stairs with a rail, but 65.1% had difficulties in climbing without a rail. Around half (49.7%) had difficulties in dressing their lower body and 62.5% had difficulties in getting on and off the toilet. In addition, 67.8% had difficulties in getting up from a chair, whereas 55.2% had difficulties in getting into and out of a car.

In comparison to a study conducted by (Magnusson & et al, 2014), the result showed that the majority of patients had the ability to move around their home and on level surfaces, but they had difficulties in walking on uneven ground, on stairs and slopes. Moreover, the majority could walk more than 1 km and move around their home and rise from a chair; even though they had trouble in doing so. Only few patients could not get into a car or bus.

Table (5.15): Summary of Respondents' Lower Extremity Functional Status -20 items OPUS Scale (N=165) Age is Above 3 Years Old

Level of functional status	Frequency	Percent
0%	10	6.1
8 to 21%	6	3.6
22 to 30%	6	3.6
31 to 40 %	22	13.3
41 to 50%	39	23.6
51 to 60%	63	38.2
61 to 59.5%	9	5.5
70 to 100%	10	6.1
Mean score= 40.2 (41% to 50%), median= 44 (41 to 50%)		

5.4.6 Upper Extremity Functional Status of the Study Group

The following information reflects the results of OPUS 28-item on upper extremity functional status of 37 respondents with affected upper extremity and aged above 3 years. Bearing in mind that (0= cannot do this activity and 4= very easy).

Table (5.16): Distribution of users' responses by upper extremity functional status-OPUS (N=35) - Lower Extremity is Excluded

Item		0 Cannot do this activity	1 Very difficult	2 Slightly difficult	3 Easy	4 Very easy	Mean
Washing face	N	10	0	5	13	7	2.205
	%	28.6	0	14.3	37.1	20	
Putting toothpaste on brush and brush teeth	N	11	2	4	12	6	1.999
	%	31.4	5.7	11.5	34.3	17.1	
Brushing/combining hair	N	11	2	5	11	6	1.971
	%	31.4	5.7	14.3	31.4	17.1	
Putting on and removing t-shirt	N	12	8	7	3	5	1.441
	%	34.3	22.9	20	8.6	14.3	
Button shirt with front buttons	N	17	7	1	5	5	1.265
	%	48.6	20	2.9	14.3	14.3	
Attaching end of zipper and zipping jacket	N	19	4	1	6	5	1.264
	%	54.3	11.5	2.9	17.1	14.3	
Putting-on socks	N	18	5	2	5	5	1.264
	%	51.4	14.3	5.7	14.3	14.3	
Tying shoelaces	N	17	8	0	5	5	1.233
	%	48.6	22.9	0	14.3	14.3	
Drinking from a paper cup	N	8	2	3	17	5	2.262
	%	22.9	5.7	8.6	48.6	14.3	
Using fork or spoon	N	10	1	7	12	5	2.026
	%	28.6	2.9	20	34.3	14.3	
Cutting meat with knife and fork	N	17	5	4	4	5	1.294
	%	48.6	14.3	11.4	11.4	14.3	
Pouring from a 12 oz can	N	18	4	6	2	5	1.205
	%	51.4	11.5	17.1	5.7	14.3	
Writing name legibly	N	14	0	9	7	5	1.675
	%	42.9	0	22.9	20	14.3	
Using scissors	N	13	4	4	9	5	1.672
	%	37.1	11.4	11.5	25.7	14.3	
Opening door with knob	N	10	0	5	15	5	2.145
	%	28.6	0	14.3	42.9	14.3	
Using a key in a lock	N	11	1	5	13	5	1.99
	%	31.4	2.9	14.3	37.1	14.3	
Carrying laundry basket	N	13	4	6	6	6	1.644
	%	37.1	11.4	17.2	17.1	17.1	
Dialling a touch tone phone	N	9	1	4	14	7	2.263
	%	25.7	2.9	11.5	40	20	
Using a hammer and nail	N	15	11	2	2	5	1.177
	%	42.9	31.5	5.7	5.7	14.3	
Folding bath towel	N	13	7	4	6	5	1.501
	%	37.1	20	11.5	17.1	14.3	
Opening an envelope	N	15	8	2	5	5	1.352
	%	42.9	22.9	5.7	14.3	14.3	
Stirring in a bowl	N	16	7	3	4	5	1.295
	%	45.7	20	8.6	11.4	14.3	
Putting on and taking of orthosis	N	16	9	1	4	5	1.264
	%	45.7	25.7	2.9	11.4	14.3	
Opening a bag of chips using both hands	N	20	3	2	5	5	1.205
	%	57.1	8.6	5.7	14.3	14.3	
Twisting a lid off a small bottle	N	17	1	5	7	5	1.47
	%	48.6	2.9	14.3	20	14.3	
Sharpening a pencil	N	17	4	4	5	5	1.352
	%	48.6	11.5	11.4	14.3	14.3	
Peeling potatoes (or fruit) with a knife/peeler	N	17	7	3	3	5	1.208
	%	48.6	20	8.6	8.6	14.3	
Taking bank note out of the wallet	N	17	7	1	5	5	1.267
	%	48.6	20	2.9	14.3	14.3	
Overall							1.57

As table 5.16 shows that the overall mean score of upper extremity function was 1.57/4 which is between very difficult and slightly difficult. The lowest score is 1.17/4 on using a hammer and nail as 80.1% reported difficulties to do so, followed by the score 1.21/4, which is opening a bag of chips using both hands and pouring from a 12 oz can. In addition, 28.6% of them cannot wash their faces, 14.3% slightly difficult to do so, while the rest found it easy/very easy. Moreover, 31.4% of them reported that they cannot put toothpaste on brush and brush their teeth, whereas 5.7% found it very difficult and around half of them (51.8%) had no difficulty to do so. Besides, brushing hair was reported "easy" by 48.5%, and "difficult" by 20%, but 31.4% reported that they couldn't do this activity at all.

There was a lack of literature available to discuss or compare the study results related to the upper extremity functional status of orthotic users studied through OPUS tool. In addition to that, the connection between reason for orthosis prescription, intended outcome, outcome measure utilized and observed effect was unclear mainly for children with cerebral palsy (Garbellini & et al., 2018).

The table also reveals that 48.6% couldn't tie shoelaces and 22.9% found it very difficult to do so. In the FGD with spinal orthotic users, there was a difficulty to tie shoes by users of spinal orthotics especially in the early stage after fitting. Those category, in fact, stated that they couldn't do it by themselves as they couldn't bend their trunk and had to request support from family, one parent said *'my child was getting annoyed when she was trying to tie her shoes, so at the beginning we were doing it for her'*.

It was found that 20% of respondents, aged above 3 years N=35, had their upper extremity functional score 0 out of 112; these are respondents with paralysis, in which the device is prescribed to hold the limb in a position for support or to avoid further complications. However, 48.4% had their scores between 15 to 50/112, and 17.2% had their scores between 51 to 95/112, while only 14.3% had their upper limb function score 112/112 (i.e. 100%), the mean score was 43.9/112. This might be attributed to the nature of their disability and the lack of physiotherapy management for this particular group.

Upper extremity function plays an important role in the performance of daily life activities requiring the use of both hands; hence, improving upper extremity function contributes positively to societal participation and QoL (Lieshout & et al., 2020). However, it was observed, that there was no physiotherapy service provided in both facilities for those cases, and it was confirmed from the study findings that only 28% of this particular group received physiotherapy training on their devices.

Table (5.17): Summary of Users responses - Upper Extremity Functional Status -28 Items OPUS Scale (N=35)

Score out of 112 (0 to 112)	Frequency	Percent
0 =0%	7	20
15 to 24	5	14.3
30 to 50	12	34.1
51 to 95	6	17.2
112 = 100%	5	14.3
Mean=43.9, Median=38.1, Min=0, Max=112		

5.4.7 Experiences of Users and Overall Perceptions about Services

Regarding to the involvement of users and their families, as both facilities mentioned, the beneficiaries and their families accompany their children throughout the whole process from the initial assessment up to delivery. In the Multidisciplinary clinic, the clinic's team discussed and agreed with beneficiaries and their families together about the treatment plan. This was also mentioned during the FGD with service user, as one parent mentioned that she was providing feedback on her daughter device and asking to do modifications, the P&O staff was responding. She recommended involving parents increasingly in the contributions of the price of device for the sake of their children, and for the sustainability of services for Gaza people.

Table (5.18): Distribution of Responses on Experiences of Users

Item	Category	N°	Percent
Returning back without receiving services in the last year (N=262)	Yes	39	14.9
	No	223	85.1
Reasons for returning home without receiving services in the last year due to: (N=39)	Services are not available	18	46.2
	Appointment wasn't planned	16	41
	Inability to pay the required fees	6	15.4
	Long waiting time	1	2.6
	Lack of staff	0	100
If respondents going to continue seeking orthotic services at ALPC/Hammad (N=262)	Yes, definitely	233	88.9
	I am not sure	21	8
	Not at all	8	3.1
Reasons to continue seeking orthotic services at ALPC/Hammad (This includes the yes definitely answers to if they continue the service) (N=233)	SU satisfied with the staff interaction	143	61.4
	The service is accessible	142	60.9
	SU Satisfied with the services provided	98	42.1
	The service has good reputation	71	30.5
	The service is free of charge/ covered by organizations	36	15.5
	Because of other reason	8	3.4
	The service provides incentives such as transportation	5	2.1
Reasons for seeking to change the orthotic centre due to (This includes the not sure, not at all answers to if they continue the service) (N=29)	Poor quality	8	27.6
	Unable to afford the fees of services	8	27.6
	Difficulty in reaching the center	6	20.7
	Inconvenient clinic schedule	4	13.8
	Other reason	2	6.9
Recommendation of current orthotic service for relatives and friends (N=262)	Strongly agree	109	41.6
	Agree	139	53.1
	Neither agree nor disagree	8	3.1
	Disagree	6	2.3
Overall satisfaction with orthotic services in Gaza (N=262)	Strongly satisfied	51	19.5
	Satisfied	173	66
	Neither satisfied nor dissatisfied	20	7.6
	Dissatisfied	16	6.1
	Strongly dissatisfied	2	0.8

As table 5.18 displays, 14.9% of the study respondents reported that they returned back without receiving services during the last year of the data collection. Moreover, the reasons reported by 46.2% of users were due to the lack of availability of service, followed by 41% of users who reported that the appointment was not planned; while reasons because of the inability to pay required fees were reported by 15.4%.

Similar reason was reported by the ALPC director through KII as he reported that there is a shortage of funds and coverage of the cost for refugees, mainly, for ready-made orthotics. Not only that, but also there was a delay in the delivery of the service, and a lack of material, which should be requested from IL (cables for torsions, joints bars). Plus, there is

a delay in the private shoemaker to produce the orthopedic shoes (GVR/GVL, long leg brace, diabetic shoes); as well as, a delay in the air cast that depends on the donor. This point was also raised through FGD with UNRWA, who pointed out the issue of the short fund that UNRWA has faced due to COVID-19 implications. For Hammad hospital, as said during the facility checklist and reported by P&Os, the delay happened with children with CP, who attended for AFO, and the reason was due to the delay of material needed to access Gaza, which created a long waiting list.

Large proportion of the study group (88.9%) reported the willingness to continue seeking orthotic services from ALPC and Hammad hospital. The reasons for continuing seeking were as the following (N=233), 61.4% was due to the satisfaction with the staff interaction, 60.9% was due to the accessible service, while 42.1% was due to the satisfaction with the services received, 30.5% was due to the good reputation, and 15.5% which reported due to the service was free of charge/covered by organizations, additionally to 2.1% which reported that they received incentives, supporting transportations. These were noticed during the FGDs as users and their families expressed their satisfaction from the staff interaction, one said, "when I enter the ALPC, instead of saying Hi, the receptionist jumps to greet and welcome me", *'she is at the top of politeness and the utmost respect'*, while others were disappointed from the waiting time and lack of following up as previously mentioned. From the observation, one user with poliomyelitis was complaining of the fees required to replace his device saying, *'I will not return to seek the service, I cannot afford'*.

Of the respondents, 8% reported that they were not sure if they could continue seeking services at their current facility or not, and 3.1% reported that they were not willing to do so, and they were seeking to change the orthotic facility instead (N=29). Reasons to change were due to poor quality, inability to afford the fees, difficulty in reaching the centre, and inconvenient clinic schedule.

Of the study group, 94.7% would recommend current orthotic service for relatives and friends, 3.1% neither agreed nor disagreed, while 2.3% disagreed to do so. Finally, as shown in figure 5.2, the study group was asked about the overall satisfaction with the orthotic services, 85.5% were satisfied, 19.5% strongly satisfied, while 66% satisfied. Moreover, 7.6% was neither satisfied nor dissatisfied, while only 0.8% were strongly dissatisfied.

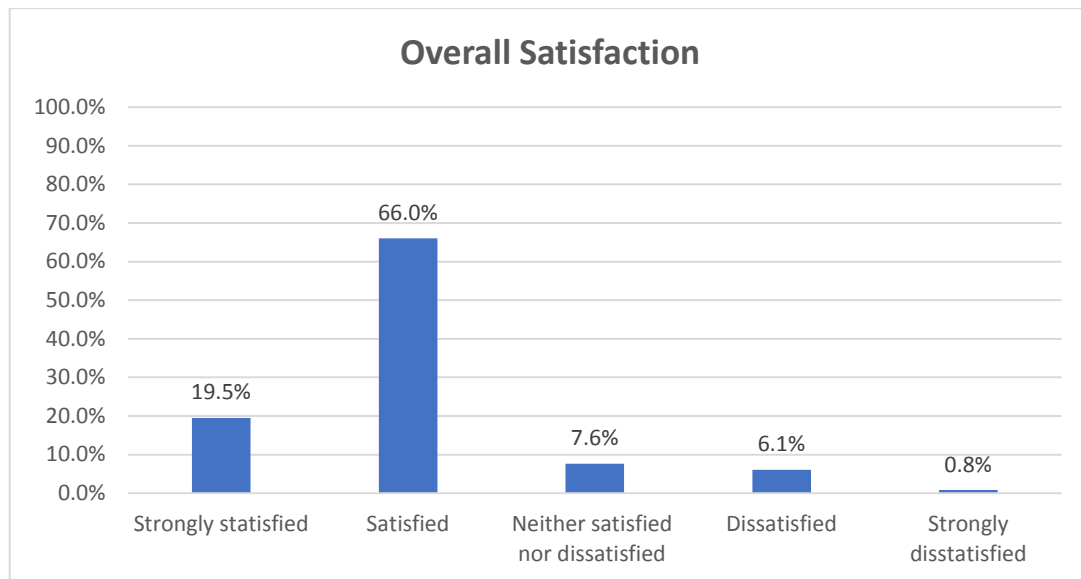


Figure (5.2): User's Overall Satisfaction of Orthotic Services in Gaza in % (N=262)

5.5 Inferential Analysis

To determine whether differences in satisfaction about device and services as well as QoL among respondents existed or not, and whether they were related to their characteristics such as gender, level of education, geographical distribution, age, health status, etc or not, t-test and ANOVA tests have been applied. Results were grouped based on the relevance and compared with other global findings.

5.5.1 Differences in Satisfaction of Service and Device in Relation to Health and Demographic characteristics

Results from table 5.19, (t test) demonstrates that non-refugees elicited higher satisfaction level (mean score 38.24) about services than refugees (mean score was 37.02). The differences between the two groups were statistically significant ($p = 0.003$). Nevertheless, it was found that the satisfaction level about the device was higher among refugees vs non refugees (mean score=35.42 vs 35.24), however the differences between the two groups were not statistically significant ($p=.788$).

Table (5.19): Differences in Satisfaction about Service and Device in Relation to Health and Demographic Data and Orthotic Experience

			Satisfaction about Service					Satisfaction about Device				
Independant Variable		N	Mean	SD	Factor	Value	Sig.	Mean	SD	Factor	Value	Sig.
Gender	Male	151	37.5	3.3	t	.66	.51	35.2	5.3	t	-.53	.59
	Female	111	37.2	3.3				35.6	4.5			
Age	0 to 14 years	210	37.5	3.1	f	.77	.47	35.1	4.7	f	2.03	.13
	15 to 64 years	48	36.9	4.3				36.7	6			
	65 and over	4	37.5	3				35.4	5.4			
Refugee Status	Refugee	183	37	3.5	t	-3.1	.003	35.4	5	t	.27	.79
	Non refugee	79	38.2	2.7				35.2	5.1			
Governorate	North	77	37.2	3.7	f	.08	.99	35.9	4.7	f	1.14	.34
	Gaza	97	37.5	3				35.5	5.1			
	Middle	50	37.4	4				35.3	5.8			
	Khan-younis	29	37.5	2.4				33.7	4.4			
	Rafah	9	37.6	3.1				34.8	3.6			
Area of residence	Urban	168	37.3	3.3	t	-.62	.54	35.6	5.3	t	.96	.34
	Rural	94	37.6	3.3				35	4.4			
Diagnosis	Cerebral P.	35	37	2.5	F	.94	.51	35.2	6	f	2.25	.013
	Hemiplegia	7	38.3	2.4				34.8	7.4			
	Paraplegia	4	36.5	1.3				34.9	3			
	Drop foot	24	37.1	4				36.5	5.2			
	Clubfoot	12	37.4	2.4				33.6	4.6			
	Luxation	18	38.1	1.8				36.8	3.4			
	Spina bifida	4	38.5	3				37.8	5			
	Scoliosis	5	38.6	2.1				39.6	3.8			
	Fracture	10	35.2	6.5				35.4	5.7			
	GVR/GVL	51	37.9	3.3				32.9	5.1			
	Foot problem	87	37.2	3.3				36.2	4.2			
	Others	5	39.2	5.3				35.6	5.3			
Other health condition	Yes	46	36.6	4.3	t	-1.4	.17	35.9	5.3	t	.757	.45
	No	216	37.6	3.1				35.3	4.9			
Custom or ready made orthosis	Custom made orthosis	76	36.9	3.3	t	-1.6	.1	35.4	5.8	t	.026	.98
	Ready-made orthosis	186	37.6	3.4				35.4	4.7			
Type of orthosis	FO	39	36.5	3.8	F	1.1	.35	37.6	5.3	f	3.82	.00
	Ready AFO	20	37	4.2				37.7	4.1			
	Custom AFO	40	36.7	3.6				35.8	5.2			
	GVR/L brace	49	37.9	3.4				32.8	5.1			
	Knee orthosis	2	37.5	0.71				30.5	3.5			
	KAFO	15	37.3	2.3				35.8	3.8			
	Hip orthosis	17	38.2	1.9				36.7	4			
	Dennis brown	63	37.5	3				34.8	4.2			
	Torsion splint	8	39.4	4				34.2	4.9			
	Wrist hand orthosis (WHO)	3	37.3	1.2				31	8.5			
	TLISO	6	38.8	1.9				38.4	4.5			
FO	Custom made	10	36.4	3	T	-.08	.94	34.8	8.7	T	-1.32	.22
	Ready made	29	36.5	4.1				38.5	3.1			
Facility	ALPC	229	37.4	3.4	T	-.17	.87	35.1	5.1	t	-2.87	.006
	Hammad H.	33	37.5	2.4				37.3	4			
Number of orthosis received	1	155	37.5	3.4	F	.83	.55	35.6	4.6	f	1.49	.18
	2	82	37.2	3.4				34.9	5.4			
	3	16	36.6	3				33.6	6.5			
	4	2	38	2.8				38	.0			
	5	4	36	1				37.9	2.4			
	6	2	41.5	2.1				42.5	2.1			
	10	1	38	0				38	0			

The highest satisfaction about device (t test) was found in respondents diagnosed with scoliosis with a mean score of 39.58, while the least was found in the study group diagnosed with GVR/GVL with a mean score of 32.93. The difference between those groups were statistically significant ($p = 0.013$). Regarding the type of orthosis; and as pointed out by ANOVA test, it was found that the mean satisfaction score about different devices (foot orthosis, ready-made AFO, custom-made AFO, GVR/L brace, knee orthosis, KAFO, hip orthosis, Dennis brown, hip orthosis, WHO & TLSO) were (37.6, 37.7, 35.8, 30.5, 35.8, 36.7, 34.8, 34.2, 31 & 38.36) respectively. The difference between those groups was statistically significant ($p = 0.000$). Post hoc test showed that the different types of devices were significantly different from one another such as GVR/GVL & FO, AFO, KAFO, HIP ORTHOSIS, Dennis Brown, TLSO. The highest mean was the TLSO (mean = 38.36), while the least mean was knee orthosis (mean = 30.5). The results are consistent with other studies, in which there were significant differences in satisfaction scores among types of orthoses ($p = 0.001$) (Chen & et al, 2014). In the other side, there was no significant difference between those groups in regard to satisfaction with service.

The mean level of satisfaction about device between the two studied facilities was higher at Hamad hospital (mean = 37.48) than at ALPC (mean = 37.37) as pointed out by t test. The mean difference was statistically significant between the two facilities ($p = 0.006$).

Neither gender nor age, governorate, area of residence, number of orthosis received, or other health condition revealed any differences among the study group in both total scores of satisfactions about service and device. Opposite to the current study finding, other studies highlighted differences between respondents based on their area of residence, type of orthoses and duration of usage (Chen & et al, 2014).

As table 5.20 indicates, the study found that there were no statistical differences between custom-made orthosis and ready-made orthosis of the study group for the satisfaction about device as well as the satisfaction about service. Totally, that is combining all different devices. However, to compare at the device level, T test found that there were no differences between custom-made AFO and ready-made AFO regarding the satisfaction with device, satisfaction with service, pain, and comfortability etc. One item was excluded since there was a statistically significant difference regarding the lower extremity functional score ($p = 0.047$), the mean of ready-made AFO (mean = 34.85) was higher than that of custom-made AFO (mean = 26).

Table (5.20): Differences Between Custom-made Orthosis and Ready-made Orthosis BY OPUS outputs domains

	Type of orthosis	N	Mean	Std. Deviation	Factor	Sig
AFO						
Pain free	Ready made AFO	20	3.5	.946	1.025	.310
	Custom made AFO	40	3.23	.973		
Durability	Ready made AFO	20	3.95	.5104	.683	.498
	Custom made AFO	40	3.85	.579		
Comfortability	Ready made AFO	20	3.45	.887	1.271	.209
	Custom made AFO	40	3.1	1.057		
Weight	Ready made AFO	20	4.05	.2236	1.826	.074
	Custom made AFO	40	3.83	.712		
Lower extremity functional score	Ready made AFO	20	34.85	12.04	2.031	.047
	Custom made AFO	40	26.05	17.369		
Foot orthosis (FO)						
Lower extremity functional score	Custom made FO	10	40.100	15.98	-2.594	.013
	Ready made FO	29	53.724	13.74		
Pain free	Custom made FO	10	3.00	1.155	-1.066	.293
	Ready made FO	29	3.38	.903		
Weight	Custom made FO	10	3.50	1.08	-1.237	.245
	Ready made FO	29	3.93	.371		
Comfortability	Custom made FO	10	3.10	1.197	-.936	.355
	Ready made FO	29	3.45	.948		
Durability	Custom made FO	10	3.40	1.075	-1.621	.136
	Ready made FO	29	3.97	.421		

Same results were found related to the foot orthosis with only statistically significant difference regarding the lower extremity functional status ($p=.013$), the mean of ready-made FO (mean=53.7) was higher than that of custom-made FO (mean=40). Similar results were found in the literature regarding the foot orthosis, where it showed no difference between custom-made and ready-made foot orthoses for pain reduction or functional improvement, and patient satisfaction (Tran & Spry , 2019).

5.5.2 Differences in QoL Related to Demographic and Health Data and Orthotic Experience

As shown in table 5.21, (t test) Female users had higher scores about QoL (mean=69) than males (mean=62). The difference between the two groups is statistically significant ($p=0.001$). The results are strange and not consistent to the literature as females consistently reported poorer QoL than their male counterparts (Lee & et al, 2020).

Table (5.21): Differences in QoL Related to Health and Demographic Data and Orthotic Experience

Independant Variable		N	Mean	SD	Factor	Value	Sig.
Gender	Male	151	62	19.8	T	-3.3	.001
	Female	111	69.1	15.2			
Age	0 to 14 years	210	69.9	13.7	F	53.5	.000
	15 to 64 years	48	45.4	21.9			
	65 and over	4	42.5	11.3			
Refugee Status	Refugee	183	65	18.1	T	-0.1	.938
	Non refugee	79	65.1	19			
Governorate	North	77	64.2	19.9	F	1.6	.168
	Gaza	97	65.9	17.3			
	Middle	50	67.4	19.5			
	Khan-younis	29	64.5	14.4			
	Rafah	9	51.1	16.3			
Area of residence	Urban	168	65.6	18.5	T	0.7	.511
	Rural	94	64	18.1			
Diagnosis	Cerebral P.	35	57	14	F	15.1	.001
	Hemiplegia	7	42.2	10.6			
	Paraplegia	4	48.6	29.7			
	Drop foot	24	42.8	18.9			
	Clubfoot	12	71.6	9.8			
	DDH	18	73	11.6			
	Spina bifida	4	63.1	10.3			
	Scoliosis	5	70	11.7			
	Fracture	10	41.1	25.1			
	GVR/GVL	51	72.7	12.9			
	Foot problem	87	72.9	13.3			
	Others	5	57.1	15.8			
Having other health condition	Yes	46	55.3	19.4	T	-4.1	.001
	No	216	67.1	17.4			
Foot orthosis	Custom made	10	61.1	22.8	T	-1.1	.293
	Ready made	29	68.9	18.9			
Facility	ALPC	229	66.6	18	T	3.9	.000
	Hammad H.	33	53.6	16.3			
Effectiveness of physiotherapy treatment received (n=103)	Strongly agree	31	58.7	16.6	F	2.6	.038
	Agree	52	50.3	19			
	Neither agree nor disagree	6	53.5	16.9			
	Disagree	12	45.2	20.8			
	Strongly disagree	2	25	2.8			

Results show that the older the age was, the less reported QoL score was. Those in the age group (0 to 14) reported higher QoL score with (mean=69.9) than those in the age group (15 to 64) with (mean=45.3), and those in the age group (65 and over) reported the least QoL score with (mean=42.5). Those differences among the age groups were statistically significant as ANOVA test revealed ($p=0,000$). This is consistent with what had been concluded by (Crocker & et al., 2019) study as aforementioned.

As table 5.21 indicates, and as per ANOVA test, respondents with DDH (mean=73.03) reported better QoL over other diagnosis, while the least reported mean went for the respondents with fractures (mean=41.11). The difference was statistically significant variance in QoL between all diagnosis as indicated by ANOVA ($p=0.000$). As for respondents who didn't suffer other health condition, t test shows that they have higher quality of life score (mean=67.84) than respondents who suffered other health condition (mean=55.27). The results indicated that there was a statistically significant variance for those who had and who didn't have other health condition ($p=0,000$).

On the other hand, results illustrated that there was no difference in QoL mean scores between refugees and non-refugees ($p=0.94$); although, the latter were a little more satisfied about their QoL. In addition to that, neither governorate, nor did area of residence show any differences in the QoL mean scores. Regarding the facility, t test shows that respondents at ALPC reported higher QoL (mean=66.65) than by Hammad hospital (mean=53.65). The difference is statistically significant ($p=0,000$).

ANOVA test found that the higher the agreement with effectiveness of physiotherapy treatment received was, the higher the QoL score found; the QoL score was higher in the strongly agreed category (mean= 58.68), while among the disagreed, the mean was 25. The difference between the groups, is statistically significant ($p=0.04$). This finding was not strange and was confirmed by the literature (Berdishevsky & et al., 2016).

Chapter Six

Conclusions and Recommendations

6.1 Conclusions

The study conclusion in this chapter is formulated and built based on assessing findings and results of the evaluation of orthotic services in the Gaza Strip, mainly, at ALPC and Hamad hospital.

Up to the knowledge of the researcher, this is the first extensive study made in Gaza that evaluated the orthotic services in Gaza. Most of the past studies evaluated specific subject such as user satisfaction, while this research studies many dimensions according to Donabedian model, including input/structure, process, and outcome as well as influencing factors. It uses quantitative data to assess user's satisfaction about both device and service, their functional status and their quality of life. The results are complemented by the qualitative data through FGDs with orthotic users and service providers as well as KIIs with policy makers.

Most of the study sample, beneficiaries of orthotics, are children, who have different medical conditions and required different types of orthotics, with the highest proportion goes for the ready-made devices. Part of the study group has other health condition. Away from their primary disability, most of the study group are poor and enable to pay out-of-pocket expenses.

Generally, both facilities are well- designed and suited the size of the intended workload as well the types of services to be provided and well equipped. However, they reported having a lack of specific material required to expand the services in order to permit more people access to the service. Both facilities have an accessible and barrier-free environment that provide privacy for individuals during receiving the service. There are wide range of orthotic types produced in Gaza. Despite that both providers have signed an agreement to distribute work among them, actual coordination was still absent.

The number of clinicians was sufficient, while the number of non-clinicians was very limited as recommended by WHO standards. Plans were made in both facilities to increase HR and to replace the staff who will resign in 2021. However, most of the staff at Hamad hospital were not permanent, plans were in place to train and contract new staff. The

situation of ALPC P&Os staff was worrying as they were not motivated and not satisfied about their work condition, especially, about the salaries, recognition from municipality, and about the high possibility for staff to be dropped out.

The context of Gaza is complex especially in term of funding as well as access of material and educational opportunities, which rely on borders. The closure of Gaza has influenced the regular availability of material in many times, which affected the provision of services. Sustainability of services is a critical issue as there is no specific budget allocated by Palestinian government for this service, and it is not included in national health and social insurance systems as well. Orthotics services are frequently perceived by the government as an expense rather than an investment. Both facilities rely on international support with absence of government support. ICRC has been supporting ALPC since 2007, and one of its domains is sustainability. ALPC has made many efforts on fundraising plans. UNRWA covers the cost of devices for many refugees; however, no proper coordination and communication activities exist. The shortage of funds has affected people's accessibility and postponing the service. Hamad is completely funded and managed by Qatar government.

Although, there is a limited number of private facilities producing custom-made devices, the exact number is still unknown. It is found that NGOs and INGOs buy orthotic devices considering low cost over quality, and don't take license of private facilities or professional accreditation into consideration. Both ALPC and Hamad have been supervised by MoH licensing department in addition to also being supervised and supported by INGOs. The problem still exists with the private providers who haven't been supervised by MoH, but acquiring license, as they are considered a craft, from Ministry of economy instead. It is reported that they use unsafe material with no supervision or regulation by the government. In spite of the licensing department supervision of both facilities, they only check physiotherapy department and not the P&O workshops. It is clear that they have a lack of experience and of professionals inside the licensing department.

There are issues found with the prescription of devices from the referring doctors, some of which are lack of information, including the diagnosis, history as well as the incorrect device, or over prescription of unnecessary devices due to the lack of knowledge of the referring doctors. In terms of satisfaction, the average score about satisfaction of services is

higher than that of satisfaction of device. Many respondents reported adherence issues to their devices for different reasons.

Generally, and most importantly to mention that the orthotic service is not regulated during the absence of guidelines and protocols resulted from the absence of government interest.

6.2 Recommendations

Policies and regulation

- The study provided a frame that shows strength and weakness points in orthotic services that can be useful for policy makers and practitioners. Positive aspects like the availability of qualified workforce, material and equipment, facilities, that need reinforcement. On the other hand, caveats like sustainability of funds, workforce motivation, user's adherence to device, follow up system need to be urgently addressed.
- Like other health care services, integrate orthotic services into the package of health services covered by health insurance, and try to avoid the out-of-pocket expenses as the lowest satisfaction about the device was the affordability to repair or replace the device (with a mean score of 2.14), only 5.3% reported agreement on the affordability of out-of-pocket expenses to purchase and maintain orthosis.
- The government need to lead national efforts to establish guidelines and protocols and should assume a leading role in the development and coordination of national orthotics service provision.
- Establish a national orthotics committee or similar entity, with a wide-range of stakeholders, to coordinate and develop the national prosthetics and orthotics service provision.
- Establish a national orthotics database to identify total need, types of need and unmet need
- Recognize the P&O staff as other health professionals with clear career structure, professional titles and profiles increases motivation, retention and personnel professional development, which in turn enhance service provision.
- The licencing department should supervise the P&O in the Gaza Strip in both facilities and the private sector. Develop standards for licensing and integrate them into the licensing department.

Service provision

- Establish system for regular follow up of service users. This to ensure users' adherence to their devices and avoid further complications. As the results show that 33.8% of participants had a compliance issue, which led to not wearing their devices.
- There should be regular monitoring of effectiveness. Quality and effectiveness should come first over cost.
- Ensure service users/caregivers receive sufficient physiotherapy training to ensure safe and effective use of orthotic devices. As the results find that only 9.2% of the study respondents received physiotherapy treatment jointly with the orthotic devices, and very few respondents received occupational therapy (1.9%).
- There should be plans to increase the number of non-clinicians that will scale up the services and the production level and avoid waiting lists as well as better utilization of resources
- Ensure financial sustainability by creating a strategy to ensure users have access to devices at any time.
- Create practical steps to improve the communication and coordination between the facilities providing orthotic services.
- Establish a feedback system between the providers and the organizations, that covers the cost, to ensure the effective communication, timely management and efficient use of resources.
- Improve the prescription of devices through improving prescriber's knowledge and capacity on the orthotic field. This is to have a common understanding and avoid wrong or over prescription of devices. Therefore, orthotics service providers to identify and train partners in identifying and referring potential users. In addition, including a relevant history in the referral to allow for better orthotic management to be taken into consideration.

Users

- Improve user's comfortability of device as 44.6% of the study group reported concerns about the comfortability of devices. Try to avoid pain as 36.7% of the study group reported pain while using their devices. Other recommendation in this

regard is to sort out the issue of skin irritation and abrasions resulted from the use of orthosis as it was reported by 27.5% of the study group.

- Also improve cosmetic appearance as 12.6% of users reported strongly disagree/disagree when asked if the device looks good, while 5.7% answered neither agree nor disagree. This is by trying to find alternative material and designs specially for children, this is as recommended also by the respondents of the qualitative study sample (including users, policy makers, P&O staff).
- Try to improve the time for the appointment with the orthotist as the least satisfaction about services was the appointment with orthotist, with a mean score of 3.15/5.

6.3 Research Recommendations

- This research will be a baseline for future researches; therefore, the researcher recommends conducting similar study in 5 years to compare findings.
- It is also recommended to study the orthotic private sector to have clearer picture of the service provided, effectiveness, protection of users, material used etc.
- To study specific service users' groups, for example users of spinal orthotics, users of upper limb orthotics, foot orthosis, custom-made orthotics and ready-made orthotics in order to have in-depth information of specific groups, which allows for recommendations of improving the provided services.
- Further evidence should be collected on the efficacy and adverse effects of some devices which has some debates, such as Genuvarum/Genuvalgum brace and torsional brace, Dennis brown.

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Annexes

Annex 1 Study activities timetable

Activity	Duration	Dec	Jan.	Feb	March	April	May	June	July	Aug	Sep
Proposal writing	1 month										
Proposal Discussion and approval	1 month										
Development of instruments											
Experts check for validity of instruments	1 month										
Update instruments	2 weeks										
Data collection											
Data entry											
Data Analysis											
Writing report											

Annex 2 Sample Size Calculation

Determine Sample Size

Confidence Level: ☒ 95% ☐ 99%

Confidence Interval:

Population:

Sample size needed:

Annex 3 Questionnaire

Evaluation of Orthotic Services in the Gaza Strip

Service User's questionnaire: Phone interview

Serial N°

“Request for approval to participate in the study”

My name is Saeda Mohammad Al-Barawi, a student at Al-Quds University, a public health program, health management track. I am doing a research entitled: "**Evaluation of Orthotic Services in the Gaza Strip**" as a requirement to obtain a master's degree.

The overall aim of this thesis is to evaluate the orthotic services (structure, process and output/outcomes) in the Gaza Strip, with the view of identifying areas for improvements contributing to better independence, wellbeing and lesser mortality and morbidities among people with physical disabilities.

You were chosen to participate in this study because of your experience and expertise in orthotic services provided at the Artificial Limbs and Polio Center (ALPC)-Municipality of Gaza and/or at Hamad Hospital. Many orthotic users will participate in this study. Note that your participation is voluntary, and you are free to withdraw at any time without expressing any justification, but I value your participation as your opinion is very important to this study.

To fill in the questionnaire, it will take about 30 minutes of your time, your information will be kept strictly confidential and only the research team will use it and it will not be shared with any other party otherwise if anonymous it could be published. If incomplete information is discovered later, you will be contacted to complete the questionnaire to ensure that no valuable information is lost.

The survey results will be shared with the Artificial Limbs and Polio Center, Municipality of Gaza and Hamad Hospital and their partners to try to find ways to improve services to meet your expectations and other beneficiaries. This study may also be published locally or internationally for professional interests for the benefit of other interested professionals in this field. If you have any questions or concerns about this research, please contact the researcher Saeda Al-Barawi on Mobile No. 0598943942 - College of Public Health, Al-Quds University, Tel Al-Hawa, Al-Sina'a Street, immediately after Barcelona Park. University phone number: 08-2644210

Please check the boxes below to indicate your approval:

- I confirm that I have read and understood the information on my participation ☐ Yes ☐ No
- I understand that my participation is voluntary, and that I am free to withdraw from study at any time without giving any justification ☐ Yes ☐ No
- I agree to use my result in this study and understand that my identity will not be identifiable in any published work ☐ Yes ☐ No
- I agree to participate in future studies and understand that my identity will not be identifiable in any published work ☐ Yes ☐ No

Date of interview

Questionnaire

Serial number

Interviewer Name:

Respondant	1-Service user 2-Caregiver, specify..... 3-Service user and caregiver
Facility (where the service user received the orthotic service from) (Mark all that apply)	1-ALPC 2-Hamad hospital

This section is to be filled from record check of service user's file

Socio-demographic data		
1.	Gender	1-Male 2-Female
2.	Age in yearsyears
Disability related information		
3.	1 Diagnosis (Mark all that apply)	1-Cerebral palsy 2-Hemiplegia 3-Paraplegia 4-Drop foot 5-Muscular dystrophy 6-Drop wrist 7- Poliomyelitis 8-Clubfoot 9-Luxation/sprain 10- Spina Bifida 11-Kyphosis 12-Lordosis 13- Scoliosis 14-Contracture 15-Fracture 16-Genu Varum/Valgum 17-Perthes Disease 18-Burn 19- Foot problems..... 20-Other, specify
4.	2 Affected part(s)	1-Lower extremity 2-Upper extremity 3-Spinal 4-Upper&lower extremity 5-Other, please specify
5.	3 If extremity	1-Unilateral 2-Bilateral 3-Diagonal 4-Three extremities 5-All extremities
6.	4 Cause of disability/problem (Mark all that apply)	1-Congenital 2-Idiopathic 3-Metabolic 4-Neurological 5-Degenerative 6-Neoplasm 7-Infectious 8-Autoimmune disease 9-Inflammatory 10-Burn 11-Vascular 12-Traumatic 13-Ageing 14-Other, specify.....15-Not documented in file
7.	If traumatic, what was the cause?	1-Conflict related 2-Work injury 3-Road traffic accident 4- Domestic injury 5-Sport injury 6-Occupational accident 7-Other, specify..... 8-NA
Documentation		
8.	What does the file include? /5	<input type="checkbox"/> Referral form <input type="checkbox"/> Assessment form <input type="checkbox"/> Progress notes <input type="checkbox"/> Financial document <input type="checkbox"/> Discharge note <input type="checkbox"/> Other, specify

	(Mark all that apply) <input type="checkbox"/> File doesn't exist <input type="checkbox"/> File is lost
9.	The referral form includes /5 (Mark all that apply)	<input type="checkbox"/> Past medical history <input type="checkbox"/> Diagnosis <input type="checkbox"/> Intervention done <input type="checkbox"/> Investigation done (X-ray, lab, MRI, etc.) <input type="checkbox"/> Clear prescription

This following sections are to be filled through the interview

Socio-demographic characteristics		
10.	Governorate	1-North 2-Gaza 3-Middle 4-Khan-Younis 5-Rafah
11.	Area of residence	1-Urban 2-Rural 3-Other, please specify
12.	Refugee Status	1-Refugee 2-Non-refugee
13.	Current enrolment in education	1-Enrolled 2-Not enrolled 3-NA
14.	Education level attained or completed	1-Illiterate 2-Some Primary 3-Preparatory 4-Secondary 5-Diploma 6-BSc 7-Higher Diploma 8-Master 9-PHD 10-NA 11-Other, specify.....
15.	Marital Status (15 years old and over)	1-Married 2-Widowed 3-Divorced 4-Separated 5-Never Married 6-NA
16.	Total household family members members
17.	Having any other household members with disabilities	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, How many and who,and what is the disability
18.	Working status (15 years old and above)	1-Housewife 2-Child/school 3-Has Work 4-Unable to work 5-Retired 6-Receive pension 7-Doesn't work 8-Other, specify...
19.	If has work, type is	1-Free lancer 2-NGO 3-INGO 4-UNRWA 5-Governmental 6-Funded micro economic project 7-Receive pension 8-NA 9-Other, specify
20.	Family monthly income from all sources NIS
Medical history information		
21.	2 Do you have any other health condition (other than disability)	1-Yes 2-No
22.	2 If Yes, specify? (Mark all that apply)	1-Renal disease 2-Cardiac disease 3-Cancer 4-Respiratory disease 5-Diabetes mellitus 6-Hypertension 7-NA 8-Other, specify.....
Disability related information and orthoses history (services received)		

23.	What type of orthosis are you currently using? (Mark all that apply)	1-Custom made 2-Ready made
24.	What type of orthosis are you currently using? (Mark all that apply)	Lower Limb 1-FO 2-Readymade AFO 3-Custom made AFO Plastic 4-Custom made AFO Plastic (articulated) 5-Conventional AFO 6-Genu varum/Genu valgum brace 7-Knee Orthosis 8-KAFO Plastic (solid) 9-KAFO Plastic articulated 10-KAFO Conventional 11-HKAFO 12-Hip Orthosis 13-Dennis Brown 14-Torsional Splint Upper Limb 15-WHO 16-EWHO 17-SEWHO 18-SO Spinal Orthosis 19-LSO 20-TLSO 21-TO 22-Other, specify.....
25.	Are you currently using your orthosis	1-Yes 2-No
26.	If not using, why	1-No need 2-Not comfortable 3-Cosmetically not accepted 4-Other, specify 5-NA
27.	How many hours per day do you currently wear your orthosis? hours/per day
28.	Duration since you have been fitted with the current orthosis? (mention number of days/months/years)
29.	Is your orthosis night splint	1-Yes 2-No
30.	How many orthoses to date have you been fitted before?
31.	From where have you received your current orthoses? (Mark all that apply)	<input type="checkbox"/> ALPC <input type="checkbox"/> Hammad hospital <input type="checkbox"/> Private <input type="checkbox"/> Other, specify
32.	Do you use any of these assistive devices? (Mark all that apply)	1-Wheelchair/scooter 2-Walker 3-Axillary crutches 4-Forearm crutches 5-Cane 6-Other, specify..... 7-No
33.	How much the orthosis costed?NIS <input type="checkbox"/> Was free of charge <input type="checkbox"/> Don't Know
34.	Who covers the cost of your current orthosis? (Mark that all apply)	1-Health insurance 2-UNRWA 3-ICRC 4-Out of pocket 5-NGO 6-INGO 7-ALPC 8-Hammad 9-Don't Know 10-Other, specify
35.	Please indicate the services you regularly receive from the orthotic facility (Mark all that apply)	<input type="checkbox"/> Orthosis <input type="checkbox"/> Physiotherapy <input type="checkbox"/> Occupational Therapy <input type="checkbox"/> Consultation by MDT led by doctor <input type="checkbox"/> Assistive devices <input type="checkbox"/> Mental health&psychosocial <input type="checkbox"/> Transportation

		fees <input type="checkbox"/> Other, specify
36.	Which services you feel that you need from the orthotic service and you didn't receive?	<input type="checkbox"/> Orthosis <input type="checkbox"/> Physiotherapy <input type="checkbox"/> Occupational Therapy <input type="checkbox"/> Consultation by MDT led by doctor <input type="checkbox"/> Assistive devices <input type="checkbox"/> Mental health&psychosocial <input type="checkbox"/> Transportation fees <input type="checkbox"/> Other, specify <input type="checkbox"/> Nothing
37.	If you received physiotherapy, from where? (Mark all that apply)	<input type="checkbox"/> ALPC <input type="checkbox"/> Hamad hospital <input type="checkbox"/> UNRWA <input type="checkbox"/> MOH <input type="checkbox"/> Private <input type="checkbox"/> NGO <input type="checkbox"/> INGO <input type="checkbox"/> Palestinian avenir center <input type="checkbox"/> NA <input type="checkbox"/> Other, specify.....
38.	Was the physiotherapy service you received effective?	1-Strongly agree 2-Agree 3-Neither agree nor disagree 4-Disagree 5-Strongly disagree 6-NA
39.	If you received mental health and psychosocial support), from where? (Mark all that apply)	<input type="checkbox"/> ALPC <input type="checkbox"/> Hamad hospital <input type="checkbox"/> UNRWA <input type="checkbox"/> MOH <input type="checkbox"/> Private <input type="checkbox"/> NGO <input type="checkbox"/> INGO <input type="checkbox"/> Palestinian avenir center <input type="checkbox"/> NA <input type="checkbox"/> Other, specify
40.	Was the mental health and psychosocial support you received effective?	1-Strongly agree 2-Agree 3-Neither agree nor disagree 4-Disagree 5-Strongly disagree 6-NA
Accessibility		
1.	Do you consider ALPC/Hammad hospital easy to access?	1-Strongly agree 2-Agree 3-Neither agree nor disagree 4-Disagree 5-Strongly disagree
41.	Indicate type of transportation used from your residence to the facility where you received your orthosis? (Mark all that apply)	1-Public transportation 2-Private transportation 3-Animal transportation 4-Walking
42.	If public transportation is available, how would you describe its availability to & from facility?	1-Regularly available 2-Sometimes available 3-Rarely available
43.	How do you perceive affordability of transportation cost from home to& from facility?	1-Affordable 2-Reasonably affordable 3-Not affordable 4-Not applicable
44.	How do you perceive distance to reach facility?	1-Short 2-Reasonable 3-Relatively long 4-Verylong
45.	How do you perceive the location of the facility?	1-Good 2-Moderate 3-Bad

Satisfaction with Device & Services (Please reflect on the service including device you received)

Please mark the response that most closely reflects your opinion. Strongly disagree=1, Disagree=2, Neither agree nor disagree=3, Agree=4, Strongly agree=5	Don't know/not applicable	1	2	3	4	5
--	---------------------------	---	---	---	---	---

1. My orthosis fits well						
2. The weight of my orthosis is manageable						
3. My orthosis is comfortable throughout the day						
4. It is easy to put on my orthosis						
5. My orthosis looks good						
6. My orthosis is durable						
7. My clothes are free of wear and tear from my orthosis						
8. My skin is free of abrasions and irritations						
9. My orthosis is pain free to wear						
10. I can afford the out-of-pocket expenses to purchase and maintain my orthosis						
11. I can afford to repair or replace my orthosis as soon as needed						
Total						
Result	<u> </u> /55					
I received an appointment with my orthotist within a reasonable amount of time						
I was shown the proper level of courtesy and respect by the staff						
I waited a reasonable amount of time to be seen						
Clinic staff fully informed me about equipment choices						
The orthotist gave me the opportunity to express my concerns regarding my equipment						
The orthotist was responsive to my concerns and questions						
I am satisfied with the training I received in the use and maintenance of my orthosis						
The orthotist discussed problems I might encounter with my equipment						
The staff coordinated their services with my therapists and doctors						
I was a partner in decision-making with clinic staff regarding my care and equipment						
Total						
Result	<u> </u> /50					

Social support

Do you receive support from your family members

1-Yes, a lot 2-Yes, Moderate 3-Not at all 4-NA

OPUS: Health Quality of Life Index

Note: For the questions below, the term "physical condition" refers to the reason you use an orthotic device. Not at all=4, A little= 3, A fair amount=2, A great deal=1, Excessively=0	4	3	2	1	0	NA
1. How much do you keep to yourself to avoid people's reactions to your need for a device?						
2. To what extent do you find that people's attitudes toward your physical condition are insulting?						
3. To what extent are you prevented from doing what you want to do because of social attitudes, the law, or environmental barriers?						
4. How much does pain interfere with your activities (including both work outside the home and household duties)?						
5. To what extent do you accomplish less than you would like because of your physical condition?						
6. To what extent do you accomplish less than you would like because of emotional problems?						
7. How much does your physical condition restrict your ability to run errands?						
8. How much does your physical condition restrict your ability to pursue a hobby?						
9. How much does your physical condition restrict your ability to do chores?						
10. How much does your physical condition restrict your ability to do paid work?						
11. To what extent have you cut down on work or other activities because of your physical condition?						
12. To what extent have you cut down on work or other activities because of emotional problems?						

During the past week, how often have you... 4=All of the time, 3=Most of the time, 2=Some of the time, 1=A little of the time, 0=None of the time	4	3	2	1	0
13. Felt full of life?					
14. Felt calm and peaceful?					
15. Had a lot of energy?					

16. Been happy?					
0=All of the time, 1=Most of the time, 2=Some of the time, 3=A little of the time, 4=None of the time	0	1	2	3	4
17. Been very nervous?					
18. Felt so down in the dumps that nothing could cheer you up?					
19. Felt downhearted and depressed?					
20. Felt worn out?					
21. Felt tired?					
22. Been easily bothered or upset?					
23. Had difficulty concentrating or paying attention?					
Total					
Result	<u> </u> /92				

OPUS: Lower-Extremity Functional Status Measure

Please indicate affected limb(s). <input type="checkbox"/> Right limb <input type="checkbox"/> Left Limb <input type="checkbox"/> Both limbs <input type="checkbox"/> NA						
How easy, or difficult, is it for you to: 4=Very Easy, 3= Easy, 2=Slightly difficult, 1=Very difficult, 0=Cannot do this activity	4	3	2	1	0	Do you typically wear an orthotic device to perform this activity?
						<input type="checkbox"/> No <input type="checkbox"/> Yes
1. Get into and out of the tub or shower						
2. Dress your lower body						
3. Get on and off the toilet						
4. Get up from the floor						
5. Balance while standing						
6. Stand for one-half hour						
7. Pick up an object from floor while standing						
8. Get up from a chair						
9. Get into and out of a car						
10. Walk around indoors						
11. Walk outside on uneven ground						

12. Walk in bad weather (e.g., rain, snow, wind)								
13. Walk up to two hours								
14. Walk up a steep ramp								
15. Get on and off an escalator								
16. Climb one flight of stairs with a rail								
17. Climb one flight of stairs without a rail								
18. Run one block								
19. Carry a plate of food while walking								
20. Put on and take off orthosis								
Total								
Result	___/80							

OPUS: UPPER EXTREMITY FUNCTIONAL STATUS

Please indicate your affected limb(s). <input type="checkbox"/> Right arm <input type="checkbox"/> Left arm <input type="checkbox"/> Both arms <input type="checkbox"/> NA								
Using the scale to the right, please indicate how easily you perform the following activities. 4=Very Easy, 3= Easy, 2=Slightly difficult, 1=Very difficult, 0=Cannot do this activity	4	3	2	1	0	NA	Do you usually perform this activity using or not using your orthosis?	
							Using	Not using
1. Wash face								
2. Put toothpaste on brush and brush teeth								
3. Brush/comb hair								
4. Put on and remove t-shirt								
5. Button shirt with front buttons								
6. Attach end of zipper and zip jacket								
7. Put-on socks								
8. Tie shoe laces								
9. Drink from a paper cup								
10. Use fork or spoon								

11. Cut meat with knife and fork								
12. Pour from a 12 oz can								
13. Write name legibly								
14. Use scissors								
15. Open door with knob								
16. Use a key in a lock								
17. Carry laundry basket								
18. Dial a touch tone phone								
19. Use a hammer and nail								
20. Fold bath towel								
21. Open an envelope								
22. Stir in a bowl								
23. Put on and take of prosthesis or orthosis								
24. Open a bag of chips using both hands								
25. Twist a lid off a small bottle								
26. Sharpen a pencil								
27. Peel potatoes (or fruit) with a knife/peeler								
28. Take bank note out of the wallet								
Total								
Result	_____/112							

Overall summary		
1.	In the past year, have you been returned back home without receiving the services you came to receive?	1-Yes 2-No If yes, answer the next question
2.	If yes, indicate reason (Don't probe answers) (Mark all that apply)	<input type="checkbox"/> No available service <input type="checkbox"/> Appointment wasn't planned <input type="checkbox"/> Lack of Staff <input type="checkbox"/> Long waiting time <input type="checkbox"/> Couldn't pay the required fees <input type="checkbox"/> Over crowdedness <input type="checkbox"/> Complicated back & forth procedures <input type="checkbox"/> Other, specify <input type="checkbox"/> NA

3.	Are you going to continue seeking orthotic services at the ALPC /Hammad	1-Yes definitely (go to Q4) 2-I'm not sure 3-Not at all (go to Q6)
4.	<i>If yes, indicate reason/s</i> (Don't probe answers)	<input type="checkbox"/> Accessible facility <input type="checkbox"/> Free of charge/price is covered by organizations <input type="checkbox"/> The center provides incentives such as transportation <input type="checkbox"/> Good reputation of the center <input type="checkbox"/> Satisfied with the services provided <input type="checkbox"/> Satisfied with the staff interaction <input type="checkbox"/> Others, specify..... <input type="checkbox"/> NA
5.	I would recommend for relatives and friends to seek services at ALPC or Hamad (where the patient receive the service from)	1-Strongly agree 2-Agree 3-Neither agree nor disagree 4-Disagree 5- Strongly disagree
6.	Indicate reasons for seeking to change the orthotic center? <i>(Don't probe answers)</i>	<input type="checkbox"/> Poor quality of services <input type="checkbox"/> Unable to afford the fees of services <input type="checkbox"/> Inconvenient clinic schedule <input type="checkbox"/> Difficulty in reaching the center <input type="checkbox"/> Other, specify..... <input type="checkbox"/> NA
7.	How would you describe your overall satisfaction with orthotic services in Gaza?	1-Strongly satisfied 2-Satisfied 3-Neither satisfied nor dissatisfied 4-Dissatisfied 5- Strongly dissatisfied

End of interview - Thank you

Annex 4 FGD Schedule with Service Users

Guide

- Tell about your life, how much you enjoy life
- Reflect on the services that you received from the orthotic facility?
- Give stories of services available and not available.
- What do you like about these services? And what not?
 - Probe on the quality: fitting, comfort, size, appearance, effectiveness, durability, waiting time, interactions with providers, respect, etc.
- What types of obstacles/barriers do you face? What about other users? Reflect on accessibility, acceptability, interactions with providers
- What are your concerns
- What are the typical services you receive from this place? How much it meets you expectations?
- What are the services you receive from other organizations?
- Tell me about your unmet needs, things you need but not covered yet?
- What are the things you don't like in this organization?
- How much the services at this centre impacted your life, in which direction, give examples
- What recommendations can you make? How could the services that you are involved in improve?

Annex 5 FGD Schedule with P&O professionals

Guide

- When we mention orthotics and your facility, what comes to your mind
- Who is usually served versus not served by your facility?
- What are the services provided at this centre? How much these services meet the needs of the population?
- What are the good and the not good aspects in the services provided at this facility?
- Reflect on your Capacity to respond to the needs (production vs capacity, working hours, HR, etc)
- In your opinion, what are the areas that require support in order to reinforce the orthotic services in your facility?
 - HR
 - Resources
 - Training
 - Equipment/material
 - Facilities
 - Educational resources
 - Systems
- Do you set outcome indicators, monitoring system in place
- Do you have appraisal, performance done in place, illustrate
- Illustrate the follow up and supervision systems you use to collect users feedback and which steps you do to fulfill needs?
- What are your strength, weakness, etc (SWOT) analysis
- In your opinion illustrate, what are the factors that could promote/enhance the orthotic services in your facility and in Gaza
- How you describe the role of administration/management in supporting orthotic service? How this role can be strengthened?
- With whom you coordinate to meet patients needs, referral services, how effective are these services?
- What could be done to improve services at this centre and nationally?
- How do you describe the referrals and prescriptions from doctors?
- Please illustrate any additional comments you have.

Annex 6-interview schedule with key informants (policy makers)

Guide

- From your perspective, how do you describe your satisfaction with the current orthotic service in Gaza?
- Is there any feedback system in place with service users and service providers? Reflect on how you respond to feedback
- Do you meet regularly with the service providers?
- How do you evaluate the services provided?
- Main barriers to accessibility (including, social, political, financial, technical, etc)
- What is your plan to enable access of people to orthotic services?
- What you should do to support orthotic service in Gaza
- Any budgeting plans
- Can you reflect on the sustainability of the orthotic service in Gaza (material, funds, coverage, government support, etc)
- Availability and use of strategic plans, does it include orthotic components
- Please illustrate any additional comments you have.

Annex 7 Orthotic Facility Assessment Checklist

Orthotic Facility Assessment Checklist

Assessment date _____	Assessor name _____	
Name of facility _____	Name and type of the mother organization	
Type of facility (A facility that provides orthotic services, specialized in orthotic domain, rehabilitation hospital)	<input type="checkbox"/> A facility that is specialized in Prosthetic and Orthotic services <input type="checkbox"/> Rehabilitation hospital which has Prosthetic and Orthotic department	
Accessibility, services and served population		
List all types of services that are currently provided by the facility		
Statistics of beneficiaries served by the facility disaggregated by services received, gender and age groups in the last 2 years (2019, 2020). Reflect on orthotic activities		
Target groups for all services (direct and indirect)		
How beneficiaries approach the facility? Self-referral, referred from other organizations or programs- give approximate proportions. Give statistics		
Physical accessibility (distance and time)-furthest distance travelled by clients to reach the facility		
Financial accessibility, how much people pay for services- affordability	Orthotic service	
	Prosthetic service	
	Physiotherapy (related to orthotics)	
	MHPSS related to orthotic users	
	Occupational Therapy service	
	Other services	
Orthotic related services currently provided at the facility		
Upper extremity	Types of services (e.g. orthosis, physiotherapy, OT, etc)	
	Targeted populations (by gender and age)	
	Number of beneficiaries in the past year	
Lower extremity	Type of services	
	Targeted populations (by	

	gender and age)				
	Number of beneficiaries in the past year				
Spinal orthotics	Type of services				
	Targeted populations (by gender and age)				
	Number of beneficiaries in the past year				
Infrastructure Physical setting and infrastructure					
Basic infrastructure such as Water, electricity, generator, waste disposal					
Physical environment (space, number of rooms, waiting area, training area, casting room, stores, ventilation, cheerfulness, light) cleanliness, etc)					
Availability of general safety measures including access to first aid tools, trained personnel, emergency exit, Fire extinguisher etc					
Availability and quality of the Registration area-orthotic services					
Availability and quality of Waiting area- orthotic services					
Availability and quality of Examination area- orthotic					
Availability and quality of fitting area- orthotic service					
Availability and quality of training area- orthotic services					
Availability of means to maintain privacy for beneficiaries receiving orthotic services					
Does the facility facilitate easy and safe movement of PWD around the facility? (check ramps, elevator, accessible toilets, slopes, safe ground etc)					
HR					
Total number of staff at the orthotic facility	M	F	Experience and qualification		
Staff available (relevant to orthotic services)					
Categories	No of Full time		No of Part time		Qualification and experience
	M	F	M	F	
1- Orthotist					
2- Orthotist assistant					
3- Physiotherapist					

4- Physiotherapist assistant					
5- MHPSS					
6- Occupational therapist					
7- Orthopedic doctor /consultant					
8- Others					
How human resources are managed at this facility? Do staff have updated job descriptions, do you conduct annual performance appraisal and how, do you monitor staff morale?					
Are staff providing orthotic services licensed to practice? How this is being verified?					
Availability of Technical internationally or locally adopted tools used in assessment, management and evaluation of orthotic services					
Reflect on involvement of beneficiaries and their families in care?					
Existence of plans for introducing additional orthotic services or suspension of such services					
Resources available for orthotic services delivery-please make more relevant to this service					
Availability of equipment needed for orthotic interventions	List of equipment available				
	Functionality of equipment				
	Equipment needed				
Availability of material	Key items available				
	Status of items				
	Availability/adequacy of stock				
	Items needed				
Availability of other resources such as Gymnasium gait training spaces, halls, special rooms, therapeutic/tools	List of items available				
	Status of items				
	Items needed				
Experiencing shortages of resources in the past year					
Experiencing returning clients (orthotic) without providing them with services they came to receive (in the last year), who are they? give reasons for that					
Training					
What is the current training system applicable in the facility? Training modalities (formal, on-the job – probe for orthotic					
Training gaps in orthotic services In which area					

Training needs (what, for whom and where in orthotics)	
Follow up after the provision of training	
Protocols and technical guideline	
How do you describe the level of availability of orthotic related protocols/guidelines	<input type="checkbox"/> Yes, seen <input type="checkbox"/> Yes, not seen <input type="checkbox"/> No
Are professionals trained on these protocols	
How do you describe the level of use of orthotic related protocols/guidelines	
What do you need to promote the use of protocols/guidelines	
Do you think that orthotic services are standardized in your country/district	
What could be done in this regard	
Any specific issues for women	
Community related issues	
How is the community informed about orthotic services	
Is there services signage? What it specifies (services and target groups)	
What is your client feedback system? Eg Do you have a feedback/suggestion box?	
Is there a complaint system? Do you have a system for dealing with complaints?	
Reflect on client-centeredness of services (involvement in planning, implementation and evaluation)	
Does staff conduct joint activities with communities or community groups? Do you have support group from the community? Please describe very briefly	
How much do you use awareness materials or audio-visual aids in orthotics? Give general idea about attention to posters or visuals.	
General management issues	
Availability and use of information system. What are the issues?	
Availability and use of performance indicators? orthotic related indicators, type of indicators, Who performs the monitoring function, how monitoring results inform	

practice, give examples,	
How you assess the outcome of your orthotic interventions? At program and individual levels	
Are staff members clear about their roles and responsibilities in orthotic domain? Reflect on the available organizational charts, clarity of titles and roles especially in orthotic services	
Are work processes related to orthotic interventions clear, documented and clients and information flow are streamlined?	
Medical records and documentation	
Availability and use of relevant medical records, log books or registries.	
Having a policy for medical records' security and confidentiality? Who can access the medical record especially in orthotic domain?	
Quality of documentations practices	
Reporting mechanisms, receiving feedback about reports	
Supervision	
Availability and regularity of supervision by the facility team itself. What are the issues?	
Availability and regularity of supervision by external supervisors. What are the issues?	
Availability and regulatory of monitoring system	
Referral services	
Availability and regularity of referral systems. Focus on orthotic services What are the issues?	
To whom do you refer cases? Who refers cases to this facility	
Type of cases you refer and their monthly number-(pay attention to age and gender)	
Type of cases that are referred to you and their monthly number -(pay attention to age and gender)	
Availability and use of referral guidelines, forms	
Reflect on feedback and communication between referring and referred to facilities	
Satisfaction	

Does your service monitor patient satisfaction? If yes please state how this is done	
Additional comments	

Annex 8 An official letter of approval from Helsinki Committee



المجلس الفلسطيني للبحوث الصحي Palestinian Health Research Council

تعزيز النظام الصحي الفلسطيني من خلال مأسسة استخدام المعلومات البحثية في صنع القرار

Developing the Palestinian health system through institutionalizing the use of information in decision making

Helsinki Committee For Ethical Approval

Date: 2020/06/01

Number: PHRC/HC/700/20

Name: Saeda Mohammed Al-Barawi

الاسم:

We would like to inform you that the committee had discussed the proposal of your study about:

نفيدكم علماً بأن اللجنة قد ناقشت مقترح دراستكم
حول:

Evaluation of Orthotic Services in the Gaza Strip

The committee has decided to approve the above mentioned research. Approval number PHRC/HC/700/20 in its meeting on 2020/06/01

و قد قررت الموافقة على البحث المذكور عاليه
بالرقم والتاريخ المذكوران عاليه

Signature

Member

Member

Chairman

Genral Conditions:-

1. Valid for 2 years from the date of approval.
2. It is necessary to notify the committee of any change in the approved study protocol.
3. The committee appreciates receiving a copy of your final research when completed.

Specific Conditions:-

E-Mail: pal.phrc@gmail.com

Gaza - Palestine

غزة - فلسطين
شارع النصر - مفترق العيون

Annex 9 Administrative approvals from ALPC/MoG & Hammad hospital

Al-Quds University
Jerusalem
School of Public Health



جامعة القدس
القدس
كلية الصحة العامة

التاريخ: 2020/7/15

حضرة الدكتور/ محمد دويمة المحترم
مدير مركز الأطراف الصناعية التابع لبلدية غزة

تحية طيبة وبعد،،،

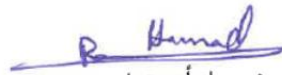
الموضوع: مساعدة الطالبة سائدة البرعاوي

نشكر لكم دعمكم الدائم لمسيرة العلم والتعليم وخصوصاً دعم كلية الصحة العامة وطلابها، ونود إعلامكم بأن الطالبة المذكورة أعلاه تقوم بعمل بحث كمتطلب للحصول على درجة الماجستير في الصحة العامة-مسار إدارة صحية بعنوان:

“Evaluation of Orthotic Services in The Gaza Strip”

وعليه نرجو من سيادتكم التكرم بالموافقة على تسهيل مهمة الطالبة في إنجاز هذا البحث حيث أن الفئة المستهدفة هم مستخدمي أجهزة تقويم العظام والمتخصصين في المجال.

و اقبلوا فائق التحية و الاحترام،،،



د. بسام أبو حمد
منسق عام برامج الصحة العامة
فرع غزة



نسخة:

- المرفق



التاريخ: 2020/8/8

حضرة الدكتور/ رافت لبد المحترم
مدير مستشفى سمو الشيخ حمد للتأهيل والأطراف الصناعية

تحية طيبة وبعد،،،

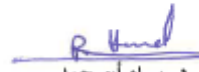
الموضوع: مساعدة الطالبة سائدة البرعاوي

نشكر لكم دعمكم الدائم لمسيرة العلم والتعليم ونحسبوا دعم كلية الصحة العامة وطلابها، ونود إعلامكم بأن الطالبة المذكورة أعلاه تقوم بعمل بحث كمتطلب للحصول على درجة الماجستير في الصحة العامة-مسار إدارة صحية بعنوان:

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فرع غزة



نسخة:

- لثاني

Annex 10 Experts who evaluated the questionnaire

Professor from Al-Quds University- Public Health, Academic teacher from Al-Azhar University- Physiotherapy Department, and an ICRC P&O expert who has an academic experience; in addition to ICRC technical advisor from Geneva, ICRC local physiotherapy staff who has a working experience in the field of P&O, 2 local P&O staff working at both facilities. Also, the director of ALPC, and a statistician.

عنوان الدراسة: تقييم خدمات أجهزة تقويم العظام في قطاع غزة

إعداد: سائدة محمد يعقوب البرعاوي

إشراف: د. بسام أبو حمد

ملخص الدراسة:

مقدمة:

يعد الوصول إلى خدمات أجهزة تقويم العظام أمراً مهماً جداً للأشخاص ذوي الإعاقة لتحقيق التنقل والاستقلالية والوفاء بحقوق الإنسان. الغرض من هذه الدراسة هو تقييم خدمات أجهزة تقويم العظام المقدمة في مركز الأطراف الصناعية ومستشفى حمد في قطاع غزة.

المنهجية:

تم إجراء دراسة مقطعية باستخدام الأساليب الكمية والنوعية بما في ذلك تم عمل استبيانات مع 262 مشاركاً، والتحقق من سجلاتهم بالإضافة لإجراء قائمة مراجعة المنشأة و 8 مقابلات فردية متعمقة مع مقدمي الخدمات وصانعي السياسات، و 5 مجموعات بؤرية مع المستفيدين ومقدمي الخدمات. تم جمع البيانات في الفترة ما بين يوليو إلى أغسطس 2020. جمعت الباحثة البيانات بمساعدة أخصائية علاج الطبيعي و بمعدل استجابة 85.1%. تم تصميم نموذج لإدخال البيانات الكمية باستخدام برنامج التحليل الإحصائي SPSS الإصدار 25 لإدخال البيانات وتحليلها وتم تحليل البيانات النوعية باستخدام تقنية الترميز.

أهم النتائج:

كان معظم المشاركين في هذه الدراسة من الأطفال بنسبة 83.1%. وكان ثلث المشاركين يعانون من مشاكل في القدم، أما تقوس الركبة كان بنسبة 19.5% والشلل الدماغي بنسبة 13.7%. أما بالنسبة للسبب الرئيسي للإعاقة فقد أظهرت النتائج بأنه سبب غير معروف أو خلقي بنسبة 71.3%. تم تزويد المشاركين بشكل أساسي بأجهزة جاهزة الصنع بنسبة 70%. وقد أظهرت النتائج بأن متوسط درجة الرضا عن الخدمات التي تلقوها بشكل عام كان 5/3.7 وهو أعلى من درجة الرضا عن الجهاز نفسه حيث كانت 5/3.2 و قد أقر ما يقارب ثلث المشاركين (بنسبة 33.8%) بعدم امتثالهم لاستخدام أجهزتهم.

كانت أعلى نتيجة تم الإبلاغ عنها حول الجهاز هي متانة الجهاز (5/3.8)، وكانت أدنى متوسط درجة رضا حول نطاق القدرة على تحمل التكاليف (5/2.1). أما فيما يتعلق بمحور جودة الحياة، فقد أبلغ 11% من المشاركين عن درجة جودة حياة أعلى من 70%.

لم تكن هناك اختلافات ذات دلالة إحصائية في الرضا بين المشاركين فيما يتعلق بالخصائص الديموغرافية (الجنس، والعمر، ومكان الإقامة)، وكذلك فيما يتعلق بعدد الأجهزة التي تم تلقيها.

من ناحية التوثيق، تضمن عدد قليل من الملفات استمارة تقييم (فقط 7.6٪)، واشتملت فقط 17.6٪ من الملفات على ملاحظات مرحلية وبالرغم من أن 90.1٪ من الإحالات أظهروا توثيقاً واضحاً لطلب الأجهزة ؛ لكن لا تزال السجلات تفنقر إلى المعلومات ذات الصلة والسجل التاريخي للمرضى.

كلا المرفقين مجهزين بشكل مناسب، ولديهما مخزون كاف من المواد والأدوات اللازمة لإنتاج أجهزة تقويم العظام ، ويقوموا بإنتاج مجموعة واسعة من أجهزة تقويم العظام ذات الصلة باحتياج السكان. قد تبين نقص في الدوافع والحوافز لدى أخصائيو الأجهزة ومساعدتهم وأيضاً عدم الرضا عن حالة العمل وعن رواتبهم والاعتراف بهم وسوء ظروف العمل.

الخلاصة:

تحتاج خدمات أجهزة تقويم العظام إلى مزيد من التكامل والدمج في حزمة الخدمات الصحية. وأيضاً، من المهم توحيد تقديم الخدمة من خلال تطوير إرشادات وبروتوكولات وزيادة التنسيق بين مزودي الخدمات وضمان الاستمرارية في تقديم الخدمات.