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

# Evaluation of Cochlear Implantation Program among Children in the Gaza Strip

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**M. Sc. Thesis**

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# Evaluation of Cochlear Implantation Program among Children in the Gaza Strip

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## Thesis Approval

# Evaluation of Cochlear Implantation Program among Children in the Gaza Strip

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## Dedication

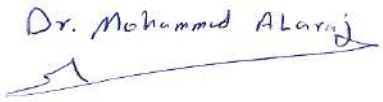
I dedicate this work to my parents who gave me unconditioned love, engorgement, and support, to my sincere wife, and to everyone who contributed to bringing this study to reality.

Thanks are also extended to my brothers and sisters, to all my friends, and to my beloved ones with whom I spent the good times and learned a lot.

**Mohammed Issam Mohammed Alaraj**

## Declaration

I certify that this entire thesis, submitted for the Degree of Master, is the result of my own work, except where otherwise acknowledged, and that this study (or any part of the same) has not been submitted for a higher degree or qualification to any other university or institution.

Signed. 

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## Abstract

Cochlear implantation (CI) has a significant impact on various aspects of life, including physical, psychological, financial, and social well-being, as well as communication and self-reliance. It plays a crucial role in enhancing the quality of life of children, enabling them to develop productive abilities and participate in their families and communities like any other child. This study is the first of its kind in the Gaza Strip, focusing on evaluating the effects of CI services on children's quality of life, satisfaction, perception of the services, current needs, and concerns of the families of children who have undergone CI.

The study design was triangulated cross-sectional quantitative and qualitative with systematic sample selection. The study includes two populations. The first population for the quantitative part was the parents of all children that underwent cochlear implantation in the Gaza Strip from 2007 till now and have recommended files program of CI, covered through interview approval questionnaires for CI recipients (Children with Cochlear Implants: Parental Perspectives questionnaire). The second population for the qualitative part is six key informant managers at Governmental, and Non-Governmental Organization organizations covered through interviews, also the patient's perceptions are expressed through a group of open-ended questions included in the questionnaire.

The study place was mainly in the Sheikh Hamad Bin Khalifa Al-Thani Hospital for Rehabilitation and Prosthetics in Gaza Strip. Statistical Package for the Social Sciences Program (SPSS) has been used for data analysis.

Results: Regarding the quality of life for CI recipients, the study showed good results in all subdominants of the quality of life for CI recipients; the total weighted mean of Quality of life for all CI recipients was 77.77%, and Mean ratings were greater than three for all eight HRQoL subdomains on a 5-point Likert scale (mean = 3.89, range = 3.34–4.25), the most affected aspect of quality of life post-CI is ‘Social relations’ which received the highest ratings (mean = 4.25), followed by General functioning’ (mean = 4.09), ‘Effects of implantation’ (mean = 4.05) and ‘Self-reliance’ (mean = 3.92), ‘Supporting the child’ (mean = 3.90), ‘Well-being’ (mean = 3.87), and ‘Communication’ (mean = 3.74) also rated positive, the ‘Education’ received the least positive ratings (mean = 3.34).

Patients' satisfactions with CI service were very good with a total weighted mean of satisfaction of 84.6 %.

Regarding the qualitative part, the study showed that the CI service is an important community need due to the continuous increase in the number of children with hearing disabilities. Moreover, the study showed that Non-Governmental Organization mainly Hamad Hospital have the main role in CI service, in comparison to the governmental sector. In addition to that, the comments expressed by CI recipients showed the importance of CI service and the harmful effect of cochlear device malfunction and educational status post-CI and explored the need for the development of CI service in the Gaza Strip.

Conclusion: in general CI service, especially Hamad Hospital service, improves the Quality of Life for CI recipients, improves CI recipient's satisfaction, and decreases CI recipient's concerns about the impact of hearing loss. The CI service at Hamad Hospital meets the community's needs as the best available rehabilitation service for CI recipients, although it still needs more work to reach sustainability in CI services.

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## List of abbreviations

| | |
|---|---|
| **APHAB** | Abbreviated Profile of Hearing Aid Benefit |
| **CCIPP** | Children with Cochlear Implants: Parental Perspectives questionnaire |
| **CI** | Cochlear Implant |
| **CP** | Cerebral palsy |
| **CWDs** | Children with Disabilities |
| **dB** | Decibels |
| **F.D.A** | U.S. Food and Drug Administration |
| **FGDs** | Focused Group Discussions |
| **GBI** | Glasgow Benefit Inventory |
| **HA** | Hearing Aid |
| **HL** | Hearing Loss |
| **HRQoL** | Health-Related Quality of Life |
| **MICS** | Multiple Indicator Cluster Survey |
| **MOH** | Ministry of Health |
| **MR** | Mental Retardation |
| **NA** | Not Available |
| **NCIQ** | Nijmegen Cochlear Implantation Questionnaire |
| **NGO** | Non-Governmental Organization |
| **NIH** | National Institutes of Health |
| **OCHA** | United Nations Office for the Coordination of Humanitarian Affairs |
| **PCBS** | Palestinian Central Bureau of Statistics |
| **PedsQL** | Pediatric Quality of Life Inventory |
| **PHC** | Primary health care |
| **PLC** | Palestinian Legislative Council |
| **PMOH** | Palestinian Ministry of Health |
| **QoL** | Quality of Life |
| **SNHL** | Sensorineural Hearing Loss |
| **UHL** | Unilateral Hearing Loss |
| **UNRWA** | United Nations Relief and Works Agency for Palestine Refugees in the Near East |
| **WHO** | World Health Organization |

# Chapter One

## Introduction

Hearing impairment is the 4th most common chronic disease worldwide (Saundersmet al, 2018), it affects 1.2 billion people, and this rate is steadily increasing. For those with bilateral moderate to profound HL who no longer receive significant benefits from hearing aids, there is a surgical option called a neuro-prosthesis implant. This procedure, known as a cochlear implant, provides a modified sense of sound by bypassing the normal acoustic hearing process and replacing it with electrical signals that directly stimulate the auditory nerve (Eliades &Tsunada, 2019). CI is not only providing the ability to communicate, but it provides benefits extend beyond that. Numerous studies have proven that social isolation, emotional impact, and intellectual and listening attempt, which might affect hearing loss, lower an individual's QoL. The progressive dramatic effect of CI includes the improvement in hearing, increase social involvement; improve the psychological state, increase self-efficacy and emotional state support (Fortunato, et al., 2016). According to Shojaei, Jafari, and Gholami (2016), unidentified HL at birth or during the first few years of life negatively affects speech and language development, academic success, and social-emotional development. The etiology of congenital or early-onset HL most likely varies from country to country. CWDs including those with hearing impairment, typically experience disabilities that affect their ability to learn and educate, as well as their QoL , social participation, and future prospects in general (Breckell, 2015). Additionally, families of CWDs also affected by the stigma attached to them since they frequently feel alone, irritated, and overburdened by the unmet demands of their CWDs. In addition to the inadequate services offered to CWDs, this is a problem (Jones et al., 2016). The fact that the majority of those with HL reside in low- and middle-income nations further exacerbates the suffering (WHO, 2017).

According to a study by Olusanya, Neumann, and Saunders in 2014, underdeveloped nations have a higher incidence of congenital or early onset HL in newborns or young children, with six cases per 1000 live births in 2012. This is three times more than in wealthy countries. The World Health Organization (WHO) estimates that 360 million people, including 328 million adults and 32 million children, which is about 5% of the world's population, are likely to experience hearing difficulties (WHO, 2012). There were

12,127 people with disabilities under the age of 18 in the Gaza Strip when the disability census was conducted there in 2012 (PCBS, 2013). About 12,096 of them were questioned for the report, and 1,432 of them identified HL as their primary hearing disability (PCBS, 2013). Encouraging early detection and treatment of hearing impairment is crucial, especially for infants and young children. However, it is equally important to prioritize primary prevention of hearing impairment, especially in low- and middle-income countries, as noted by Olusanya, Neumann, & Saunders (2014). The availability of universal screening, or at the very least, focusing on children and families with risk factors, is essential for prevention and early detection. In order to focus on awareness-raising, health education and counseling, screening activities, and psychosocial support, it would be helpful to identify risky populations done (Abu Hamad, 2011).

Prior to 2009, the majority of cases reporting significant SNHL in the Gaza Strip was directed to hospitals outside of the strip. Typically, these cases were referred to neighboring countries like Jordan and Egypt. In the period from 2009 to 2011, about 119 cases of children who complained of SNHL underwent CI at PMOH hospitals through a project supported by Qatar country. However the CI at that moment was done by the abroad surgical team, and the program was lack a lot of facilities, including pre and post-rehabilitation programs.

In 2017, the Qatari-Palestinian team with new comprehensive program is started to carry out this type of surgery, which is complex, costly, and usually only performed abroad, for the first time in the Gaza Strip as a comprehensive program with pre-and post-rehabilitation program. Since 2017, the PMOH has performed nearly 180 CI surgeries, 66 of them in 2019, with the support of Emaar development association in partnership with Qatari Red Crescent, cochlear implement society, in cooperation with Sheikh Hamad bin Khalifa Al-Thani Rehabilitation and Prosthetics for the Reconstruction Hospital.

In 2021, local surgical teams in Palestine successfully implanted a cochlear for the first time in Gaza. The operation was performed on a two-and-a-half-year-old girl who had hearing impairment due to complications after birth. The surgery took place at Al-Quds Hospital, with the Qatari medical team observing via video conference. The procedure was completed successfully by Dr. Muhammad Murad, an otorhinolaryngologist consultant and head of the medical team specializing in CI. He stated that all vital signs during the

operation indicated a positive response from the child undergoing the surgery. (MoH, 2021).

In this study the researcher evaluated the benefits of CI not only on the hearing performance level also on the QoL of these patients, by the use of CCIP questionnaire that developed by Archbold et al. and later validated and shown reliable by O'Neill et al. and Nunes et al. (O'Neill et al,2004, Archbold et al, 2002, Nunes et al, 2005).

## 1.1 Problem Statement

The MICS that done in Palestine at 2019-2020 (PCBS, 2021) showed that the highest percentage in disability was communication for children that aged from 2-4 years, which reached about 1%, about hearing disability it was 0.1 for children from 2-4 years, and 0.4 for children from 5-17years. Since no studies done on the outcomes beyond the auditory performance for the children post CI, variables such as 'communication', 'general functioning', 'well-being and happiness', 'self-reliance', 'social relations', and 'education', should be assessed by questionnaire to determine the improvement in the Qol before and after CI.

There is an information gap, almost little is known about the efficacy of CI among children in the Gaza Strip, and no studies have been carried out previously on this topic. Therefore, the need for this evaluation is particularly acute. It is anticipated that this study explore the gaps and challenges that face the CI implantation patients in Gaza and identify some positive points and recommendations. The evaluation is expected to answer unanswered questions about the reality of CI services including structure, processes, outputs, and outcomes.

## 1.2 Justification of the study:

In the Gaza Strip, this is the first research of its sort to handle the subject. It will cover the outcome, output, and effectiveness of CI, which will offer helpful hints about the benefits and drawbacks of this procedure. Additionally, the results will offer insights for policymakers, donors, and service providers, forming the basis for better planning, better implementation, informing and guiding decision-making, and ultimately improving the QoL of people with CI.

By searching the literature, it was evident that the literature to date, have focused globally more on audiological performance of a CI rather than the QoL that provided by CI (Keintzel et al., 2023). Therefore, this study may offer a framework for local CI monitoring and evaluation, which will aid in discussions about how it might be operationalized at the national level and how international partners might cooperate to support the CI program.

As a researcher and residency member at the otolaryngologist Palestinian and Arab board program, the CI is an exciting topic in my specialized, and since the program of CI is under development in my country, this research will provide a good view of the future of this field. As this study is the first one ever done in Gaza governorates that explores the evaluation of the CI program among children in the Gaza Strip, it can be used as a foundation for more in-depth research. Having that said, the study is beneficial to a wide sector of audiences including but not restricted to interested researchers, policymakers, practitioners, international development agencies, and most importantly to the local community.

Dialogue could be initiated with policymakers to set several strategies to support the program of CI. The dialogue will involve all main healthcare providers such as MOH, UNRWA, and NGOs to analyze the outcomes and suggest interventions and health messages to be communicated to the public. The findings of this research could be utilized by first-line healthcare providers to give more attention to children having CI. Additionally, universities and public health institutions could be approached for collaboration, potential future cooperation, and further advanced research in this area.

### 1.3 Aim

The purpose of this study is to evaluate the CI program among children in the Gaza Strip to come out with recommendations to improve the QoL post-CI and satisfaction with CI services provision in Gaza Strip.

### 1.4 Research objectives

- To Identify the impact of CI on improvement in the QoL among children.
- To explore CI patients' satisfaction with the delivered CI service.

- To assess the level of improvement in the audiological performance and other variable that affects the QoL post CI among patient in Gaza Strip.
- Identifying the worries of CI patients both before and after CI fitting.
- To identify the positives, negatives, and difficulties associated with offering CI services in Gaza.
- To identify the barriers that hinder the medical staff and patients from reaching effective services post-CI.
- To set recommendations to enhance patients and medical staff to achieve the best benefits from CI.

## 1.5 Research questions

- What is the setup of the CI services in Gaza Strip?
- How much does the CI services contribute to the quality of clients' life and wellbeing?
- What are the main barriers to give optimum services to CI services?
- Does demographic and educational level contribute to the quality of clients' life and wellbeing post CI?
- What is the strength, weak areas and challenges related to CI services?
- How much does the CI services contribute to the quality of clients' social life and communication?
- Does the medical staff have an impact on the quality and effectiveness of CI service?
- To what extent the CI service is sustainable?
- What can be done to improve CI service?

## 1.6 Context of the research

The demographic, socioeconomic, and political situations may impact provision of health services by specific way to suit these situations; the advanced medical such as CI service is affected according to changes in these situations.

### 1.6.1 Demographic context:

Palestine is located at the Eastern Mediterranean Sea. Mediterranean Sea bordered Palestine from the west, Jordan bordered Palestine from the east, Syria and Lebanon bordered Palestine from the north, Aqaba Gulf from the south see annex (1) (Ministry of Foreign Affairs and Expatriates, 2019). The Gaza Strip is a Palestinian territory, with a total area of 365 square kilometers and with a high population density; of 5855 persons per Square km (PCBS, 2022). The Gaza Strip is classified into five governorates, North of Gaza, Gaza City, Mid-Zone, Khan-Younis, and Rafah, see annex (2).

### 1.6.2 Socio-economic situation:

The current political situation, regular Israeli military operations, and the Gaza Strip embargo have all had a negative impact on the Palestinian economy. The unemployment rate in Gaza Strip was 45% compared with 13% in the WB, while the unemployment rate for males in Palestine was 20% compared with 42% for females (PCBS, 2019). Moreover, the Gaza Strip's economic situation is negatively impacted by the region's high population density, restricted land and sea access, ongoing isolation, and harsh external blockade. Poverty rates among individuals according to monthly consumption patterns in Gaza Strip reached 53%, while the deep poverty rate reached about 34% (PCBS, 2018a).

The Palestinian population has one of the highest fertility rates in the region, the mean number of children ever born to ever married Palestinian women (15 Years and over) equals to 4.5 in Gaza Governorates (PCBS, 2018b). Religious and cultural beliefs dominating the society encourage fertility and having many children. Having many children provides a type of social security and protection for the family and the tribe against others (Courbage, et al, 2016). Consanguinity practiced in Gaza was found to be strongly associated with hearing impairment in infants and toddlers (Zaqqout & Hamad, 2022).

### 1.6.3 Environmental context:

With the demands of Gaza's expanding population, basic infrastructure in the areas of electricity, water, sanitation, and municipal and social services are having difficulty keeping up. Water consumption and hygiene standards have decreased as a result of the limited operation of water pumps and water desalination facilities, and the Gaza Strip now consumes less water than the WHO-recommended service delivery level of 100 L per capita per day. Sea pollution along the Gaza and southern Israel coasts has worsened as a result of the shortening or suspension of sewage treatment cycles (OCHA, 2018a). In addition, the aquifer is contaminated by nitrates from uncontrolled sewage, and fertilizers

from the irrigation of farmlands (Manenti et al, 2016). Many specialists say that frequent battles have contaminated the groundwater with heavy metals in some parts of the Gaza Strip, and they also contend that women are more susceptible to changes in the water's quality brought on by war (Safi, 2015).In the end, it is estimated that 97% of piped water is unfit for human consumption (OCHA, 2018a).

Due to the high rates of solid waste generation and Israel's political and economic restrictions, managing solid waste in the Gaza Strip is a critical concern and one of the biggest problems facing the local government. A significant portion of the waste is temporarily dumped at transfer sites around Gaza without control or protection since there is limited access to the three overburdened core dump sites (Nassar, 2015). The environment and public health are seriously threatened by the way garbage is currently being handled in the Gaza Strip. The mixing of toxic and untreated medical waste with common household solid trash poses a serious threat (German Federal Ministry for Economic Cooperation, 2014). Both waste collectors, as well as the general public, are directly exposed to these threats, specifically near public containers along the streets where the waste is mixed and near dump sites (Nassar, 2015). It is important to research and link between these factors and the risk of HL.

In Israeli attacks, the Gaza Strip, especially on the eastern side, was blasted with tons of weapons, explosives, and deadly chemicals (Safi, 2015). 100,000 people were forced to flee their homes during the 2014 conflict, of whom 20,300 were still without homes as of November 2017. Millions of tons of rubble were left behind, polluting the air with dust and particulate matter and possibly harboring rodents and insects, which could lead to other types of nuisances (OCHA, 2018a). During these aggressions, many people were exposed to white phosphorus, which correlated significantly with the occurrence of birth defects (Naim et al, 2012). It is necessary to investigate and associate the risk of hearing impairment with all these environmental changes and recurring harmful events.

In a study was done in the Gaza Strip about risk factors of hearing impairment among infants and toddlers found that loud continuous noise like generators, music, and traffic can increase the risk of hearing impairment in children. Even exposure to very high noise for a short time, such as bombing and explosion, can be harmful. Smoking and exposure to chemicals were not found to have an association with hearing impairment. The proximity of a house to a trash container was found to increase the risk of hearing impairment in

children. The most important factor is noise pollution, which can be controlled to decrease the risk of hearing impairment in infants and toddlers (Zaqqout & Hamad, 2022).

### 1.6.4 Political context:

The issue faced by patients with CI has been exacerbated by the political divide between Gaza and the West Bank, as well as the ineffective performance of the PLC. This has prevented the introduction of laws and policies aimed at alleviating the hardships faced by disabled Palestinians, especially those with CI. The political conflict has also led to a decrease in health services, administrative duplication, poorly-planned healthcare policies and strategies, and a lack of clarity in determining the top healthcare priorities in the Gaza Strip.

### 1.6.5 Healthcare system:

In Palestine, the top four health service providers are MOH, UNRWA, NGOs, and private for-profit organizations that offer their services for purchase. MOH offers primary, secondary, and tertiary healthcare services and purchases tertiary healthcare services that aren't available from domestic and international suppliers. Particularly for patients with non-communicable diseases and emergency patients, Gaza hospitals' electrical outages and lack of medications and medical supplies pose a serious health risk. Over 140 PHC clinics and 14 hospitals are directly impacted by electricity shortages (49 MOH, 22 UNRWA, and 66 NGO PHC facilities), and disrupting critical services such as blood banks, laboratory, and vaccine storage (OCHA, 2018b).

Reviewing indicators of Palestinian health status, it is found that the average number of years a newborn is expected to live in the Gaza strip is 74.4, while the rate of people with disabilities is 2.4% on average (MOH, 2019). The infant mortality rate in the Gaza Strip was reported to be 12.7 per 1000 live births (PCBS, 2019b), beds capacity per 10,000 population is 15.1, 15.2 physicians are available per 10,000 population, bed occupancy rate 95% (MOH, 2019), and approximately 94.8 % of the population of the Gaza Strip are covered by some form of prepayment for health care (PCBS, 2019b).

Health and education are the main CWD services offered at the national level, with some social protection assistance provided through the Palestinian National Cash Transfer Program and health insurance for those with disabilities (Jones et al, 2016). Although

many of the other necessary services are expected to be provided at the local and intermediary levels, not all of them are. Similar to health services offered to the general community, numerous stakeholders offer health and rehabilitation services for CWDs. Although MOH is required by law to provide health services to all citizens, including CWDs, and UNWRA offers services to the refugee population, the basic package of available services is insufficiently tailored to address the specific healthcare needs of people with disabilities, including those with hearing impairment, especially the youngest children. Early diagnosis and intervention, which are crucial to supporting positive developmental trajectories, are absent or of low quality (Jones et al, 2016).

NGOs are important in the diagnosis, treatment, and care of kids with hearing impairment. The Sheikh Hamad bin Khalifa Al-Thani Rehabilitation and Prosthetics Hospital, the Atfaluna Society for Deaf Children, the Al Amal Rehabilitation Society-Rafah, the Deir Al Balah for Rehabilitation, Emaar For Development & Rehabilitation and the Jabalia Rehabilitation Society are some of the major institutions that provide services for people with hearing impairment. These institutions also provide diagnosis, education services, and assistive devices. Recently, the Sheikh Hamad bin Khalifa Al-Thani Rehabilitation and Prosthetics Hospital has played a major part in the CI among children in the Gaza Strip. This is done in collaboration with the MOH, and this program represents a paradigm shift in the way that CI patients in the Gaza Strip receive medical rehabilitation.

His Highness Sheikh Hamad bin Khalifa Al Thani Hospital for Rehabilitation and Prosthetics was founded in 2016 AD on the orders of His Highness, the Father Emir Sheikh Hamad bin Khalifa, for the Qatari Committee to construct a hospital specialized in the installation of prostheses and rehabilitation in the Gaza Strip. The Qatar Fund for Development finished the giving process when it began operating the hospital on April 22, 2019 AD. Since its operation in April 2019, Hamad Hospital in Gaza has provided services to more than 14,000 patients and people with disabilities through its three main departments: the Prosthetics Department, the Audiology and Balance Unit, and the Medical Rehabilitation Unit (HH Sheikh Hamad Hospital in Gaza Launches Electronic Limbs Project, 2022).

Antenatal care is strongly associated with a lower risk of hearing impairment in children. Early registration during the first trimester is particularly important. Completeness of antenatal care also showed the same association. Preconception care, postnatal care, and

place of delivery have unclear relationships with hearing impairment. Early screening and enhanced physician suspicions can improve early detection (Zaqqout & Hamad, 2022).

## 1.7 Operational definitions

### 1.7.1 Cochlear implant (CI):

CI are devices that allow electrical stimulation of the auditory nerve through the interpretation of sound stimuli. It is a surgical medical treatment of HL that requires surgery and subsequent auditory and speech rehabilitation (Torre & Montoya, 2022).

### 1.7.2 The Old approach of CI:

Posterior tympanotomy is a well-known otologic procedure that allows surgeons access to the middle ear cavity. This technique was first described by Jansen in 1958 and is achieved by opening of the facial recess, which is a triangular space defined medially by the mastoid segment of the facial nerve, laterally by the chorda tympani nerve and superiorly by the incudal fossa (Kim et al, 2008). During posterior tympanotomy the surgeon can approach the round window niche and promontory, where a cochleostomy is carried out for cochlear implant electrode array insertion (Hamamoto et al, 2000). In our study it refer to children that underwent CI between 2009 and 2011 with old technique of CI, estimated that119 cases of CI done during this stage.( Franz B K, et al, 1988).

### 1.7.3 The new approach of CI:

endoscope-assisted cochlear implantation (CI) technique, in which the middle ear landmarks were identified through the facial recess exposure by using an endoscopic view without elevating the tympanic annulus(Güneri & Olgun, 2018), the surgeons in our study use the Trans-meatal endoscopic technique for CI in the new approach. In our study it refer to children that underwent CI between 2017 and until now with new technique, estimated about 350 cases of CI done during this stage.

### 1.7.4 The Quality of Life:

QoL is a concept which aims to capture the well-being, whether of a population or individual, regarding both positive and negative elements within the entirety of their existence at a specific point in time (Teoli, 2023). The World Health Organization WHO

defines Quality of Life as 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 (Mental Health and Substance Use, 2012).

### 1.7.5 The Irregular Education (Non-Formal Education)

In this study, a particular term is used to describe children who did not continue their education in public schools. This includes children who entered government schools for a certain period but then left either to stay at home or attend a school for children with disabilities. It also includes those who left school for many years due to problems with external devices or other causes but later returned to complete their studies.

### 1.7.6 The Activation Age

Initial activation day is the day when the audiologist turns on and programs the settings for the cochlear implant, allowing the recipient to hear sound through the device for the first time. The cochlear implant activation day is much anticipated for our cochlear implant recipients, their family, and friends. Activation of the device typically is done one to two weeks after surgery.

### 1.7.7 The Patient Satisfaction

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

# Chapter Two

## Conceptual Framework

Optimal health service delivery is linked to facility capacity to deliver the services needed and demanded. If a health system has the appropriate balance of skilled staff and supplies to meet the health needs of its population, then a strong foundation exists to support the delivery of cost-effective and equitable services. The study's conceptual framework was adapted from Donabedian's quality of care framework (Donabedian, 1988; Ghaffri et al., 2014), which links structure, process, and output/outcomes utilizing program evaluation theory and the six WHO building blocks framework.

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

### 2.1 Input/structure

The input/structure contains all of the components required to successfully perform CI services. In this instance, the focus of the study would be primarily on the standard of the facilities and the setting in which care is delivered. They have an effect on how medical staff and patients behave and are indications of the average level of care offered within an institution or system. The structure is typically easy to identify and measure, and it could be the root cause of problems encountered during the process. Input/structure examples include the facility's actual physical area, its contents and equipment, the workforce information system, the financial system, the laws and regulations, and the leadership and governance.

#### 2.1.1 Physical space of facilities:

Look at the facilities' availability, their distribution, whether building and informational accessibility are guaranteed, as well as whether privacy and confidentiality are.

#### 2.1.2 Workforce:

Workforce involved in CI: size, distribution, qualifications, pay, state regulation of the industry, and alignment with medical professionals. The availability of a support team will also be investigated by the researcher.

### 2.1.3 Information system:

The study will determine whether a database has been established, whether there is infrastructure (in a soft or hard format), and whether the information can be produced, analyzed, disseminated, and used. Analyze the availability of standardized tools and instruments. Information on how many, what kind, and where people live who need services.

### 2.1.4 Financing system:

If the financing method ensures sustainable CI services, the researcher will investigate it. Examine if national social and health insurance systems offer coverage for CI treatments. And if a funding structure is in place to raise the necessary funds for CI services in a way that ensures individuals in need may access them and are protected from experiencing financial ruin or destitution as a result of having to pay for them.

### 2.1.5 Guidelines/standards:

The best available evidence should be used as the foundation for all processes in the delivery of CI services, and local, national, and international standards and practices should be followed. The researcher will examine the existence of accepted policies, procedures, and standards as well as their application.

## 2.2 Process

The word "process" refers to the fundamental actions that make up healthcare, how care is provided, or interpersonal processes. Donabedian (1988) and Ghaffri et al. (2014) asserts that because the process includes all actions of healthcare delivery, measuring the process is almost comparable to measuring care quality.

Access, an appointment system, waiting times, rules and procedures, user-provider interactions, records and documentation, and follow-up are all part of the process.

### 2.2.1 Appointment system/Waiting Time:

Appointment system ensures attendance and adherence to the scheduled appointment to guarantee that no patient is forgotten. Appointments for the assessment, measuring, fitting,

instruction in use, and delivery sessions. Timely service CI provision is important to restore functioning and to prevent secondary deformities. Time from registration to assessment, to first fitting, and to delivery. Also, the waiting time during the visits, sessions in the facility. Waiting lists which reflect the information required to measure this factor.

### 2.2.2 User-provider interaction:

It relates to how patients and providers communicate with one another. If the patient is respected by the physician and if the provider introduces themselves. If everyone involved in the process agrees on the goals and the team is dedicated to the procedures. If the privacy, respect, and dignity of patients are upheld; if staff members are aware of their tasks; and if communication is informal. if the staff provides accurate information about the management process, including guidelines, recommendations, plans, and a roadmap.

### 2.2.3 Records/Documentation:

The documentation system for keeping track of patient development and follow-up, properly written and documented in patient files, and ensuring that all appointments are remembered. Will also evaluate how securely clinical records are maintained.

### 2.2.4 Follow-up:

It is necessary to follow up at predetermined intervals to review results and make sure the CI is comfortable, functional, and durable. Follow-up enhances results and is crucial to the provision of services. It will also state who follows up, who is the provider or referrer, etc.

## 2.3 Output/Outcomes

Inputs and processes have an impact on output and outcomes. The impact of CI services on the patient's happiness with the device and the services offered are referred to as outcomes. Patient service, patient satisfaction, and QoL are the subdomains in this case.

### 2.3.1 Outputs:

- Represent the service's capabilities.
- The number of clients who requested and/or obtained CI devices.

- The system's capacity is shown by the number of persons who have used and/or profited from CI services.
- Number of sessions: the study will explore the number of sessions provided including consultations, casting, related rehabilitation sessions, and follow-up sessions.

### 2.3.2 Outcomes

#### 2.3.2.1 Patients' satisfaction:

Patient feedback on the device, including its use, comfort, fit, functionality, and durability, will be examined in this study in relation to patient satisfaction with the product and the services. Will also discover patient experience with the services provided, whether it met their expectations or not which include appointment, waiting, management pathway, staff interaction, the responsiveness of the service, and patient involvement.

#### 2.3.2.2 Quality of life:

In this study, patients' opinions on how the services have affected their QoL will be evaluated, along with their perspectives on their disabilities, health, how they feel overall, how they feel about themselves, how others perceive them, and social interactions.

## 2.4 Influencing factors

### 2.4.1 Patient's characteristics:

Other variables that might affect the service include the demographics of CI recipients, including their age, sex, province, level of education of the parents, any related illnesses, causes, family income, and health insurance.

### 2.4.2 Socioeconomic status:

Opportunities for people to improve their health might be impacted by socioeconomic level. This will take into account the parent's educational background, the family's financial situation, their health insurance, as well as the price of goods and services.

### 2.4.3 The study conceptual framework:

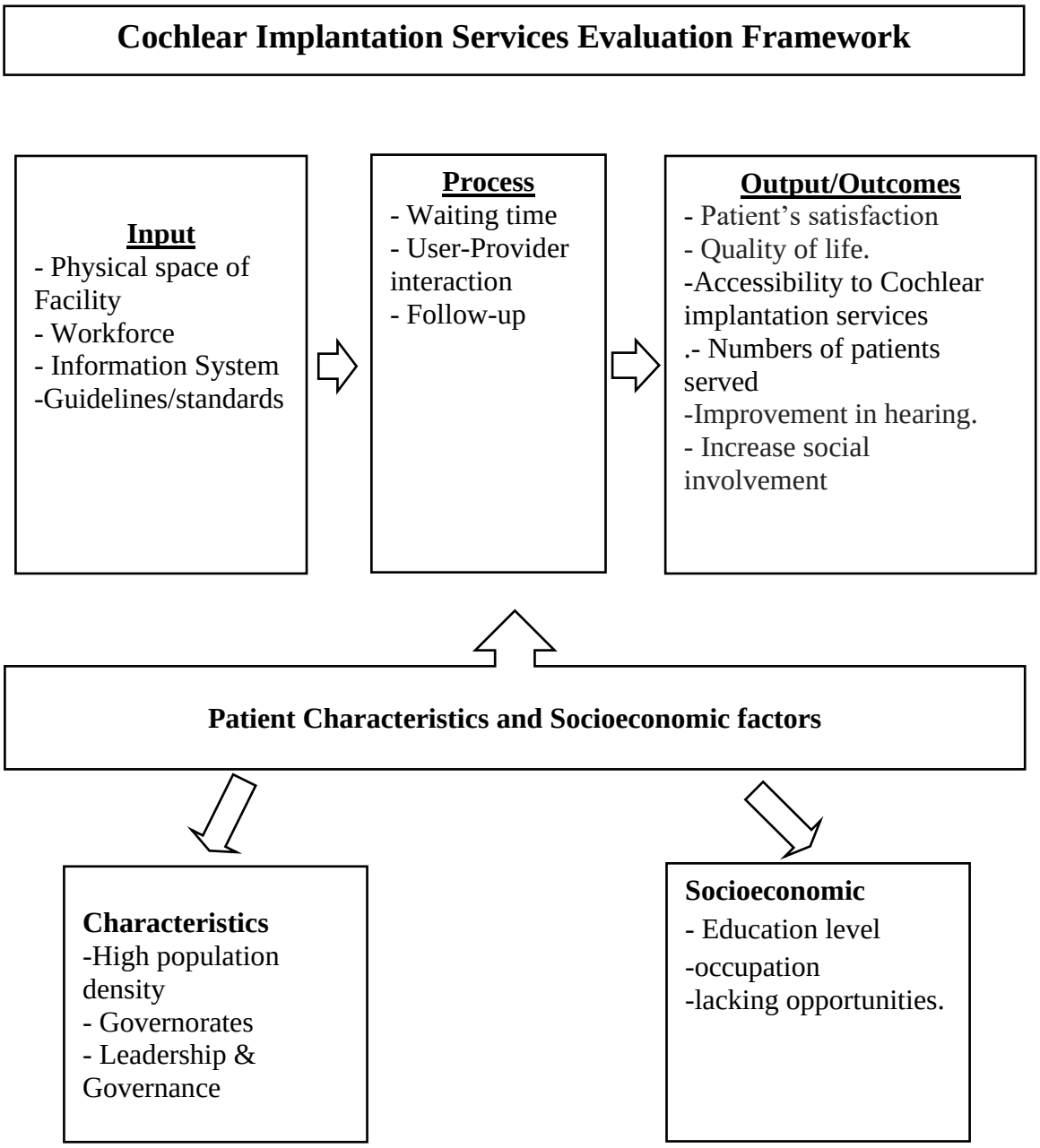



**Figure (2.1): Conceptual framework**

## 2.5 Literature review

### 2.5.1 Epidemiology of hearing impairment

A report published by the Centers for Disease Control and Prevention in 2019 revealed that congenital hearing loss occurs in approximately 1.7 out of every 1,000 newborns (Summary of Diagnostics Among Infants Not Passing Hearing Screening, 2021). In the United States, the incidence of sensorineural UHL is thought to be 1 in 1000 live births. Once acquired causes and delayed-onset congenital UHL combine, the prevalence among children aged 6 to 19 years rises to roughly 3% to 6.3% (Benchetrit et al., 2021). As it is well known, hearing loss in children leads to other disabilities in 40%-50% of cases (Omidvar et al., 2020).

The WHO estimates that in 2018, around 466 million individuals (equivalent to 6.1% of the global population) had hearing impairments that affected their daily lives. This number is expected to increase to 630 million by 2030 and surpass 900 million by 2050 (WHO, 2018). Around 90% of individuals who have moderate to severe hearing loss live in countries with low to middle incomes. According to the Global Burden of Disease study, even mild and unilateral hearing loss is included in their estimates of the population with hearing loss. Their study shows that the number of people with hearing loss increased from 1.2 billion (17.2%) in 2008 to 1.4 billion (18.7%) in 2017 ( (James et al., 2018). In 2014, the prevalence of hearing impairment in children below 18 years was found to be 1 per 1000 (MOH, 2015)

### 2.5.2 Burden of hearing loss

At the individual level, the burden of hearing loss over the life course is substantial and can be exacerbated by negative societal attitudes and prejudice towards affected people. (Olusanya, et al, 2019) In general, hearing loss has adverse consequences on interpersonal communication, psychosocial well-being, quality of life, and economic independence (Huddle et al., 2017). The condition impedes speech and language development from early childhood and can set affected children on a trajectory of sub-optimal educational and vocational attainment. Adults with hearing loss often experience social isolation and stigmatization, abuse, psychiatric disturbance, depression, difficulties in relationships with partners and children, restricted career choices, occupational stress, and relatively low

earnings (Shield B. Hearing Loss Numbers and Costs,2019). The economic impact of unaddressed hearing loss on health, education, and productivity for society is staggering, estimated to cost over 750 billion United States dollars globally (Global Costs of Unaddressed Hearing Loss and Cost-effectiveness of Interventions, 2017).

### 2.5.3 Risk factors of hearing impairment in children

The main drivers for the rising trend in hearing loss include demographic changes attributable to global population growth and improved life expectancy (WHO, 2018). Since 2000, significant global investments in child survival programs have led to an increasing number of individuals with special healthcare requirements in low- and middle-income nations who benefit from these programs (Nordvik et al., 2018). Damage to the hair cells in the inner ear can lead to SNHL, which is a major cause of permanent hearing impairment. Unfortunately, many countries do not have programs in place to reduce exposure to risk factors such as occupational and recreational noise. It is important to limit the use of ototoxic drugs to prevent further damage to hearing (Olusanya, et al, 2019). There are several reasons why the number of cases has been increasing. Some common ear conditions like chronic otitis media with effusion are contributing to this, as well as infections that could have been prevented through vaccination. Examples of such infections include measles, mumps, rubella, and bacterial meningitis (Wilson et al., 2017). In a study was done in the Gaza Strip about risk factors of Hearing Impairment Among Infants and Toddlers found that socio-demographic factors were linked to hearing impairment in infants and toddlers. Rural areas, affected by bombing and invasion, need more attention in screening programs. The education level of parents did not show a significant relationship. Consanguinity and family history of hearing impairment were strongly associated. Maternal exposure to trauma or imaging was linked to hearing impairment, and monitoring medication use and imaging is important. Healthcare providers should focus on maternal history during pregnancy to identify at-risk groups (Zaqqout & Hamad, 2022).

### 2.5.4 Cochlear Implantation

World Hearing Day has been observed every March since 2007 by WHO to raise public awareness about hearing loss. There have been numerous reports on the need for action to prevent the increasing number of individuals with hearing loss and to enhance the quality

of life for those affected. However, progress is still limited, especially in low- and middle-income countries, due to insufficient local capacity to scale up proven interventions at all levels of health-care delivery (WHO, 2018). The impact of hearing loss is widely acknowledged by various stakeholders, such as researchers, clinicians, policymakers, and individuals who experience the condition. (Lancet, 2017) A large proportion of the incidence of hearing loss could be prevented through appropriate interventions including community-oriented health education. Early identification of hearing loss and understanding its etiology can assist with prognosis and counseling of families. In addition, awareness of treatment strategies including the many hearing device options, cochlear implant, and assistive devices can help direct management of the patient to optimize outcomes (Lin & Niparko, 2006).

To avoid a decline in neural plasticity that might delay language development, auditory input exposure during the first year of life is crucial. The majority of otolaryngologists currently recommend scheduling CI during infancy or early childhood because it is crucial to do so during this crucial time of cortex neuroplasticity (Theunissen et al., 2015). CI surgery is regarded as a safe procedure from a surgical standpoint, with low rates of surgical adverse events that can happen at any age after implantation. Surgical adverse event rates have been found to range from 3.2% to 24.7% in previous studies (Bruijnzeel et al., 2020). In order to partially restore hearing to patients with profound to severe hearing loss, CI are currently the only medical option. Implants are surgically inserted behind the ear, under the skin, where they bypass the natural sound-conducting mechanism, convert sound signals into electrical stimulation, and then directly stimulate the remaining auditory nerves. This is how CI differs fundamentally from the use of HA (Chen et al., 2019). A CI is a successful treatment for children with severe to profound hearing loss and helps them acquire language in a way that is currently on par with hearing-normal kids (Niparko, 2010). These advantages seem to remain consistent over time. There was no evidence of deterioration. (Peixoto et al., 2013). When patients with profound hearing loss interact socially, their perception of their health has a greater impact on their emotional issues than heart or kidney disease does. As a result, it is possible to anticipate that treatment for hearing issues will have a greater impact on emotional difficulties. (Ramos et al., 2016).

### 2.5.5 CI surgery

To determine if a patient is a good candidate for CI, most implant centers conduct a thorough evaluation that includes medical and psychosocial assessments, an audiological examination, and imaging of the cochlea and auditory nerve. The goal is to identify any issues that could impact outcomes after implantation or make a child ineligible for the procedure. While bilateral implantation is not yet widespread, it is becoming more popular. The implantation procedure is performed under general anesthesia. A small incision is made behind the patient's ear, and a mastoidectomy is performed. (Papsin & Gordon, 2007a). A depression is created in the parietal bone to hold the receiver, and a passage is made into the middle ear to access the cochlea. An electrode array is inserted into the scala tympani, taking care not to damage surrounding structures. The wound is then closed and allowed to heal for several weeks before the device is activated. After the healing period, the transmitter is placed externally over the receiver site and held in place magnetically, while the microphone is positioned over the ear (Papsin & Gordon, 2007a).

The stimulation settings of each implant electrode must be customized for each child. At a minimum, the stimulation levels must be high enough to be detectable and low enough to be comfortable. Although older children can provide reliable behavioral responses to the new input, young children with very limited auditory experience often do not. Physiological measures of central auditory activity (e.g., evoked-potential responses and the stapedius reflex) are useful to establish the integrity of each implanted electrode, estimate required stimulus levels, and identify unwanted nonauditory stimulation of the facial nerve (Li et al., 2004). Threshold measures correlate with subsequent behavioral responses, although not strongly enough to make accurate individual predictions (Brown, 2003).

### 2.5.6 Old versus New approach of CI

The traditional and most recommended method of facilitating
CI, particularly when the electrode is put through the circular window, is posterior tympanotomy through facial recess (Franz et al., 1987). In this approach The mastoid segment of the facial nerve and the chorda tympani nerve could be injured in cases of narrow facial recess or inadequate posterior tympanotomy (Jeon et al., 2013). This issue typically arises as a result of various mastoid segment malformations and a lack of

knowledge regarding the anatomy of the facial recess (Measurements of the Facial Recess Anatomy, 2010). There are various options when it becomes necessary to change the surgical approach due to the insufficient microscopic vision (difficult surgical exposure) through the PT. One of them is the transcanal exposure by elevating a tympanomeatal flap, identification of the RW membrane, followed by insertion of the array delivered into the middle ear through the aditus or facial recess, sometimes splitting the posterior canal wall or laying the electrode in a groove created in the external auditory canal (Dia et al., 2014, Sennaroglu & Aydin, 2002). The trans-canal exposure by elevating a tympanomeatal flap, identification of the RW membrane, followed by insertion of the array delivered into the middle ear through the aditus or facial recess, sometimes splitting the posterior canal wall or laying the electrode in a groove created in the external auditory canal (Sennaroglu & Aydin, 2002, Lavinsky et al., 2010, Dia et al., 2014) Endoscopic cochlear implantation may become a viable, safe, and feasible alternative to the standard open transmastoid approach ( (Dia et al., 2014).

### 2.5.7 Complication Post CI

Perioperative complications of CI include peri-lymphatic fistula or cerebrospinal fluid leak, tinnitus, vertigo, facial-nerve weakness or paralysis, epidural hematoma, and cellulitis of the surgical flap. Most of these complications are minor and resolve with appropriate management (Papsin & Gordon, 2007b). Reported rates of perioperative complications vary, but complications typically occur among 15 to 20% of patients who receive cochlear implants (Dutt et al., 2005). More serious complications, which tend to occur later, include flap necrosis, otitis media, cholesteatoma formation, nonauditory stimulation of the facial nerve, and electrode extrusion; each of these complications occurs at a rate of about 1%. (Papsin & Gordon, 2007b).The overall rates of major complications requiring surgical intervention range from 2% to 5% in large series (Postelmans et al., 2006). The most frequent complication in the long term is device failure requiring reimplantation in 3 to 6% of patients (Côté et al., 2007). Device malfunction can occur because of “hard failure” of the internal components, traumatic failure (more often in children than in adults), or “soft failure” characterized by a decrement in the auditory performance of a child or adult and thought to result from a poorly functioning device (European Consensus Statement on Cochlear Implant Failures and Explantations, 2005).

### 2.5.8 Rehabilitation program

Successful auditory rehabilitation is defined as the patient‘s (re)gaining of hearing and speech ability. This involves a dynamic learning process over several months and is divided into different stages of basic therapy, follow-up therapy and aftercare (Dazert et al., 2020). Basic therapy (initial adjustment phase of the audio processor) is generally carried out by specialized professionals (CI audiologists) to set the individual electrical stimulation current intensity and stimulation parameter. The subsequent follow-up therapy (CI rehabilitation) is carried out using outpatient or inpatient interdisciplinary treatment concepts (teachers, speech therapists, audiologists, and physicians, among others) and is aimed at optimizing hearing and speech (Zeh & Baumann, 2015). In children language delays/ deviancy may occur alone as in case of Specific Language Impairment or it can occur as a result of conditions like Cerebral Palsy, Mental Sub-normality, Autism Spectrum Disorders, and HL (NISH - Speech Language Diagnostics, 2022). Due to the developmental differences between adults, children, and infants and toddlers, speech pathologists may approach assessment differently for each of these age groups. However, a speech pathologist can select several assessment instruments to help address patients' various speech and language needs. Speech pathology assessment tools are various instruments that a speech language pathologist can use to measure, diagnose and rehabilitate individuals at any age. Whether the goal is to evaluate speech and language disorders or communication disorders, an Speech pathology assessment can identify an appropriate assessment tool (Rodriguez, 2022). These speech assessment tests includes (Stuttering Severity Index, Stuttering Prediction Instrument, Malayalam Articulation Test, Photo Articulation Test, FrenchayDysarthric Assessment, Apraxia Battery for Adults, Behaviour assessment battery for school-age children who stutter) and language assessment tools (Boston Diagnostic Aphasia Examination test, Western Aphasia Battery, Receptive and Expressive Emergent Language Scale, Scale of Early Communication Skills, and 3 Dimensional Language Acquisition Skills) (NISH - Speech Language Diagnostics, 2022). According to most speech rehabilitation director among Gaza city they said that they use Jish's Articulation Test which is the first standardized test to examine the pronunciation of Arabic speech sounds (at the beginning, middle and end of a word). The test is standardized on the Saudi environment, but it can be applied to all Arabic-speakers individuals with different accents Speech and language users.

### 2.5.9 Quality Of Life status for CI patients:

Nowadays, concepts like QoL, and HRQL, place a lot of emphasis on the use of various kinds of medical procedures. According to the WHO definition of QoL , it is made up of a "subjective assessment of the patient's life situation in reference to the culture in which he lives, his system of values, goals, and interests." WHO defines a state of complete physical, mental, and social well-being, rather than just the absence of illness, as the second definition of HRQoL (Czerniejewska-Wolska et al., 2019). Using CI in children offers significant advantages in the development of their listening and communication skills. This, in turn, helps them succeed in school and eventually in their chosen profession. As a result, many children worldwide have benefited from the use of CI (Lin & Niparko, 2006). The effectiveness of this intervention relies on various factors. Within the realm of family-related factors, the expectations of parents and the resources they provide to aid their children in developing language and listening skills are crucial. Additionally, the dynamics of social relationships within the family and with other relatives also play a significant role (Huttunen et al., 2009). Due to the recipients' excellent levels of communication and interaction with their surroundings, CI has a significant impact on the lives of people with hearing impairment and their families (Alzhrani et al., 2019). Due to the recipients' excellent levels of communication and interaction with their surroundings, CI has a significant impact on the lives of people with hearing impairment and their families. (Byčkova et al., 2018) CI in children who are hearing loss affects not only communication skills such as speech recognition, speech production, and language use, but also how these children interact with others and how they feel about themselves—also known as psychosocial well-being, a component of QoL ( Kouwenberg et al., 2012; Huber et al., 2015; Theunissen et al., 2015; Warner-Czyz et al., 2018).

### 2.5.10 CCIP

There are two types of QoL assessment tools: generic and condition-specific. Generic tools evaluate physical, psychological, and social well-being without considering the medical condition. Generally, generic QoL measurements show similar results for children with CIs and those with typical hearing in terms of overall QoL and physical well-being. However, differences have been observed in the psychological and social domains. ( (Huber, 2005; Loy et al., 2010; Theunissen et al., 2014; Warner-Czyz et al., 2018). Generic QoL instruments allow comparison of QoL ratings across various diseases, interventions, or

conditions, including comparison with neuro-typical, healthy populations (e.g., children using CIs vs. children with typical hearing). The major drawback of a generic measure of QoL is its insensitivity to smaller changes specific to a treatment, condition, or population Lin & Niparko, 2006). On the other hand, instruments that are specific to a certain condition are more adept at detecting the positive and negative effects of that treatment or condition (Bjornson & McLaughlin, 2001).

Questionnaires that are specific to certain medical conditions, such as cancer and diabetes, are widely used and validated. However, for other conditions like cochlear implantation, there are not many available. Over the past 25 years, various measures of QoL specifically for children with cochlear implants have been developed (listed chronologically below): Cochlear Implant Expectations Questionnaire (Zaidman-Zait and Most, 2005); Children with Cochlear Implants: Parental Perspectives (CCIPP; Archbold et al., 2008), Parental Attitudes of Various Aspects of Cochlear Implantation (Soleimanifar, 2015), Brief Assessment of Parental Perception (Samuel et al., 2016), and Quality of Life—Cochlear Implant (Cejas et al., 2021).

All these measures use parent proxy reports, in which parents appraise their child's QoL; only one instrument (Quality of Life—Cochlear Implant) also has a self-report option for pediatric CI users to rate their own well-being relative to cochlear implantation. The CCIPP reflects the most frequently used CI-specific QoL instrument worldwide (e.g., Incesulu et al., 2003; Nicholas and Geers, 2003; O'Neill et al., 2004; Nunes et al., 2005; Archbold et al., 2006, 2008; Damen et al., 2007; Huttunen et al., 2009; Fortunato-Tavares et al., 2012; Sparreboom et al., 2012; Stefanini et al., 2014; de Almeida et al., 2015; Kumar et al., 2015; Yorgun et al., 2015; Asfour et al., 2018; Byckova et al., 2018; Zhao et al., 2019; Hassuji, 2019; Molla et al., 2019; Tokat et al., 2019; Brewis et al., 2020; Peker et al., 2020; Shahmahmood et al., 2020; Silva et al., 2020, 2021; Anne et al., 2021; Yang et al., 2022; Zhang et al., 2022; Zhumabayev et al., 2022).

### 2.5.11 Satisfaction

Cochlear implants are currently the standard treatment for children with severe to profound sensorineural hearing loss (Vincenti et al., 2014). Over the years, advancements in the device's technical performance have allowed for improved hearing sensitivity within speech, and more patients have become eligible for implantation at younger ages (Vincenti

et al., 2014). Research has shown that cochlear implantation can lead to better hearing, speech and language skills, and academic performance in implanted children (Vincenti et al., 2014). However, successful management of the condition requires the involvement of parents and consideration of their family's perspective. This is crucial for achieving desirable language and reading skills among cochlear-implanted children (Erbasi et al., 2016). Parenting a child with hearing loss can be challenging for both parents, with communication difficulties, medical care, and academic problems being common issues (Hashemi & Monshizadeh, 2012). Mothers, in particular, may experience increased stress due to their high level of responsibility in attending appointments, managing hearing devices, and providing home care. Fathers may develop different coping strategies (Erbasi et al., 2016). To effectively manage cochlear-implanted children, it is important to involve parents and consider their family's perspective in rehabilitation and family-oriented interventions (Mostafavi et al., 2017).

# Chapter Three

## Methodology

### 3.1 Study design

Triangulated cross-sectional design was used for this study. The qualitative portion was evaluated through measurements of patients and key person perceptions about CI service, while the quantitative portion was covered through an interviewed questionnaire for the parents (Mother or Father or Both) of children who underwent CI in the Gaza Strip. Key individuals underwent in-depth interviews with a number of managers from the public and private sectors. Open-ended questions about the impact of HL, the impact of CI (economic status, educational status, communication), and the current need for CI services were used to gauge patients' perceptions. Methodological triangulation would afford a combination of quantitative and qualitative models to validate findings from one method with another.

### 3.2 Study population

The study includes two populations. The first population for the quantitative part included the parents of children who underwent CI (224 patients), these included 44 with the old approach and 180 cases with the new approach.

The CI in Gaza Strip passes with several stages:

- The first stage: between 2009 and 2011 with old technique of CI, about 119 cases of CI done during this stage.
- The second stage: between 2017 and until now with new technique of CI, about 350 cases of CI done.
- In 2021, Palestinian local surgical teams have succeeded for the first time to implant cochlear in Gaza, the operation performed on a two-and-a-half-year-old girl who had a hearing impairment due to complications after birth.

### 3.3 Study Setting

The study place was mainly in Sheikh Hamad Bin Khalifa Al-Thani Hospital for Rehabilitation and Prosthetics in Gaza Strip.

### 3.4 Study Period

The study was initially proposed in February 2022. The proposal of the research was submitted and defended in the front of School of Public Health (SPH) committee in April 2022 annex (3). Upon approval, the researcher started to develop the research questionnaire. The researcher consulted 8 experts to modify the tools annex (4). By reviewing more literature and studies the questionnaire was designed in May 2022 and re-modified by experts' comments in July 2022. In October 2022 the researcher was finishing the collection of data with the assistance of one data collector who carried out the required training before piloting and fieldwork.

A pilot study was carried out during the first week of August where 20 individuals were interviewed. Some questions were added or modified after piloting. Data collection started in August 2022 through October 2022. Some delays resulted from the unavailability of cases or their addresses. Data entry started with coincidence with data collection. A data entry model was developed on the Statistical Package of Social Science (SPSS) program. The data entry ended in October 2022. Data analysis started in November 2022 and ended in December 2022. In parallel with the analysis, the researcher started to create descriptive tables followed by inferential tables and graphs. The researcher started to conclude the findings and discussion by linking the results with the literature. A final draft was submitted on Aprill.2023 to the supervisor after modifications according to his advice and comments Annex (5).

### 3.5 Eligibility criteria

#### 3.5.1 Inclusion:

- Children (less than 18 years old) who received CI in the Gaza Strip, between 2009 and 2011 with the old technique of CI, at least after one year of surgery and documented at Hamad Hospital.
- Children (less than 18 years old) who received CI with the new technique in Gaza Strip between 2017 and now, at least after six months post-surgery, and documented at Hamad hospital.

### 3.5.2 Exclusion:

- Any patient that has CI surgery outside of the Gaza strip.
- Children who received CI services before the 2009 year.
- Any patient receives CI surgery and his age becomes above 18 years old (over the age of children).

## 3.6 Sampling

- **Quantitative:**
  - Multi-stage randomized technique was used to select clients. First, patients was classified according to the device received into old and new techniques of CI. And then, probability randomized selection for clients was done depending on their listed files number from the sheet.
  - Sample calculation of the quantitative: The study population was the patients who receive CI services at one point in time at Hamad Hospital. The sampling frame was the clients who received CI from 2019 to 2022 they will be taken from records and registries at the facility.
  - To calculate the sample size, the researcher used an online survey system sample size statistical calculator at https://www.surveysystem.com/sscalc.htm, See annex (6).
- **Qualitative:**
  - A purposive sample of 6 key informants, specifically otolaryngologist consultants, has been selected See Annex (7).
  - A non-probability purposive sample of CI technicians from both Hamad Hospital and al-Quds Hospital will be included in the focus group discussion.
  - The qualitative component will follow the quantitative study to further explore emerging issues.

## 3.7 Study instrument

- **Quantitative:**

The data were tested by two main approved questionnaires:

1-The CCIPP questionnaire, a closed-ended questionnaire developed by Archbold et al. and later validated and shown reliable by O'Neill et al. and Nunes et al. (O'Neill et

al,2004, Archbold et al, 2002, Nunes et al, 2005) Parents and their CI child: questionnaire development to assess parental views and experiences. The questionnaire has high test–retest reliability and has been adapted to different languages and used in various countries to assess children's QOL post-implantation (O'Neill et al, 2004, Archbold et al, 2002). CCIPP focuses on evaluating the child's QOL from the parents' perspective since parents are able to observe children in different s settings (Archbold et al, 2002).

Based on parent responses, the questionnaire for CIs, Children with CI: Parental Perspectives, has been validated, approved, and tailored for CIs. The implantation results (48 items) and decision-making (26 items) aspects of the CI process are covered in its 74 statements. The implantation domain outcomes are divided into eight subdomains, including two family-related subdomains ('effects of implantation' and supporting the child') and six child-related subdomains ('communication', 'general functioning', 'well-being and happiness', 'self-reliance', 'social relations', and 'education') Annex(8).

2-The seven domains of general satisfaction, technical quality, interpersonal manners, communication, financial aspect, time spent with doctors, and accessibility and convenience were examined using a satisfaction questionnaire for all CI patients Annex(8).

- **Qualitative:**

The qualitative part was tested by in-depth interviews and open-ended questions to identify the current needs for CI service.

- A purposive of 6 key managers were selected. The idea of including this is to dig deep and understand in-depth the perspectives about current needs for CI service, the key mangers includes two from governmental sector, two NGO managers were chosen from Hamad hospital, and two from Al-Quds hospital Annex (7).
- To investigate the concerns raised by the quantitative study, the qualitative component was conducted following the quantitative one. Six managers were chosen from the government and NGOs in the following ways: two government managers (the director and medical director) were picked from Al-Quds Hospital because it is the only hospital in the Gaza Strip that does CI surgery.
- In addition to that, the CI program officer in the governmental sector at AL-Shifa Medical Complex represents the PMOH the person that helped us to understand the

agreement and protocol signed between the PMOH and the NGO sector (Hamad Hospital).

- While two NGO managers were chosen from Sheikh Hamad Bin Khalifa Al-Thani Hospital for Rehabilitation and Prosthetics in the Gaza Strip, the only center in the Gaza Strip that delivers comprehensive CI.
- The second group includes all children's families who underwent CI with an old or new approach.
- Their reviews are expressed through a group of open-ended questions included in the questionnaire Annex (8).

### 3.8 Ethical considerations

The following will be contacted for ethical approval:

- Academic approval from Al-Quds University's School of Public Health.
- Helsinki Committee approval for the research.
- Hamad Hospital's administrative consent.

A cover letter stating that participation is optional and that confidentiality would be maintained for everyone is required to protect participants' rights. Customers from Hamad Hospital who are chosen were asked if they consent to take part in the study. The in-depth interviews were recorded when the key informants have given their consent. It was necessary to obtain the Technicians' consent before recording the FGD.

The following ethical considerations should be made when working with patients who have CI:

- Admin approval from all locations that were utilized to gather data and interviews to gain approval for conducting this study.
- Every participant involved in the study received a detailed explanation of the confidentiality measures and research objectives.
- Every member of the study population is aware that taking part in the study is voluntary.
- All ethical principles, including respect for others and respect for the truth, shall be taken into account.
- Confidentiality and anonymity were granted and upheld.

- Assent for recording the interviews was taken into account.
- Respect the patient's right to privacy regarding their health issues and their suffering.
- Be aware of the connection between the patient's illness and some of their hostile verbal or physical expressions, remarks, or acts, or even in some unusual conduct while interacting with them.
- No sharing of patients' images or personal or medical information without their consent.

## 3.9 Data collection

By calling all CI patient's families on their mobile devices or sending them SMS messages to set up an interview time, the first piece of data was collected from interviews with all CI patient's families.

In two months, this component was completed. The researcher created some open-ended questions and asked them to all CI patients. She also created some semi-structured questions and asked them to important government and NGO managers as the second part of the data-gathering process. To facilitate the gathering of additional information, any notes made during the interviews were recorded. After completing the quantitative data collection, in-depth interviews with managers were undertaken.

## 3.10 Scientific rigors

### 3.10.1 Quantitative part (questionnaire):

- **Validity:**

Experts examined the questionnaire to determine its applicability and their feedback was taken into consideration. Prior to gathering actual data, a pilot study will be carried out to assess how customers responded to and understood the questionnaire. This improved the questionnaire's validity when it was modified to make it more understandable.

- **Reliability:**

According to Phelan, C., and Wren (2006), reliability is the extent to which an assessment instrument yields outcomes that are stable and consistent. To ensure the dependability of the instruments, the following actions have been taken:

The following actions will be taken to ensure the dependability of the instrument.

- Effective instruction in patient interviewing techniques and questioning strategies for data collectors. The uniformity of questionnaire completion ensured this.
- Data and results were recorded on the same day of data collection to allow for potential interventions to verify the accuracy of the data or to re-complete the questionnaire if necessary.
- After data input was complete, 5% of the data were re-entered to ensure proper entry technique and reduce entry mistakes.

### 3.10.2 Qualitative part (in-depth interviews):

Three steps were taken in this investigation to increase approvability. To adapt and amend the present need questions that lead to covering all dimensions, health experts must first perform a peer review. Long-term involvement and probing techniques were the next step. The third step was recording the interviews in order to later follow up and double-check the information or data..

## 3.11 Pilot study

To determine whether the study instruments are adequate and to provide the researcher with practice gathering data, a pilot study with 20 individuals—15 from the new technique of CI and 5 from the old approach (Total:20 people). This also made it feasible to strengthen the validity and reliability of the study even further.

## 3.12 Data entry and analysis

### 3.12.1 Quantitative part:

Version 20 of the Statistical Package of Social Science (SPSS) program was used for data entry and analysis in this study. Data analysis involved checking and verifying data, data entry and coding, data cleaning and recoding, and data processing, as well as the consecration of all necessary data analysis techniques and methods.

- On a Likert scale of 1 to 5, parents and caregivers indicated how strongly they agreed or disagreed with each statement: strongly agree (coded as 5), agree (4), neither agree nor disagree (3), disagree (2), and strongly disagree (1). 48 statements were worded positively, compared to 28 that were worded negatively. To achieve meaningful statistical representation, the scoring of the negative statements was reversed, whereas

higher ratings indicated higher HRQoL. We checked to make sure there were no missing values during the questionnaire completion process.

- The questionnaire were coded and entered into the computer.
- Data cleaning was performed to ensure that data are entered correctly.
- Statistical analysis includes simple statistical procedures (frequency, means, and standard deviations).
- In addition, cross-tabulation for main findings and advanced statistical tests such as:
- The chi-Square test was used to determine the relationship between old and new approaches in relation to complications post-surgery.
- t-test to assess whether the means of two groups are statistically different from each other. For example (QOL in relation to gender, Child attendance at a hearing impairment organization before CI).
- One-way ANOVA test to determine whether there are any significant differences between the means of more independent groups. For example: (QOL with family income, Activation age).
- P- value equal to or less than 0.05 was considered statistically significant, with a confidence interval (CI) of 95%.

### 3.12.2 Qualitative part:

In order to assess the current needs, the open-ended questionnaire transcripts and in-depth interviews with 6 key managers and children's families who underwent CI with an old or new approach, were analyzed using the open coding thematic analysis method. Recording the interviews is the first step, followed by gathering the main findings from the transcripts of the interviews, and making sure to include only the pertinent and useful parts. Next, you should extract the themes from the compiled data and rewrite the final product as a classification of related concepts. The quantitative findings were discussed then followed by the qualitative part to produce rich discussion and representational topics.

## 3.13 Limitations of the study

There were several limitations that detected during the study, include the following:

1. There were few studies that looked at the CI service in relation to surgical problems.
2. The presence of a high number of variables can affect the result and several questionnaires can be used.

3. Some cases were not completely recorded, or have access to CI services, so it was difficult to assess.
4. The CI is still a new process in Gaza Strip, which makes the medical staff does not have enough information that can be added to research.
5. It can take a long time to complete the pilot.
6. Some of the studies that were found need cash access. That was costly to the researcher.
7. In-depth interviews in relation to UNRWA were canceled due to the absence of CI service in its organizations.

### 3.14 Response rate

There were 250 questionnaires given in all, 224 people responded, and the response rate was 89.6%.

# Chapter Four

## Results and discussion

### 4.1 Introduction

The data's statistical analysis outcomes are presented in this chapter along with their interpretation. After summarizing all of the respondents' demographic traits using frequency tables, the descriptive analysis findings were first discussed. The results of some comparisons between our findings and those of prior studies on related subjects are presented. In order to conclude the main points and conclusions extracted from this study, inferential statistics results pertaining to the objected relationships of the various factors in relation to the QoL score and satisfaction score will then be discussed.

### 4.2 Descriptive statistics

#### 4.2.1 Demographic variables:

This study sample consisted of 224 participants. About 40 of them were from (0-59) months at a rate of 17.9%, 123 were from (60-120) months at a rate of 54.9%, and 61 were from (121-215) months at a rate of 27.2%. Of the 224 participants, 111(49.6%) were male and 113(50.4%) were female. About the respondents, 166 of the children attended with their mothers, 48 of them attended with their fathers, and 8 of them had attended with both of them, and 2 were attended with others family members. 107 participants (47.8%) were from Gaza city, 29 participants (12.9%) were from North Gaza, 27 participants (12.1%) were from Middle Area, 36 participants (16.1%) were from Khanyounis, 25 participants (11.2%) were from Rafah. The demographic residency for the participants showed a normal geographic distribution for a representative sample.

**Table (4.1): Distribution of the study population by Socio-demographic characteristic**

| Variable | | Frequency | Percentage |
|---|---|---|---|
| Age group | (0-59) | 40 | 17.9% |
| | (60-120) | 123 | 54.9% |
| | 121-215 | 61 | 27.2% |
| Gender | Male | 111 | 49.6% |
| | Female | 113 | 50.4% |
| Respondent | Mother | 166 | 74.1% |
| | Father | 48 | 21.4% |
| | Both | 8 | 3.6% |
| | others specify | 2 | 0.9% |
| Residency | Gaza | 107 | 47.8% |
| | North | 29 | 12.9% |
| | Middle Area | 27 | 12.1% |
| | Khanyounis | 36 | 16.1% |
| | Rafah | 25 | 11.2% |
| Refugee status | Refuge | 160 | 71.4% |
| | Non-refuge | 64 | 28.6% |
| Educational years of the child's mother | 0-9y | 23 | 10.3% |
| | 10-12y | 80 | 35.7% |
| | 13-20y | 121 | 54% |
| Educational years of the child's Father | 0-9y | 39 | 17.4% |
| | 10-12y | 78 | 34.8% |
| | 13-20y | 107 | 47.8% |
| Consanguinity between the parents of child | Yes | 163 | 72.8% |
| | No | 61 | 27.2% |

Out of the total 224 participants, the majority were Refuge (71.4%) while the rest were non-Refuge (28.6%). When it came to the educational background of the children's mothers, 23 had mothers who studied for 0-9 years (10.3%), 80 had mothers who studied for 10-12 years (35.7%), and the largest percentage (54%) belonged to children whose mothers had studied for 13-20 years. This percentage of illiteracy was similar to what was reported by the PCBS (2018). On the other hand, the educational background of the children's fathers showed that 39 had fathers who studied for 0-9 years (17.4%), 78 had fathers who studied for 10-12 years (34.8%), and the largest percentage (47.8%) belonged to children whose fathers had studied for 13-20 years. A significant percentage (72.8%) of the children had consanguinity between their parents, while the rest (27.2%) did not. Marriages between first-degree relatives, particularly when parents are closely related by blood, can lead to higher occurrences of genetic congenital anomalies. This increases the risk for neonatal and childhood death, intellectual disability, and other anomalies nearly twofold, according to WHO (2016). A study in Saudi Arabia surveyed a random sample of

6,421 Saudi infants and children to observe the prevalence of consanguineous marriage and how it affects the prevalence of hereditary sensorineural HL. The findings revealed that consanguinity is widely practiced among the population surveyed and has a negative impact on the incidence of hereditary sensorineural hearing impairment (Zakzouk et al., 1993). A similar outcome was observed in Qatar, where a HL prevalence of 5.2% was reported, with parental consanguinity being more common among affected individuals compared to unaffected ones (Girotto et al., 2014). About 80% of HL that occurs before language acquisition is caused by genetics, typically through autosomal recessive and non-syndromic inheritance. It's important to note that an inherited HL doesn't necessarily mean that the parents are also hard of hearing. In fact, the majority of children with congenital HL are born to hearing parents who may have passed on the condition through recessive genes. (CDC, 2015). Consanguinity practiced in Gaza was found to be strongly associated with hearing impairment in infants and toddlers (Zaqqout & Hamad, 2022).

### 4.2.2 Income and Health Insurance:

**Table (4.2): Distribution of the study population by income and health insurance**

| **Variable** | | **Frequency** | **Percentage** |
|---|---|---|---|
| Type of health issuance | governmental health insurance | 184 | 82.1% |
| | Other type of health insurance | 24 | 10.7% |
| | Does not have health insurance | 16 | 7.1% |
| Family income | Less than 2000 Shekel | 140 | 62.5% |
| | (2000-2500) Shekel | 69 | 30.8% |
| | More than 2500 Shekel | 15 | 6.7% |

In the same way, as the table shows, it was found by this study that 82.1% of them have governmental health insurance, 10.7% of them have another type of health insurance, and 7.2% of them, the lowest percentage, do not have any health insurance. Also the study showed (62.5%) of the sample had a monthly income accounted for less than 2000 NIS, followed by (30.8%)% earning between 2000-2500 NIS monthly, and the lowest percent (6.7%) was for those who have more than 2500 NIS monthly. According to study participants the CI services are mainly provided by NGOs, so the rule of health insurance

is limited here, however, the increase of CI children should give orientation to the governmental sector to provide more support to this sector.

### 4.2.3 Health profile information:

Our study on health information and age of detection section revealed that 40.2% of the children were between 0-6 months when HL was determined by family members. Similarly, 35.3% of the children were between 7-12 months, and 24.6% were over 13 months old. In terms of age at assessment or diagnosis, 26.8% of children were evaluated between 0-6 months, 35.3% were evaluated between 7-12 months, and 37.9% were evaluated at over 13 months of age. The results presented here align with a previous study conducted in the Gaza Strip regarding the risk factors of hearing impairment among infants and toddlers. In that study, the researcher discovered that families were not entirely informed about the age at which their children were diagnosed with hearing impairment. Records indicated that most children were diagnosed after their first birthday, which is considered late (Zaqqout & Hamad, 2022).These findings emphasize the significance of early detection of hearing loss through the use of screening programs.

When talking about the duration of HL, we had the results that 38.8% of the children had a duration of HL ranging from 0-5 years, and 37.9% of them had a duration ranging between 5.1-10 years, the lowest percentage was for children whose duration of HL ranged from 10.1 to 18 years, this means that the majority of children had a period <10 years. And we found that 27.2% of the children were less than 24 months when they had CI surgery, the majority 44.6%, were between 25-48 months old, And for those who underwent surgery between 49-192 months, the percentage was 28.1%. And that consider a good result for CI surgery, since the most of children who underwent CI surgery at age less than four years, and that corresponding to global criteria.

The results showed that 27.2% of the children had a hearing age (Activation age) of 6-12 months, and the majority of them, by 43.8%, had a hearing age ranging between 13-60 months, and 29% of them ranged between 61-174 months. The below table clarify the health profile information that we discussed previously.

**Table (4.3): Distribution of the study population by health information.**

| Variable | | Frequency | Percentage |
|---|---|---|---|
| Age at which detected child with HL (months) | 0-6 | 90 | 40.2% |
| | 7-12 | 79 | 35.3% |
| | ≥13 | 55 | 24.6% |
| Age at assessment (diagnosis) (months): | 0-6 | 60 | 26.8% |
| | 7-12 | 79 | 35.3% |
| | ≥13 | 85 | 37.9% |
| Duration of HL (years) | 0-5Y | 87 | 38.8% |
| | 5.1-10Y | 85 | 37.9% |
| | 10.1-18Y | 52 | 23.2% |
| Age of child at CI surgery(months) | 0-24 | 61 | 27.2% |
| | 25-48 | 100 | 44.6% |
| | 49-192 | 63 | 28.1% |
| Hearing age months (Activation age) | 6-12 | 61 | 27.2% |
| | 13-60 | 98 | 43.8% |
| | 61-174 | 65 | 29% |

### 4.2.4 Educational Information:

Regarding educational information, our study found that the majority of children (55.4%) entered first grade, while a small percentage (13.4%) did not enter, and 31.3% were not relevant. The term "not relevant" pertains to children below six years old who are unable to enter the first degree. There were several reasons for these results. Children who underwent CI often have difficulty engaging with governmental education, and even if they become members of governmental education, they may face difficulties later on, causing them to leave education. Even children who enter special educational organizations may have financial difficulties that prevent them from continuing their education.

When we looked into the ages at which children entered first grade, we found that a large percentage (44.6%) did not enter for various reasons. Some of these reasons include the heavy curriculum found in governmental education, the need for special guidance during their studies, and the need for specific exams that are compatible with their abilities. These all require a lot of time to develop, and children also need continuous psychological and

educational support. Only 15.6% of children entered first grade at the normal age of 6 years, while 30.9% entered at the age of 7-8 years. A small number (8.9%) entered at the age of more than 9 years.

Regular (Formal) education involves attending either governmental or private educational institutions with a commitment to uninterrupted education for extended periods. Any absences should not exceed a year. On the other hand, irregular (Non-formal) education refers to children who didn't continue their education in public schools. This includes children who attended government schools for a while but left either to stay at home or attend schools for children with disabilities. It also includes those who left school for several years due to external circumstances but later returned. Our study found that 70.5% of children had regular education, 7.6% had irregular education, and 21.9% did not attend any educational institution or school. Irregular education means that the child may have entered governmental education and then left it for several reasons, entered special education and then left it, or had frequent and continuous periods of absence from governmental or special education for a period exceeding one year.

**Table (4.4): Distribution of the study population by educational information**

| **Variable** | | **Frequency** | **Percentage** |
|---|---|---|---|
| Did the child enter the first grade | Yes | 124 | 55.4% |
| | No | 30 | 13.4% |
| | Not Relevant | 70 | 31.3% |
| The age of child at first grade | Not enter the first grade for several causes | 100 | 44.6% |
| | 6Y | 35 | 15.6% |
| | 7-8Y | 69 | 30.9% |
| | +9Y | 20 | 8.9% |
| Special educational institutions attended by the child | Regular education(Formal) | 158 | 70.5% |
| | Irregular education(Non-Formal) | 17 | 7.6% |
| | Did not attend any educational institution or school | 49 | 21.9% |

### 4.2.5 Health services profile:

**Table (4.5): Distribution of the study population according to health services profile**

| Variable | | Frequency | Percentage |
|---|---|---|---|
| Child attendance a HL organization before CI | Yes | 56 | 25% |
| | No | 168 | 75% |
| The site at which the child gets his/her CI services | Hamad | 153 | 68.3% |
| | Hamad and other organization | 55 | 24.6% |
| | Other organization | 16 | 7.1% |
| Regular visits for CI services before surgery? | Yes | 180 | 82.1% |
| | No | 40 | 17.9% |
| Waiting in each rehabilitation visit (minutes) | 0-5 | 186 | 83% |
| | 6-80 | 38 | 17% |

In health service profile, first of all, regarding child attendance a hearing impairment organization before CI, including governmental school, special school, Kindergarten, and speech therapy center, the results showed that the vast majority 75% were for children who did not go to any institution for the hearing impairment, and those who went were only 25%. And that can be explained as the following, as we said previously most of the CI children in this study were from the new approach of surgery, and most of the children in the new approach have their CI at an age less than four years, that explained that most of them did not reach the age to enter special organization for HL.

About the site at which the child gets his/her CI services it was found that the highest percentage was for Hamad Hospital alone, and the next percentage was for Hamad Hospital with other hospitals. The sum of the two percentages was 92.9%. It is very clear that Hamad Hospital covers the largest percentage of CI services for children who have had a transplant through the hospital's program, or even children who have had a CI in other programs that are not affiliated with the hospital. As it is noted that more than two-thirds of the patients who underwent the operation are covered by Hamad Hospital, and almost the remaining quarter of children are covered by Hamad Hospital and other institutions. Although Al-Quds Hospital was the site for the new approach to CI surgery and AL-Shifa Medical Complex was the site for the old approach, neither of them offered rehabilitation services. These sites only served as locations for CI surgery.

About Regular visits for CI services before surgery the largest percentage was for those who had regular follow-up visits before the CI surgery, 82.1% of children. Only 17.9% of the children did not have regular visits before the CI. That confirmed that the CI children's families want to change their children's life and that is what we clarify in detail in the qualitative part. Also, that confirmed the success of the rehabilitating program in providing good adherence from CI children families to the pre-CI rehabilitation program. Taking into consideration, the CI program of Hamad Hospital includes a rehabilitation and evaluation program for all patients who will undergo CI, as any patient before undergoing transplantation must meet the criteria for that, and certain examinations must be completed in order to become qualified for CI. Children who do not meet the criteria are excluded. Waiting in each rehabilitative visit, the results were as follows: 83% of children wait for short periods that do not exceed 5 minutes only. And only 17% had been waiting longer than that, this indicates that the appointments of Hamad Hospital are scheduled and everyone committed to his appointments.

### 4.2.6 Etiology of Hearing loss:

When talking about the etiology of HL, it is clear from the table that the results were very close, almost identical when comparing the reasons shown in the files and the reasons given by the family. The largest percentage was for congenital reasons, and the next percentage was for unknown reasons, then for infection during child age Meningitis). As shown in the table, the lowest percentages were for trauma, ICU admission>5days, Infection during mother pregnancy, Jaundice with blood exchange and Medication use during pregnancy. The etiology of congenital or early-onset hearing loss most likely varies from a country to country. A study in Gaza Strip found that pregnancy complications, such as hypertension and high fever, and medication use during pregnancy increase the risk of hearing impairment in children. Congenital anomalies, ototoxic medications, trauma, and severe jaundice, including those requiring blood exchanges, also increase the risk (Zaqqout & Hamad, 2022). Generally speaking, the neonatal period is very critical, and insults or diseases can affect the risk of hearing impairment. These previous results direct the health care provider to focus on maternal history during pregnancy for identification of risky groups; medications use and imaging should be strictly supervised.

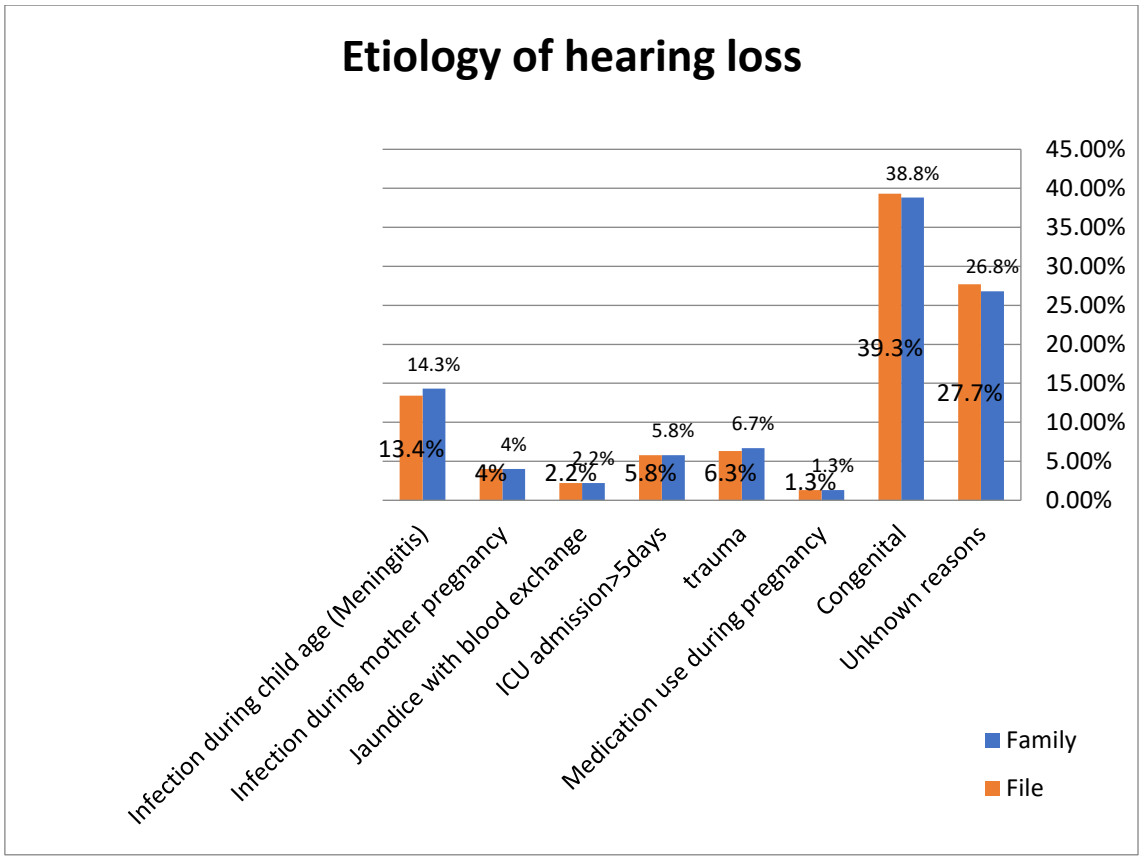



**Figure (4.1): Distribution of the study population according to etiology of hearing loss (according to Family, according to File)**

### 4.2.7 Associated disease:

About the associated disease Most of them 92% did not have any associated disease, this is something that does not reflect reality, and the reason for that is that there are many diseases that need more tests and investigations that we do not have. And the remaining 8% (other diseases) is divided between MR, CP, and Epilepsy.

**Table (4.6): Distribution of the study population according to associated disease**

| Variable | | Frequency | Percentage |
|---|---|---|---|
| Diseases associated | Nothing | 206 | 92% |
| | Other disorders | 18 | 8% |

### 4.2.8 Pre-Operative Hearing Assessment (HL):

The American Speech-Language-Hearing Association classify the hearing loss as the following: Normal: –10 to 15, Slight: 16 to 25, Mild:26 to 40,Moderate: 41 to 55,

Moderately severe:56 to 70, Severe:71 to 90 (American Speech-Language-Hearing Association, 2022). The Pre-operative HL (category) in operated and non-operated ear for children in our study was Profound (>91dB) by 86.2%, this is something that matches to the global indication (Dazert et al., 2020). And for children whose results were NA, most of these operations were very old, more than ten years ago, and have undergone operations on the old approach, certainly most of them, if not all of them, were profound, but we do not have clear data about their pre-operation hearing assessment.

**Table (4.7): Distribution of the study population according to pre-operative hearing assessment (HL)**

| **Variable** | | **Frequency** | **Percentage** |
|---|---|---|---|
| Pre-operative HL(category) operated ear | Profound | 193 | 86.2% |
| | NA | 31 | 13.8% |
| Pre-operative HL:(dB HL) operated ear | >91dB | 193 | 86.2% |
| | NA | 31 | 13.8% |
| Pre-operative HL (category) non-operated | Profound | 193 | 86.2% |
| | NA | 31 | 13.8% |
| Pre-operative HL (dB) non-operated | >91dB | 193 | 86.2% |
| | NA | 31 | 13.8% |

### 4.2.9 Cochlear implant surgery (clinical Data):

For the approaches that used in the CI, the number of those for whom underwent the new approach was approximately 350 cases, and in our study, it considers 180 cases of them were included, and this number represents them, while those who underwent CI with the old approach were approximately 119 cases, and we have reached 44 cases of them, and this is a number that represents them approximately.

**Table (4.8): Distribution of the study population according to clinical data surgery operation**

| **Variable** | | **Frequency** | **Percentage** |
|---|---|---|---|
| Approach used in CI surgery: | New approach | 180 | 80.4% |
| | Old approach | 44 | 19.6% |
| site of CI | Unilateral (Right) | 177 | 79% |
| | Unilateral (Left) | 46 | 20.5% |
| | Bilateral (old, new) | 1 | 0.4% |
| The duration of admission post CI(days) | 0-2 | 166 | 74.1% |
| | 3-10 | 57 | 25.4 |

For the old approach, the operation was done on the left ear, and this related to the surgeon, while for most of the cases who underwent the new approach, the operation was on the right ear, and this is something that related to the surgery, as the surgeon preferred to start his surgery on a side clear from complications from previously surgery that mainly done on the left side in old approach. However in study that done in Egypt they found that right-ear cochlear implantation has an advantage over left-ear implantation regarding the speech intelligibility (Mohammed & Sarwat, 2014). Hence, in case of bilateral profound deafness of the same degree with no anatomical complications in either of the ears, it is recommended to choose the right ear for cochlear implantation (Mohammed & Sarwat, 2014). And in another study reveals that the side of implantation can significantly influence the brain activation patterns evoked by frequency changes in adults with right-handedness (Liang et al., 2020). Right-ear CIs result in stronger brain activities in the contralateral hemisphere than in the ipsilateral hemisphere. Such a contralateral dominance was not observed for left-ear CIs (Liang et al., 2020). There was a small percentage (0.4%) of children who had the operation on both sides, the first time in the old approach and the second time in the new approach.

About the duration of admission post CI, 74.1% of the children were hospitalized for less than two days post surgery, and most of them were from the new approach. Those who stayed in the hospital after the CI surgery for more than 3 days, most of them were children who underwent the operation on the old approach.

### 4.2.10 Operation Surgery Complication:

The complications are associated with either the surgical technique or implantation of a foreign body or device failure. The majority of publications on this subject classify complications as minor complications (requiring conservative management or minimal surgery such as placement of trans-tympanic ventilation tubes) and major complications (requiring surgical revision or hospitalization for medical treatment). Since the European Consensus Statement on Cochlear Implant Failures and Explanations in 2005, more recent publications have distinguished between minor complications, major complications, and complications requiring cochlear re-implantation (European Consensus Statement on Cochlear Implant Failures and Explantations, 2005). Since the article published by Cohen in 1991 (one of the first large series evaluating the complications after cochlear implantation), the global complication rate after cochlear implantation has regularly

decreased as a result of the improvement of surgical techniques with smaller incisions and the use of increasingly miniaturized and biocompatible implants (Cohen & Hoffman, 1991). The global complication rate, which was initially about 39%, is now only 9 (Bhatia et al., 2004). The global complication rate comprised 14.9% of minor complications and 5% of major complications, 42.8% of which were due to implant dysfunction (Farinetti et al., 2014). When talking about complications related to the operation surgery, others in the table mean minor complications ( Related to skin flap Ulcers, Labyrinthitis, Vestibular, Tinnitus, CSF leaks, Neurological complications), While several combined (Major) complications mean (Related to skin flap Super-infections, Meningitis, Mastoiditis, Tinnitus, Device failure, Tympanic retraction pockets, Cholesteatoma, and Post-AOM perforated eardrum).In our study it found that the vast majority, 81.3%, did not have any complications, and most of them were approximately from the new approach. And the remaining 19.7% had complications, but in general the complications are self-limited (resolving) with time, for example: Recurrent ear discharge, Facial nerve palsy, ear swelling, wound Infection, Device/Electrode nmigration/ misplacement/ accidental removal, Ear infection, and others. Only 9.8% had several combined complications, and most of them, if not all of them, were definitely from the old approach, which clarify in another part of our research (table 4.22).

**Table (4.9): Distribution of the study population according to operation surgery complication**

| **Variable** | | **Frequency** | **Percentage** |
|---|---|---|---|
| Complication related to surgery: | Ear infection | 2 | 0.9% |
| | Device/Electrode migration/misplacement/accidental removal | 4 | 1.8% |
| | Wound Infection | 2 | 0.9% |
| | Ear swelling | 1 | 0.4% |
| | Facial nerve palsy | 3 | 1.3% |
| | Recurrent ear discharge | 1 | 0.4% |
| | Others | 7 | 3.1% |
| | Several Combined complications | 22 | 9.8% |
| | Nothing | 182 | 81.3% |
| RE-implantation | Not-need | 193 | 86.2% |
| | Need | 1 | 0.4% |
| | underwent | 29 | 12.9% |
| | controversial | 1 | 0.4% |

As for the re-implantation, 193 children out of the 224 were in excellent condition and did not need a re-implantation, and only 29 children out of the 224 underwent a re-implantation, and to clarify here, those who re-operated were due to a malfunction or

defect in the implanted device. The CI program officer in the governmental sector and at AL-Shifa Medical Complex who represents the CI at PMOH with Hamad Hospital Managers that this is a malfunction caused by the company and not related to surgery or surgeon, and after re-implantation the result was excellent. 0.4% only has need re-implantation and wait for surgery, and also 0.4% was controversial.

### 4.2.11 Post-Operative Hearing Assessment (HL):

Now we will start talking about Postoperative Hearing Assessment (dB HL) in operated ear. We found that most of the results became normal and mild-moderate, and their percentage was approximately 82.5%. In detail, those who became normal (<26 dB) were 22 children, and their percentage was 9.8%., and who became mild (26-40 dB) were 130 children, and their percentage was 58%.and who became moderate (41-55 dB) were 33 children, and their percentage was 14.7%. And by default, Postoperative Hearing Assessment in Non-operated ear remained the same, and the results showed that there was indeed a significant improvement in hearing, as 93.8% of their answers indicated that their improvement was excellent. And only a small percentage, 6.3%, were somewhat better ear pure-tone

**Table (4.10): Distribution of the study population according to post-operative hearing assessment (HL)**

| Variable | | Frequency | Percentage |
|---|---|---|---|
| Postoperative Hearing Assessment (dB HL) operated ear | Mild | 130 | 58% |
| | moderate | 33 | 14.7% |
| | Moderate - sever | 6 | 2.7% |
| | sever | 1 | .4% |
| | Normal | 22 | 9.8% |
| | NA | 32 | 14.3% |
| Postoperative Hearing Assessment (dB HL) operated ear | <26 dB | 22 | 9.8% |
| | 26-40 dB | 130 | 58% |
| | 41-55 dB | 33 | 14.7% |
| | 56-70 dB | 6 | 2.7% |
| | 71-90 dB | 1 | 0.4% |
| | NA | 32 | 14.3% |
| Postoperative Hearing Assessment (category) Non-operated ear | Profound | 193 | 86.2% |
| | NA | 31 | 13.8% |
| Postoperative Hearing Assessment (dB HL) Non-operated ear | >91dB | 193 | 86.2% |
| | NA | 31 | 13.8% |
| Better-ear pure-tone average (dB HL) | Yes | 210 | 93.8% |
| | Somewhat | 14 | 6.3% |

### 4.2.12 Rehabilitation service:

By talking about children who use the external device after CI and almost all the answers indicated that children are committed to using the external device permanently by 96.9%. And those who answered that they do not always committee to that meant the frequent damage to the external device and the lack of easy availability of spare parts when it malfunctioned, or that the electrical wires connected to it had been cut or had some kind of defect, or that the child might have trauma and the device was damaged, or that the battery damaged, many and many problems that were preventing them from using the device continuously, all the previous causes clarify in the qualitative part of our study.

It was confirmed that nearly 90% of the children had regular visits for rehabilitation after the operation (always and sometimes). Only 9.8% of the children did not visit the hospital after the operation regularly, and there are reasons for that, either because they were on the old approach and follow-up visits after the operation were NA at that time, or they were from the new approach but their place of residence is far from the hospital and they do not have the financial ability to reach the hospital , however Hamad Hospital may provide paid transportation back and forth for most of its patients, or they are from the new approach as well, but they completed a certain number of sessions, then they got excluded from the program or graduated. This point must be discussed because some of the parents had objections and wanted more sessions and more visits; the solution is either to increase the number of rehabilitative sessions or to establish a special institution for them that will take care of them permanently even when their sessions at Hamad Hospital are over.

Upon reaching Problems with the maintenance of the external device, In depth interview was done with CI children Families that clarify that there were many problems that prevented them from continuing to use the external device: however, there is financial support from Hamad Hospital for them (According to Hamad hospital Director) , but it is not complete support, only partial. They also added that the cost of the device and the parts related to it are very expensive, compared to the people of the Gaza Strip and their deteriorating financial conditions , Also, many families were complaining about the continuous defects of the device's parts, for example the connecting wires, batteries, and hooks, in addition to the lack of spare parts for them in the Gaza Strip, and this requires them to wait for a long time, and this negatively affects their children from a psychological point, and also from a rehabilitation point . Also, as a child who has a malfunction in his

external device may be forced to stay without an external device for a long time, which makes him lose many of the skills he acquired during the period in which he, was using the device.

**Table (4.11): Distribution of the study population according to Rehabilitation service**

| Variable | | Frequency | Percentage |
|---|---|---|---|
| Child use the external device after CI | Always | 217 | 96.9% |
| | Usually | 2 | 0.9% |
| | Often | 4 | 1.8% |
| | Never | 1 | 0.4% |
| Regular visits for rehabilitation after the operation? | Yes (always) | 187 | 83.5% |
| | Yes (sometimes) | 15 | 6.7% |
| | No | 22 | 9.8% |
| Problems with the maintenance of the external device | Yes | 181 | 80.8% |
| | No | 43 | 19.2% |

### 4.2.13 Quality of communication subdomains post Cochlear implantation:

**Table (4.12): Distribution of the study population according to the quality communication**

| Items | 1. Strongly disagree | | 2. Disagree | | 3. Neither agree nor disagree | | 4. Agree | | 5. Strongly agree | | Mean | Wt. Mean % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | No | % | No | % | | |
| C1 Communication easy | 6 | 2.7 | 28 | 12.5 | 18 | 8 | 45 | 20.1 | 127 | 56.7 | 4.22 | 84.4 |
| C2 NO Quality speech concern | 46 | 20.5 | 59 | 26.3 | 37 | 16.5 | 36 | 16.1 | 46 | 20.5 | 2.9 | 58 |
| C3 Chat without see face | 17 | 7.6 | 38 | 17 | 20 | 8.9 | 58 | 25.9 | 91 | 40.6 | 3.75 | 75 |
| C4 Easy to communicate by speaking | 9 | 4 | 36 | 16.1 | 29 | 12.9 | 71 | 31.7 | 79 | 35.3 | 3.78 | 75.6 |
| C5 Use spoken language developed | 6 | 2.7 | 15 | 6.7 | 30 | 13.4 | 84 | 37.5 | 89 | 39.7 | 4.05 | 81 |
| C6 Talkative and engaged in conversation | 11 | 4.9 | 19 | 8.5 | 40 | 17.9 | 82 | 36.6 | 72 | 32.1 | 3.83 | 76.6 |
| Over All | Total mean: 3.74 Weighted mean % =75.03 % SD= 0.94 | | | | | | | | | | | |

This table shows the result of our study on children's communication skills after CI, and according to the results included, the Total mean was: 3.74 and Weighted mean % = 75.03%, meaning that there was a significant improvement and the results were positive by 75.03% according to the families, and the results were moving towards (AGREE). This confirms that the families have noticed the improvement of their children in communicating with them and with strangers, and their ability to talk in general has improved, and they can chat with them easier than before. The communication score of our study is less than the study that done in South Africa that found the communication subdominant was highest score of 4.15 (Brewis et al.2020), also less than the study of that done United States of America and the United Kingdom that found the communication subdominant score of 3.93, 3.90 respectively. (Kumar et al. 2015, Byčkova et al.2018). But more than the study that done in China shows the mean score for communication post-CI was 3.45. (Zhao et al.2019)

About the questions of communication, the first question (Is the communication become easy post CI?) have the highest mean score with mean:4.22 and weighted mean 84.4%, and that for several causes including the CI result in progressive improvement in hearing, and followed by increase the ability to communication, on the other hand this communication need rehabilitation and good guidance and appropriate practice, and according to that it is seem that the concern about the quality of speech still a main problem for most of the children families, since most of the participants answered that there is concerned about the quality of speech (NO Quality speech concern), and that related to several factors including that the children need frequent rehabilitation seasons, the development in speech clearly different from each child to another, the effort and follow up by child parents have an important role, the problem that may happened in electrical device and their effect, the limitation of education program that corresponding with the activation age of children, and other problems.

### 4.2.14 Quality of general functioning subdomains post Cochlear implantation:

This table shows the result of the study on children's general functioning after CI, and according to the results included, the Total mean was: 4.09 and Weighted mean%= 82% meaning that there was a significant improvement and the results were positive by 82% according to the families, and the results were moving towards (AGREE). This confirms that the families have noticed the improvement of their children in general

functioning. The general functioning score of our study was high in comparison to another studies, it was close to the score that was recorded in South Africa which was 4.05 (Brewis et al.2020), but higher than the mean score recorded in the United States of America, China 3.86, 3.62 respectively. (Kumar et al. 2015, Zhao et al.2019).

About the questions of quality of general functioning, the second question (S/he is totally reliant on implant all the time) have the highest mean score with mean: 4.75and weighted mean 95%, and that for several causes including the CI result in progressive improvement in hearing, and the child has improved well with the CI, and that it was successful and the child is happy with it and happy that he can hear everything clearly and can also communicate with the outside world through it, and he can understand what is happening around him, and therefore he has become very dependent on it, and this indicates that the child hears the sound clearly without distortions or any strange sounds, which leads them to adhere to it and rely on it completely, as is the case in 95% of children, and also indicates the great success of the CI surgery.

The final question (S/he is become able to cope in new situations) , have the lowest mean score with mean: 3.09 and weighted mean 61.8%, and that for several causes including the parents of children are afraid that the external device will be broken, or damaged as a result of their integration and coping with new situations for the first time, so they try to avoid such situations in order to preserve the external device from malfunctioning, because the word “internal device failure” is not an easy word for parents, as this costs them a lot financially. Morally and psychologically, for several reasons we mentioned earlier about the difficulty of repairing the problems related to the external device, and also because the child’s long stay without an external device affects him negatively from many aspects, and the efforts of the parents for many months may go to waste once the external device damaged , and they are forced to repeat many rehabilitation sessions with their children, for these reasons, parents are afraid and try not to put their children in new situations to protect them and the device as well , In addition, the child after CI needs time to complete his cognitive development compared to other children of his age.

**Table (4.13): Distribution of the study population according to the general functioning**

| Items | 1. Strongly disagree | | 2. Disagree | | 3. Neither agree nor disagree | | 4. Agree | | 5. Strongly agree | | Mean | Wt. Mean % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | No | % | No | % | | |
| F1 No benefit from HA | 13 | 5.8 | 16 | 7.1 | 10 | 4.5 | 15 | 6.7 | 170 | 75.9 | 4.4 | 88 |
| F2 Reliant on implant | 0 | 0 | 3 | 1.3 | 4 | 1.8 | 40 | 17.9 | 177 | 79 | 4.75 | 95 |
| F3 knows when I want and hear me | 5 | 2.2 | 4 | 1.8 | 11 | 4.9 | 83 | 37.1 | 121 | 54 | 4.39 | 87.8 |
| F4 Listening to music. watching TV | 2 | .9 | 6 | 2.7 | 12 | 5.4 | 85 | 37.9 | 119 | 53.1 | 4.4 | 88 |
| F5 play outside and aware of traffic sound | 38 | 17 | 23 | 10.3 | 16 | 7.1 | 67 | 29.9 | 80 | 35.7 | 3.57 | 71.4 |
| F6 able to cope in new situations | 32 | 14.3 | 70 | 31.3 | 23 | 10.3 | 44 | 19.6 | 55 | 24.6 | 3.09 | 61.8 |
| Over All | Total mean: 4.09 Weighted mean % =82 % ,SD= 0.55 | | | | | | | | | | | |

### 4.2.15 Quality of Self-reliance subdomains post Cochlear implantation:

This table below shows the result of children's Self-reliance after CI, and according to the results included, the Total mean was: 3.92 and Weighted mean % = 78.5% meaning that there was an improvement and the results were positive by 78.5% according to the families answers, and the results were moving towards (AGREE). This confirms that the families have noticed the improvement of their children in Self-reliance. The mean score of Self-reliance in our study considers high when it comparison to another studies, such as the studies that was done in Kazakhstan, South Africa, United States of America with mean scores of 3.80, 3.88, 3.7 respectively (Zhumabayev et al. 2022, Brewis et al.2020, Kumar et al. 2015).

**Table (4.14): Distribution of the study population according to the Self-reliance**

| Items | 1. Strongly disagree (SD) | | 2. Disagree (D) | | 3. Neither agree nor disagree (N) | | 4. Agree (A) | | 5 Strongly agree (SA) | | Mean | Wt. Mean % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | No | % | No | % | | |
| R1 Do something on own | 29 | 12.9 | 73 | 32.6 | 12 | 5.4 | 40 | 17.9 | 70 | 31.3 | 3.22 | 64.4 |
| R2 change has in her/his confidence | 5 | 2.2 | 8 | 3.6 | 24 | 10.7 | 86 | 38.4 | 101 | 45.1 | 4.21 | 84.2 |
| R3 dependency before CI | 1 | 0.4 | 5 | 2.2 | 9 | 4 | 82 | 36.6 | 127 | 56.7 | 4.47 | 89.4 |
| R4 independent as children in same age | 8 | 3.6 | 38 | 17 | 22 | 9.8 | 78 | 34.8 | 78 | 34.8 | 3.8 | 76 |
| Over All | Total mean: 3.92 Weighted mean % =78.5% ,SD= 0.67 | | | | | | | | | | | |

About the questions of quality of Self-reliance, the third question (S/he was very dependent on us before the implantation) have the highest mean score with mean: 4.47and weighted mean 89.4%, This is consider normal , as children when they have a certain health problem, their dependence on parents is greater than normal children, and in our study we studied children suffering from HL, and it is natural that their dependence on parents is very large, as it is difficult for them to meet all their needs on their own For two reasons, the first is that they are still children, and the second is that they have a hearing problem, and it is difficult for them to communicate with the outside world without the help of their parents, who may consider them the key to the surrounding world.

But once the implant was done, the self-confidence will improve, and the ability to communicate will improve, and they will be able to know what they want, and they may be able to be independent from his family. For the same reasons we mentioned previously in general function section, the results show that the first question (S/he Do something on own) have the lowest mean score with mean: 3.22 and weighted mean 64.4%

### 4.2.16 Quality of Well-being and happiness subdomains post Cochlear implantation:

This table blow shows the result of children's Well-being and happiness after CI, and according to the results included, the total mean was: 3.87 and Weighted mean % = 77.4% meaning that there was an improvement and the results were positive by 77.4% according to the families answers, and the results were moving towards (AGREE). This confirms that the families have noticed the improvement of their children in well-being and happiness. The Well-being and happiness score of our study is less than that done in Kazakhstan that found the Well-being and happiness subdominant score was 3.89 (Zhumabayev et al.2022), But more than other studies, such as the studies that done in South Africa and China and shows the mean score for Well-being and happiness 3.81, 3.70 respectively . (Brewis et al.2020, Zhao et al.2019)

**Table (4.15): Distribution of the study population according to the Well-being and happiness**

| Items | 1. Strongly disagree | | 2. Disagree | | 3. Neither agree nor disagree | | 4. Agree | | 5. Strongly agree | | Mean | Wt. Mean % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | No | % | No | % | | |
| W1 NO frustration in behavior | 67 | 29.9 | 40 | 17.9 | 15 | 6.7 | 39 | 17.4 | 63 | 28.1 | 2.95 | 59 |
| W2 behavior improved after CI | 1 | 0.4 | 3 | 1.3 | 18 | 8 | 92 | 41.1 | 110 | 49.1 | 4.37 | 87.4 |
| W3 become argumentative after CI | 3 | 1.3 | 4 | 1.8 | 36 | 16.1 | 98 | 43.8 | 83 | 37.1 | 4.13 | 82.6 |
| W4 less frustrated than before implant | 15 | 6.7 | 18 | 8 | 31 | 13.8 | 68 | 30.4 | 92 | 41.1 | 3.91 | 78.2 |
| W5 happy child and good fun | 5 | 2.2 | 24 | 10.7 | 25 | 11.2 | 84 | 37.5 | 86 | 38.4 | 3.99 | 79.8 |
| Over All | Total mean:3.87 Weighted mean % =77.4% ,SD= 0.79 | | | | | | | | | | | |

About the questions of quality of Well-being and happiness after CI, the second question (Her/his behavior has improved since she had her implant) have the highest mean score with mean: 4.37 and weighted mean 87.4%. That because the child after the CI improves his cognitive-behavioral development and this is thanks to the CI surgery, the successful rehabilitation sessions, and the great efforts of the parents to help in the success, improvement and development of everything related to the child from the auditory, cognitive, behavioral and verbal aspects.

Nevertheless, some children may show signs of frustration in their behavior for several reasons: as the child faces difficulties to integrate into society after CI, and becomes frustrated when making a great effort to explain what he wants from people, so he prefers to withdraw, and this makes him depressed and his psychological condition deteriorates. That was shown when we asked (S/he Don't show signs of frustration in her behavior), this question has the lowest mean score with a mean: of 2.95 and a weighted mean of 59%.

### 4.2.17 Quality of Social relations subdomains post Cochlear implantation:

This table shows the result of children's Social relations after CI, and according to the results included, the total mean was: 4.24 and Weighted mean % = 84.88% meaning that there was an significant improvement compared to other subdomains and the results were positive by 84.88% according to the families answers, and the results were moving towards (STRONGLY AGREE). This confirms that the families have noticed the significant improvement of their children in social relations. In comparison to another studies that done previously, our score on Social relations was the highest in comparison to most previous studies such as that done in Kazakhstan, South Africa, China, the United States of America, and the United Kingdom as these studies show the mean score of Social relations 3.85, 3.87, 3.72, 3.85, 4.05 respectively. (Zhumabayev et al.2022, Brewis et al.2020, Zhao et al.2019, Kumar et al. 2015, Byčkova et al.2018)

About the questions of quality of social relations after CI, the first question (S/he has a close relationship with her grandparents) has the highest mean score with mean: 4.52and weighted mean 90.4%. Once the child implants the cochlea, he can hear well and also communicate well with people close to him and with the community, but the problem remains that the child cannot easily form relationships and friendships because despite the implantation, there are many factors that prevent him from doing it , including Cognitive development is not mature enough like other children, and also the parents' fear for him, he is exposed to bullying from other people, he is now not with the hearing disability community, and at the same time he is not a completely normal person, and this exposes him to difficulty in forming relationships and friendships because he differs from them in the way and speed of speech and manner of behavior, which exposes him to criticism and insults. This was shown when we asked (S/he make friends easily outside the family), THIS question have the lowest mean score with mean: 3.93and weighted mean 78.6%.

**Table (4.16): Distribution of the study population according to the social relations**

| Items | 1. Strongly disagree | | 2. Disagree | | 3. Neither agree nor disagree | | 4. Agree | | 5. Strongly agree | | Mean | Wt. Mean % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | No | % | No | % | | |
| Sr1 close relationship with grandparents | 9 | 4 | 2 | 0.9 | 9 | 4 | 47 | 21 | 157 | 70.1 | 4.52 | 90.4 |
| Sr2 NO socially isolated before implant | 4 | 1.8 | 16 | 7.1 | 34 | 15.2 | 58 | 25.9 | 112 | 50 | 4.15 | 83 |
| S3 make friends easily | 17 | 7.6 | 30 | 13.4 | 15 | 6.7 | 52 | 23.2 | 110 | 49.1 | 3.93 | 78.6 |
| Sr4 sociable within family | 2 | 0.9 | 3 | 1.3 | 9 | 4 | 108 | 48.2 | 102 | 45.5 | 4.36 | 87.2 |
| Sr5 shares in family situations | 0 | 0 | 2 | 0.9 | 15 | 6.7 | 111 | 49.6 | 96 | 42.9 | 4.34 | 86.8 |
| Sr6 takes part in family relationships | 8 | 3.6 | 19 | 8.5 | 19 | 8.5 | 91 | 40.6 | 87 | 38.8 | 4.03 | 80.6 |
| Sr7 relationship with brothers and sisters improved | 1 | 0.4 | 2 | 0.9 | 18 | 8 | 94 | 42 | 109 | 48.7 | 4.38 | 87.6 |
| Over All | Total mean: 4.2443, Weighted mean % =84.88%, SD=0.609 | | | | | | | | | | | |

### 4.2.18 Quality of Education subdomains post Cochlear implantation:

The table shows the result of children's Education after CI, and according to the results included, the total mean was: 3.34 and Weighted mean % = 66.85% meaning that there was an improvement and the results were approximately positive by 66.85% according to the families' answers, and according to some global study which consider that the mean above 3 positive, in this section it consider the results were moving towards neutral in comparison to other sections. The Education score of our study is less than that recorded in studies that done in Kazakhstan, South Africa, and China which found that Education was 3.49, 3.70, 3.38 respectively. (Zhumabayev et al.2022, Brewis et al.2020, Zhao et al.2019) But more than another study that done in the United States of America shows the mean score for Education post-CI was 3.32. (Kumar et al. 2015) This confirms that the families have noticed some improvement of their children in education However, the percentage is

considered low compared to the rest of the other subdomains, for reasons that we will explain later.

About the questions of quality of education , the seventh question (S/he is totally reliant on her implant at school) have the highest mean score with mean: 4.35 and weighted mean 87%, Their great use and their total dependence on the external device at school indicates that the CI surgery was successful, and the child is in dire need of the device to be able to hear and communicate in order to understand what is being said and explained to him, as the child without the external device is like a HL child, and therefore he relies heavily on implants to benefit from his going to school. But when looking at the quality of education in general, the weighted mean is the lowest compared to the rest of the subdomains, due to many difficulties and reasons. Cchildren who underwent CI have a restriction ability to engage with governmental education because of immature cognitive development and function , and even who become member of governmental education they will faces several of difficulties later, so most of them will leave the education, and even some children who enter a special organization of education, their family unable to give financial requirements for these organizations , As we mentioned earlier, the child who has an implant needs special guidance during their study and a special curriculum at the beginning of their school life ,also they need a pattern of specific questions and exams that are compatible with their abilities, which need a lot of time to develop ,they also need continuous psychological and educational support . So, it is difficult for him to integrate into public education, and private education is financially costly. We also emphasize that some children who suffer from HL may be accompanied by other diseases, including CP, MR, and others, and these diseases affect the child's perception and his intellectual and educational skills, and it is natural that the educational subdomains are the lowest percentage

Therefore, the answers to the fourth question are "I am not concerned about her/his future school placement" has the lowest mean score with mean: 2.255and weighted mean 45.1%. As it is natural for parents to be concerned about the academic future of their children because they know all the difficulties and problems they face.

**Table (4.17): Distribution of the study population according to the Education**

| Items | 1. Strongly disagree | | 2. Disagree | | 3. Neither agree nor disagree | | 4. Agree | | 5. Strongly agree | | Mean | Wt. Mean % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | No | % | No | % | | |
| E1 able to cope with schooling | 35 | 15.6 | 42 | 18.8 | 77 | 34.4 | 27 | 12.1 | 43 | 19.2 | 3.005 | 60.1 |
| E2 keeping up with children | 18 | 8 | 59 | 26.3 | 70 | 31.3 | 42 | 18.8 | 35 | 16.5 | 3.08 | 61.6 |
| E3 school meet all needs | 29 | 12.9 | 56 | 25 | 67 | 29.9 | 43 | 19.2 | 29 | 12.9 | 2.94 | 58.8 |
| E4 NOT concerned about future in school | 84 | 37.5 | 59 | 26.3 | 44 | 19.6 | 14 | 6.3 | 23 | 10.3 | 2.255 | 45.1 |
| E5 use sign language at school | 7 | 3.1 | 15 | 6.7 | 53 | 23.7 | 11 | 4.9 | 138 | 61.6 | 4.188 | 83.76 |
| E6 happy about progress at school | 16 | 7.1 | 10 | 4.5 | 72 | 32.1 | 80 | 35.7 | 46 | 20.5 | 3.58 | 71.6 |
| E7 reliant on implant at school | 1 | 0.4 | 0 | 0 | 51 | 22.8 | 40 | 17.9 | 132 | 58.9 | 4.35 | 87 |
| Over All | Total mean:3.34, Weighted mean % =66.85%, SD= 0.709 | | | | | | | | | | | |

## 4.2.19 Quality of the Effects of implantation subdomains post Cochlear implantation:

**Table (4.18): Distribution of the study population according to the Effects of implantation**

| Items | 1. Strongly disagree | | 2. Disagree | | 3. Neither agree nor disagree | | 4. Agree | | 5. Strongly agree | | Mean | Wt. Mean % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | No | % | No | % | | |
| Ei1 communicate good immediately after CI | 7 | 3.1 | 14 | 6.3 | 18 | 8 | 115 | 51.3 | 70 | 31.3 | 4.013 | 80.3 |
| Ei2 worry of implant break down | 0 | 0 | 1 | 0.4 | 2 | 0.9 | 24 | 10.7 | 197 | 87.9 | 4.86 | 97.2 |
| Ei3 Progress slow in first months | 32 | 14.3 | 27 | 12.1 | 18 | 8 | 85 | 37.9 | 62 | 27.7 | 3.53 | 70.6 |
| Ei4 NO worry of blame | 18 | 8 | 14 | 6.3 | 11 | 4.9 | 17 | 7.6 | 164 | 73.2 | 4.317 | 86.34 |
| Ei5 NO refusal from hearing disability society | 17 | 7.6 | 23 | 10.3 | 16 | 7.1 | 16 | 7.1 | 152 | 67.9 | 4.174 | 83.48 |
| Ei6 Progress exceeded expectations | 36 | 16.1 | 33 | 14.7 | 23 | 10.3 | 53 | 23.7 | 79 | 35.3 | 3.47 | 69.4 |
| Ei7 NO resentment of other children | 15 | 6.7 | 20 | 8.9 | 23 | 10.3 | 62 | 27.7 | 104 | 46.4 | 3.982 | 79.6 |
| Over All | Total mean: 4.0497 Weighted mean % =80.99 % SD=0.512 | | | | | | | | | | | |

This table shows the result of Effects of implantation on children after CI, and according to the results included, the total mean was: 4.05 and Weighted mean % = 80.99 % meaning that there was an excellent improvement and the results were positive by 80.99% according to the families' answers, and the results were moving towards (AGREE). In comparison to another studies, our study score of Effects of implantation was high in comparison to most previous studies such as the studies that done in Kazakhstan, South Africa, China, the United States of America, and the United States Kingdom as these studies show the mean score of Effects of implantation 3.15, 3.49, 3.67, 3.11, 3.16 respectively. (Zhumabayev et al.2022, Brewis et al.2020, Zhao et al.2019, Kumar et al. 2015, Byčkova et al.2018) This confirms that the families have noticed the significant improvement of Effects of implantation on children post CI.

About the questions of quality of Effects of implantation on children post CI, the second question (I worry that the implant will break down) have the highest mean score with mean: 4.86 and weighted mean 97.2%, Certainly, the biggest fear among parents is the damage of the implanted cochlea, because they know its importance to their children and their total dependence on it in all aspects of life, and the biggest fear has become that it may malfunction one day, because they know its great role in improving the lives of their children and improving their cognitive, social and psychological abilities. Some of the impressive sentences we heard from parents: one of them says, "I am reading the Qur'an on the external device, and I pray to God that it does not break." The other says, "I feel like my heart is broken when the device is broken." "I say, in the name of God, before I carry the device and before I hold it in my hand." "I have nightmares and see the device is broken." And many other sentences that hurt our hearts. About the sixth question, "Progress after implantation has exceeded my expectations," although the Weighted Mean is 69.4%, which is not a small percentage, but it is the lowest percentage in the quality of effects of implantation on children post CI, and this is normal because the parents expected that the child would become like a normal child. Who was born hearing normally, but they find that this is not true.

### 4.2.20 Quality of the Supporting the child subdomains post Cochlear implantation:

This table shows the result of Supporting the child after CI, and according to the results included, the Total mean was: 3.9010 and Weighted mean % = 78% meaning that there was an improvement and the results were positive by 78% according to the families' answers, and the results were moving towards (AGREE). The mean Supporting the child in our study is close to the study that is done in the United Kingdom with 3.89 as a recorded

score for Supporting the child. (Byčkova et al.2018) But more than another study that was done in the United States of America, China, and South Africa shows the mean score for Education post-CI was 3.11, 3.67, and 3.49 respectively. (Kumar et al. 2015, Zhao et al. 2019, Brewis et al. 2020) This confirms that the families have noticed the significant improvement of the Supporting the child subdomains post CI.

About the questions of quality of the supporting the child subdomains post CI, the fifth question (A parent of a child with an implant needs to be patient, as benefits may take time to show) have the highest mean score with mean: 4.59 and weighted mean 91.86%, This is because parents become know that the journey is long and requires a lot of time and effort, and they must be very patient in order to pass this stage with the best results and outcomes , for example, there are rehabilitation sessions before CI and also sessions after CI, continuous visits and great effort in teaching them when they join the school, and great effort when Explain to them everything in life, from how to pronounce letters, name things, and call people, all the way to explaining difficult school curricula. Although the child's dependence on his parents may decrease slightly after the CI, some children continue to depend on their parents a lot, and this made the fourth question, "I get more time to myself because of her/his increased independence," have a less weighted mean=54.4%.

**Table (4.19): Distribution of the study population according to the Supporting the child**

| Items | 1. Strongly disagree | | 2. Disagree | | 3. Neither agree nor disagree | | 4. Agree | | 5. Strongly agree | | Mean | Wt. Mean % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | No | % | No | % | | |
| S1. help more productive after CI | 8 | 3.6 | 10 | 4.5 | 12 | 5.4 | 103 | 46 | 91 | 40.6 | 4.156 | 83.2 |
| S2. Need more help after CI | 26 | 11.6 | 22 | 9.8 | 9 | 4 | 80 | 35.7 | 87 | 38.8 | 3.803 | 76.06 |
| S3. help first means less help later | 4 | 1.8 | 7 | 3.1 | 6 | 2.7 | 91 | 40.6 | 116 | 51.8 | 4.375 | 87.5 |
| S4. increased independence | 73 | 32.6 | 51 | 22.8 | 19 | 8.5 | 28 | 12.5 | 53 | 23.7 | 2.718 | 54.4 |
| S5. be patient as benefits take time | 8 | 3.6 | 0 | 0 | 2 | .9 | 55 | 24.6 | 159 | 71 | .4.593 | 91.86 |
| S6. NO Need same amount of help after CI | 19 | 8.5 | 41 | 18.3 | 15 | 6.7 | 49 | 21.9 | 100 | 44.6 | 3.758 | 75.18 |
| Over All | TOTAL MEAN : 3.9010 Weighted mean % =78%, SD= .50410 | | | | | | | | | | | |

### 4.2.21 The overall quality with study population post cochlear implantation:

#### 4.2.21.1 Comparisons between health‐related quality of life subdomains:

Mean ratings were greater than three for all eight HRQoL subdomains on a 5-point Likert scale (mean = 3.89, range = 3.34–4.25), indicating that parents considered their child's HRQoL as either average or being more positive than negative. 'Social relations' received the highest ratings (mean = 4.25, range = 3.47–4.86), followed by the General functioning' (mean= 4.09, range= 3.09-4.75), 'Effects of implantation' (mean = 4.05, range =3.47-4.32) and 'Self-reliance' (mean= 3.92, range =3.22-4.47) as shown in table below. 'Supporting the child' (mean= 3.9010, range= 2.71-4.59), 'Well-being' (mean = 3.87 range= 2.95-4.37) and 'Communication' (mean = 3.74, range = 3.09-4.75) also rated positive. The 'Education' received the least positive ratings (mean = 3.34 range =2.94-4.35).

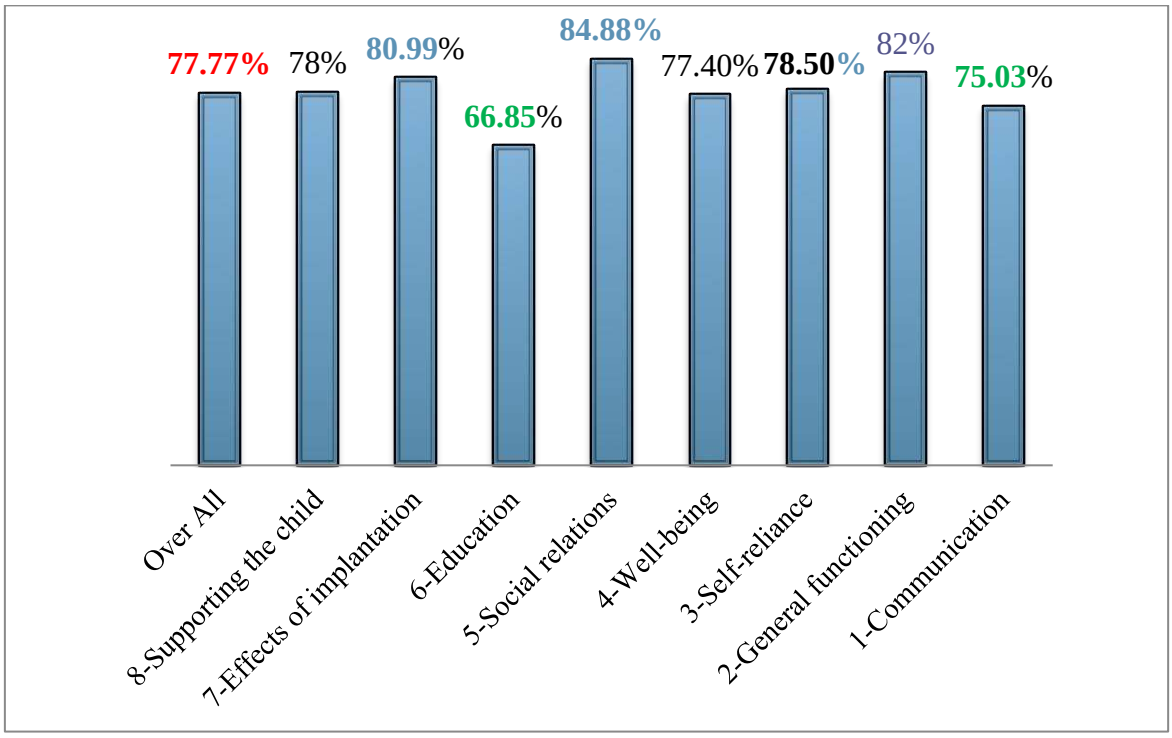



**Figure (4.2): The weighted mean score for subdominants of the QoL post CI**

### 4.2.22 The Comparison with other studies with CCIPP questionnaire:

All eight subdomains received good parent/caregiver evaluations (ratings above three out of five). The subdomain of "Social relations" obtained the greatest rating, while the subdomain of "education" received the lowest rating. Comparison of CCIPP studies with other research The subdomains in every study that used the CCIPP questionnaire received

more than three points, and the outcome was regarded as favorable (O'Neill et al, 2004, De Moura Silva et al, 2020, Fortunato-Tavares et al, 2012, Kumar et al. 2015, Archbold et al, 2008, Brewis et al. 2020). Given that the average score for all eight HRQoL subdomains was 3.89, the current study's premise that HRQoL subdomains were typically positive was supported. The top three subdomains received scores of 4.25, 4.09, and 4.05 for "Social relations," "General functioning," and "Effects of implantation," respectively. In contrast, an analysis of 53 families with children who receive CI in Kazakhstan found that "Well-being and happiness" received the highest ratings (mean = 3.89), followed by "supporting of the child" (mean = 3.87), "social relations" (mean = 3.85) and "self-reliance" (mean = 3.80), while "effects of implantation" received the least favorable ratings (mean = 3.15) (Zhumabayev et al. 2022). In a previous study, Kumar and colleagues (2015) got an average rating of 3.65 for "well-being and happiness," with a maximum rating of 3.93 for "communication." With scores of 3.72 and 4.05, respectively, Zhao et al. and Byèkova et al. revealed the superior ranking in "social relations.

"Kumar et al. (2015) also noted that the high ratings in the subdomains of "communication," "general functioning," and "social relations" were the outcome of the parents'/caregivers' completion of questionnaires at the summer camp, where the children with implants were gathered and professionals worked with them. The same subdomains scored highly in Huttunen et al. (2009)'s study, but because children with concurrent pathology after CI were included in the sample, a direct comparison was difficult. In the 'communication' subdomain, Zhao et al. reported a low rating (3.45) that is consistent with the results of the current study (3.59). Zhao et al. hypothesized that CIs were used for less time than was the case in the Kumar et al. (2015) study.

The lowest rating in the present study was in the 'education' subdomain (3.34), Low ratings of this subdomain suggested that parents' observation of their child post-CI did not reach their pre-implant expectations for education outcomes.

Due to variances in the research sample, CI age range, and survey age range, it is challenging to explain disparities in findings. It is interesting that "communication" and "social relations" also earned excellent scores in earlier research examining HRQoL for children with CIs.

### 4.2.23 Patients Satisfaction with cochlear implantation services at the Gaza Strips:

The table below shows the result of Patients Satisfaction with CI services at Gaza strips, and according to the results included, the total mean was: 4.2314 and weighted mean % = 84.6 % meaning that there was an sufficient satisfaction and the results were positive by 84.6% according to the families' answers, and the results were moving towards (STRONGLY AGREE). This confirms that the families have noticed the significant improvement in their child post-CI, and make them satisfaction about services of CI at Gaza strips.

About the questions of Patients Satisfaction with CI services at Gaza strips, both tenth and eleventh questions (Health care providers act too businesslike and impersonal toward me), (My health care provider treats me in a very friendly and courteous manner) have the highest mean scores with mean: 4.58, 4.60 respectively, and weighted mean 91.6%, 92% respectively. These are excellent results for satisfaction with health providers, especially those who work in Hamad Hospital. They used to clear and explain everything to parents, Parents of children feel good when they see them treat their children with love, credibility, efficiency, and impersonally, in addition to that reaching to them was easy and at any time and they give the child sufficient time in all his sessions and visits to them, and they easily booked appointments for them, and the hospital was committed to those appointments, meaning that the satisfaction towards the health care providers in Hamad Hospital was very good. Although the satisfaction was great, there were some complaints about the financial aspects, because however Hamad Hospital is financially supported, but in some conditions the damage to cochlear devices not completely cover, and this causes problems for families of children, as the economic conditions are difficult and deteriorating in the Gaza Strip, and requires them to pay part of the costs, and the price of spare parts are expensive, and not always available. This made the fifth and seventh questions, " I feel confident that I can get the health care I need without being set back financially", " I have to pay for more of my health care than I can afford " have less mean scores with mean: 2.5, 3.45 respectively and weighted mean=50%, 69% respectively.

**Table (4.20): Patients satisfaction with cochlear implantation services at the Gaza Strips**

| Items | 1. Strongly disagree | | 2. Disagree | | 3. Neither agree nor disagree | | 4. Agree | | 5. Strongly agree | | Mean | Wt. Mean% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No | % | No | % | No | % | No | % | No | % | | |
| T1.Explain tests by providers | 18 | 8 | 15 | 6.7 | 10 | 4.5 | 20 | 8.9 | 161 | 71.9 | 4.299 | 85.8 |
| T2.Complete medical care. | 20 | 8.9 | 16 | 7.1 | 8 | 3.6 | 26 | 11.6 | 154 | 68.8 | 4.241 | 84.8 |
| T3. receiving perfect health care | 28 | 12.5 | 17 | 7.6 | 18 | 8 | 20 | 8.9 | 141 | 62.9 | 4.022 | 80.45 |
| T4. Not wonder if diagnosis correct | 163 | 72.8 | 23 | 10.2 | 20 | 8.9 | 16 | 7.1 | 163 | 72.8 | 4.406 | 88.12 |
| T5. health without set back financially | 110 | 49.1 | 19 | 8.5 | 15 | 6.7 | 33 | 14.7 | 47 | 21 | 2.500 | 50 |
| T6. provider check everything | 7 | 3.1 | 14 | 6.3 | 16 | 7.1 | 22 | 9.8 | 165 | 73.7 | 4.446 | 88.8 |
| T7. Not pay more of health care afford | 33 | 14.7 | 48 | 21.4 | 29 | 12.9 | 13 | 5.8 | 101 | 45.1 | 3.450 | 69 |
| T8. easy access to specialists | 16 | 7.1 | 12 | 5.4 | 10 | 4.5 | 24 | 10.7 | 162 | 72.3 | 4.357 | 87 |
| T9.not waits too long for emergency treatment. | 1 | 0.4 | 22 | 9.8 | 5 | 2.2 | 21 | 9.4 | 175 | 78.1 | 4.549 | 91.4 |
| T10. providers businesslike and impersonal | 1 | 0.4 | 5 | 2.2 | 30 | 13.4 | 15 | 6.7 | 173 | 77.2 | 4.580 | 91.6 |
| T11. provider friendly and courteous | 1 | 0.4 | 4 | 1.8 | 28 | 12.5 | 16 | 7.1 | 175 | 78.1 | 4.607 | 92 |
| T12. Provide not hurry when treat | 1 | 0.4 | 15 | 6.7 | 25 | 11.2 | 10 | 4.5 | 173 | 77.2 | 4.513 | 90.3 |
| T13. no ignorance of providers | 7 | 3.1 | 24 | 10.7 | 5 | 2.2 | 14 | 6.3 | 174 | 77.7 | 4.446 | 88.9 |
| T14. No doubts in providers ability | 6 | 2.7 | 17 | 7.6 | 20 | 8.9 | 10 | 4.5 | 171 | 76.3 | 4.442 | 88.84 |
| T15. good time from providers | 10 | 4.5 | 9 | 4 | 15 | 6.7 | 27 | 12.1 | 163 | 72.8 | 4.446 | 88.92 |
| T16. get appointment easy | 19 | 8.5 | 4 | 1.8 | 21 | 9.4 | 9 | 4 | 171 | 76.3 | 4.379 | 87.59 |
| T17. satisfaction about care | 28 | 12.5 | 22 | 9.8 | 2 | 0.9 | 26 | 11.6 | 146 | 65.2 | 4.071 | 81.4 |
| T18. get care whenever need | 8 | 3.6 | 23 | 10.3 | 11 | 4.9 | 10 | 4.5 | 172 | 76.8 | 4.406 | 88.12 |
| Over All | Total mean : 4.2314 Weighted mean % =84.6, SD=0.988 | | | | | | | | | | | |

### 4.2.24 Difficulties with cochlear implantation stages:

About which of the following stage has the most difficult for you and your child who has a CI, most of parents 58% answer that Post-CI stage is the most difficult stage as it is the most stage requires a lot of time and effort to see benefit from CI surgery, then 29.9% from parents answer that pre-CI stage is the most difficult Its difficulty is the fear from the operation and the fear of the difficult and fateful decision that will turn the child from the hearing disability into a normal society, in addition to the fear of the complications of the operation and its impact on the child, and the constant concern of the parents whether this will be a correct decision or will my child blame me in the future for it, 4.9% from them that pre and post CI stages was difficult, 13% of them were all stages difficult. However the children developed improvement in the QOL post-CI, but the difficulties that they face by parents post-CI caused these results. according to the parents' explanation that children before CI were known as CWDs, they go to the HL organization and learned there without any difficulties, but after CI the effort required from the parents and their children to learn, accommodation with CI, prevent any trauma to the device, develop language, education, difficulties in schools, financial issues, transport to rehabilitation organization, the device damage, the battery problems, the fear about their children future education, the decision to keep with CI with difficulties or return to HL society, Re-implantation CI issues, some post-CI complications, difficulties in earning new friends and hate from previous HL society, all these factors made the post-CI as a challenging stage that required a lot of effort from parents to reach the accepted level for their children behavior, education, and communication.

**Table (4.21): Distribution of the study population according to the stages difficulties.**

| **Variable** | | **Frequency** | **Percentage** |
|---|---|---|---|
| Which of the following stage has the most difficult for you and your child who has a CI? | Pre-CI stage | 67 | 29.9% |
| | CI stage | 13 | 5.8% |
| | Post-CI stage | 130 | 58% |
| | Pre and post CI stage | 11 | 4.9% |
| | All stages | 3 | 1.3% |

### 4.2.25 Comparison between the old and new approach in relation to post-operation complications :

**Table (4.22): Distribution of the study population according to the stages difficulties.**

| The approach | | New approach (Endoscopic permanent approach) (2017y-2022y) | Old approach (classic facial recess approach) (2009y-2011) | Total |
|---|---|---|---|---|
| Complication post-surgery | Ear infection | 1 | 1 | 2 |
| | Electrode migration/misplacement/ accidental removal | 2 | 2 | 4 |
| | wound Infection | 1 | 1 | 2 |
| | ear swelling | 0 | 1 | 1 |
| | Facial nerve palsy | 2 | 1 | 3 |
| | Recurrent ear discharge | 0 | 1 | 1 |
| | Several Combined complications | 0 | 22 | 22 |
| | others | 7 | 0 | 7 |
| | Nothing | 167 | 15 | 182 |
| Total of Sample | | 180 | 44 | 224 |

As we said previously about complications related to the operation surgery, others in the table mean minor complications ( Related to skin flap Ulcers, Labyrinthitis, Vestibular, Tinnitus, CSF leaks, Neurological complications), While several combined (Major) complications mean (Related to skin flap Super-infections, Meningitis, Mastoiditis, Tinnitus, Device failure, Tympanic retraction pockets, Cholesteatoma, and Post-AOM perforated eardrum).The global complication rate comprised 14.9% of minor complications and 5% of major complications, 42.8% of which were due to implant dysfunction (Farinetti et al., 2014). By doing Chi-square there was statistical significance between complications related to surgery between the old and new approach (p value<.001). Annex (10)

We observe that the complication was significant in frequency (65.9%) and type (severity) in relation to the old approach and that was due to that the old approach of surgery that was done and it is a complication, also the cochlear devices which were Non-F.D.A approval approach version of CI. On the other hand, we observe that the new approach has

significantly less frequency of complication (7.2%), and all the complication was temporary without any permanent complications, and that mainly related to skilled surgeons, and to the new approach used by the surgeons, and the F.D.A approval devices that were used in CI.

## 4.3 Inferential statistics

In order to determine the statistically significant influencing factors on the CI-related research dependent variables, inferential statistical tests like the t-test and one-way ANOVA will be used. Statistical significance is defined as a P-value of less than 0.05. Additionally, comparisons with the outcomes of other prior studies would be made and presented.

### 4.3.1 Associations between socio-demographic variables and health related quality of life ratings:

In our study, the age of the children, Residency, and the Education years of the father were statistically significant with QoL. Our findings are in line with other research that found a significant relationship between the age of CI and the children's QoL in terms of associated determinants of QoL among children with CI (Noroozi et al., 2020). Children who were exposed to sounds earlier (especially those who underwent implantation by the age of 3.5) were said to have better chances for age-appropriate auditory development and normal development of the central auditory pathways, which led to them being more integrated and involved with their surroundings and less likely to feel alone and left behind (Loy et al., 2010). In another previous study found more factors that can influence the perceived QoL among CI, including birth order, gender (Sarant et al., 2018), and level of parent education (Alnuhayer et al., 2020), Another study found that the education level of the father is the influencing factor of QoL among their CI children in addition to the age of CI and duration of CI use (Huong et al., 2022), which correspond to our findings. In a different study, the researchers discovered that the older age at evaluation, the better hearing and language skills, the mother's level of education, and the family's receptivity were the influencing elements that linked with the quality of life of the children with CI (Silva et al., 2020).

Analysis of the sample (N=224) indicated that the age groups of children was significantly correlated with the total QoL score (p value <.001). The age group from (60-120) was the highest QoL mean score (4.04) in comparison with age group (0-59) with mean score (3.90), and finally with the least QoL mean score (3.60) for age group from (121-215). In order to find out exactly which groups are different from each other, we must conduct a post-hoc test that is capable of controlling the family-wise error rate (Zach, 2020). By doing the Tukey post hoc test we observe that the highest statically significantly between the age group (60-120) and age group (121-215) (p value <.001). However, the QoL mean score was found not to be statically significantly in relation to range of age in Kazakhstan (Zhumabayev et al. 2022).

By looking to results the reader suspected that the result un-logic, but acutely when we clarify the reasons for this result it will become completely logic, as we clarify previously most the new cases(180 cases) underwent CI mainly at age between (2-5) years, and with time with rehabilitation seasons the children ability to communication, and other subdominant of QoL improved since the children acquired more skills with time, so it is logic that increase of age from less than 5y to more than 5y will increase the mean score of QoL, on the other hand most of the children with age from (121-215) are from children who underwent CI with the old approach with the old CI device, and here the mean score of QoL decrease because the type of surgery approach is old with less outcome result, also the CI device old with several complication.

Gender was not significantly correlated with the QoL mean score, however the female mean score (3.94) slight increase compare with male(3.84),and this is give us a hint that there is no gender based biases in selection the patients for surgery or even in the CI implantation services. Respondent was not significantly correlated with the QoL mean score, however when both (mother and father) responded have the highest QoL mean score (4.00), and this is can be explained by that information from any of children parents will represent the condition of children who underwent CI.

Residency was significantly correlated with the QoL mean score, and that may be explained that the site for CI surgery, pre and post rehabilitation services in Gaza city, Because of that Gaza city show the highest QoL mean score (3.98). Refugee status was not significantly correlated with the QoL mean score, and this give us good hint that there are no biases according to refugee status of children.

**Table (4.23): The relationship between the score of Quality of life and Socio-demographic characteristic variables (N=224)**

| Variables | | N | Mean | Factor | Sig. |
|---|---|---|---|---|---|
| Age group | (0-59) | 40 | 3.9057 | F | <.001* |
| | (60-120) | 123 | 4.0388 | | |
| | 121-215 | 61 | 3.6052 | | |
| Gender | Male | 111 | 3.8491 | t | .132 |
| | Female | 113 | 3.9440 | | |
| Respondent | Mother | 166 | 3.9333 | F | .126 |
| | Father | 48 | 3.7556 | | |
| | Both | 8 | 4.0010 | | |
| | others specify | 2 | 3.8570 | | |
| Residency | North | 29 | 3.8078 | F | .046 |
| | Gaza | 107 | 3.9855 | | |
| | Middle Area | 27 | 3.9233 | | |
| | Khanyounis | 36 | 3.7389 | | |
| | Rafah | 25 | 3.8205 | | |
| Refugee status | Refuge | 160 | 3.9111 | t | .478* |
| | Non-refuge | 64 | 3.8615 | | |
| Educational years of the child's Mother | 0-9y | 23 | 3.9721 | F | .508 |
| | 10-12y | 80 | 3.8539 | | |
| | 13-20y | 121 | 3.9112 | | |
| Educational years of the child's Father | 0-9y | 39 | 3.9830 | F | .033* |
| | 10-12y | 78 | 3.7861 | | |
| | 13-20y | 107 | 3.9464 | | |
| consanguinity between the parents of child | Yes | 163 | 3.9144 | t | .365 |
| | No | 61 | 3.8503 | | |

(*) Refer to statistically significant when the p value less or equal to 0.05. However educational years of the child's Mother was not statistical significantly correlated with the QoL mean score, the educational years of the child's Father was statistical significantly correlated with the total QoL score(p value <.033). This can be explained that the level of education of father can affect the level of communication, and income, since the father usually the responsible for family decision, so his communication and financial level can affect the QoL for children. Although by doing the Tukey post hoc test we observe that there is no statistical significant between the different groups (p value 0.05). The higher mean score of QoL (3.98) was for 0-9 years of educations with comparison to other groups, the 10-12y of education was less of QoL score mean in comparison with group of (13-20y) of fathers education. However, the QoL mean score was found not to be statically significantly in relation to parental education level in Kazakhstan (Zhumabayev et al. 2022). Consanguinity between the parents of child show no significantly correlated with the QoL mean score.

### 4.3.2 Associations between income and health insurance variables and health related quality of life ratings:

The economic situation was assessed through asking participant about their Family income and Health insurance. The relationship was not clear and perhaps reflecting the tendency of underestimating their values. Social factors may be affect the answers of participants such as social assistance, financial support, support for CI devices.

We observe from the table below that the type of health issuance not significantly correlated with the QoL mean score, and this easy to explain because no one from any type of health insurance give any financial support from the process of CI and its services, so being have health insurance or not will not support the process of CI and its services (p value <081). Also this can be explained that the pre-rehabilitation, post-rehabilitation, Follow up, the devices, and other issues related to CI surgery are mainly undergo in NGOs. However (Other type of health insurance) achieve the lowest score of QoL, but that may be not reflect the fact due to that the participants did not understand the question or related to sample size. On the other hand the family income was significantly correlated with the total QoL score (p value <.014), and by doing the Tukey post hoc test we observe that the only statically significantly was between the family income (Less than 2000 Shekel) and (2000-2500) (p value <.042) Shekel. And this is can be explained by the finical support was needed for cochlear device maintenance, and for transport and other thing.

**Table (4.24): The relationship between the score of Quality of life and income and health insurance variables (N=224)**

| **Variable** | | **N** | **Mean** | **Factor** | **Sig.** |
|---|---|---|---|---|---|
| Type of health issuance | governmental health insurance | 184 | 3.9242 | F | .081 |
| | Other type of health insurance | 24 | 3.6956 | | |
| | Does not have health insurance | 16 | 3.8862 | | |
| Family income | Less than 2000 Shekel | 140 | 3.9657 | F | .014* |
| | (2000-2500) Shekel | 69 | 3.7998 | | |
| | More than 2500 Shekel | 15 | 3.7025 | | |

### 4.3.3 Associations between Health profile information variables and health related quality of life ratings:

The age at which the family detected that the child have HL (months), age at assessment (diagnosis) by months, and age of child at CI surgery (months) , all these variables were not statistical significantly correlated with the QoL mean score in this study, and this corresponding to finding results that found in Kazakhstan (Zhumabayev et al. 2022). Hearing age by months (Activation age) and Duration of HL (years) was statistical significantly correlated with the total QoL score (p value <.001), and that not corresponding to finding results that found in Kazakhstan (Zhumabayev et al. 2022), where the Hearing age in months (Activation age) and Duration of HL not statistical significantly correlated with the QoL mean, according to Kazakhstan study (Zhumabayev et al. 2022), age at assessment showed positive significant correlations with three psychosocial subdomains, including: general functioning, effects of implantation, supporting the child in children with acquired HL. About the Hearing age months (Activation age) by doing the Tukey post hoc test we observe that the highest statically significantly between the (61-174) months group and (6-12) months group with (p value <.001), also between the (61-174) months group and (13-60) months group with (p value <.001), and with highest mean score of QoL for (13-60) months group, and this can be clarify by that most the new cases(180 cases) underwent CI mainly at age between (2-5) years, and with time with rehabilitation seasons the children ability to communication, and other subdominant of QoL improved since the children acquired more skills with time, so it is logic that increase of age of activation from less than 5y to more than 5y will increase the mean score of QoL, on the other hand most of the children with age from (61-174) are from children who underwent CI with the old approach with the old CI device, and here the mean score of QoL decrease because the type of surgery approach is old with less outcome result, also the CI device old with several complication with time. About the Duration of HL(years) by doing the Tukey post hoc test we observe that the highest statically significantly between the (10.1-18) years group and (0-5) years group with (p value <.001), also between the (10.1-18) years group and (5.1-10) years group with (p value <.001), with highest mean score of QoL for (5.1-10) years group, and this can be clear by previous reasons that clarify previously. In another study found that duration of CI use showed positive correlation with QoL of the children (Huong et al., 2022). This is inconsistent with study conducted by (Warner-Czyz et al., 2011).

**Table (4.25): The relationship between the score of Quality of life and Health profile information variables (N=224)**

| Variable | | N | Mean | Factor | Sig. |
|---|---|---|---|---|---|
| Age detected child HL (months) | 0-6 | 90 | 3.9152 | F | .608 |
| | 7-12 | 79 | 3.8548 | | |
| | ≥13 | 55 | 3.9276 | | |
| Age at assessment (diagnosis) (months): | 0-6 | 60 | 3.9751 | F | .285 |
| | 7-12 | 79 | 3.8488 | | |
| | ≥13 | 85 | 3.8866 | | |
| Duration of HL (years) | 0-5Y | 87 | 3.9397 | F | <.001* |
| | 5.1-10Y | 85 | 4.0843 | | |
| | 10.1-18Y | 52 | 3.5193 | | |
| Age of child at CI surgery(Years) | 0-2Y | 61 | 3.8330 | F | .448 |
| | >2-4 | 100 | 3.9283 | | |
| | >4-16 | 63 | 3.9092 | | |
| Hearing age months (Activation age) | 6-12 | 61 | 3.9455 | F | <.001* |
| | 13-60 | 98 | 4.0381 | | |
| | 61-174 | 65 | 3.6386 | | |

### 4.3.4 Associations between educational information variables and health related quality of life ratings:

The age of child at first grade and the special educational institutions attended by the child who underwent CI was statistical significantly correlated with the total QoL score (p value <.001), and that not corresponding to finding results that found in Kazakhstan (Zhumabayev et al. 2022), where the attendance at special educational institutions not statistical significantly correlated with the QoL mean.

About the age of child at first grade by doing the Tukey post hoc test we observe that the highest statically significantly between the (6) years group and (>9) years group with (p value.001), also between the (6) years group and (Not entire first grade) group with (p value <.027), and with highest mean score of QoL for (6) years group (4.13).

About the special educational institutions attended by the child who underwent CI by doing the Tukey post hoc test we observe that the highest statically significantly between

the (Regular education) group and (Irregular education) group with (p value<.001), also between the (Regular education) group and (Did not attend any educational institution or school) group with (p value <.001), and with highest mean score of QoL for Regular education group (3.99).

**Table (4.26): The relationship between the score of Quality of life and educational information variables (N=224)**

| Variable | | N | Mean | Factor | Sig. |
|---|---|---|---|---|---|
| Did the child enter the first grade | Yes | 124 | 3.9078 | F | .313 |
| | No | 30 | 3.7771 | | |
| | Not Relevant | 70 | 3.9291 | | |
| The age of child at first grade | Not enter the first grade for several causes | 100 | 3.8835 | F | <.001* |
| | 6Y | 35 | 4.1359 | | |
| | 7-8Y | 69 | 3.8726 | | |
| | +9Y | 20 | 3.6303 | | |
| Special educational institutions attended by the child | Regular education | 158 | 3.9977 | F | <.001* |
| | Irregular education | 17 | 3.5070 | | |
| | Did not attend any educational institution or school | 49 | 3.7075 | | |

### 4.3.5 Associations between health services profile variables and health related quality of life ratings:

The child attendance a of hearing disability organization before CI (p value.012), the site at which the child gets his/her CI services (p value <.001), Regular visits for CI services before surgery (p value <.001), and waiting in each rehabilitation visit (p value <.001) was statistical significantly correlated with the total QoL score.

About the site at which the child gets his/her CI services, by doing the Tukey post hoc test we observe that the highest statically significantly between the (Hamad organization) group and (Hamad and other organization) group with (p value<.001), also between the (Hamad hospital) group and (other organization) group with (p value <.001), and with highest mean score of QoL for Hamad organization group (4.01). And that for several causes including that the CI program of Hamad Hospital includes rehabilitation and evaluation program for all patients who will undergo CI before and after surgery, as any child before undergoing CI must meet the criteria for that, and certain examinations must

be completed in order to become qualified for CI. Children who do not meet the criteria are excluded, also all the child in the CI program of Hamad Hospital underwent CI in the new approach with skilled surgeons, also the rehabilitation program after surgery play an important role in increasing the QoL of children who underwent CI. We observe that the mean score of the QoL is higher for children who did not attendee of hearing disability organization in comparison who attended a of hearing disability organization, and that meanly related according to children families due to that in each stages post-CI the families children faces obstacles they became want to return to of hearing disability community, mainly when the Cochlear device damage.

**Table (4.27): The relationship between the score of Quality of life and health services profile variables (N=224)**

| Variable | | N | mean | factor | Sig. |
|---|---|---|---|---|---|
| Child attendance a hearing disability organization before CI | Yes | 56 | 3.7613 | t | .012* |
| | No | 168 | 3.9422 | | |
| The site at which the child gets his/her CI services: | Hamad hospital | 153 | 4.0178 | F | <.001* |
| | Hamad and other organization | 55 | 3.6697 | | |
| | Other organization | 16 | 3.5222 | | |
| Before surgery had regular visits for CI services? | Yes | 180 | 3.9948 | t | <.001* |
| | No | 40 | 3.4468 | | |
| Waiting in each rehabilitation visit | 0-5 | 186 | 3.9753 | t | <.001* |
| | 6-80 | 38 | 3.5133 | | |

### 4.3.6 Associations between etiology of hearing loss variables and health related quality of life ratings:

The etiology of Hearing disability according to family, and the etiology of Hearing disability according to file record variables were not statistical significantly correlated with the QoL mean score in this study, and this corresponding to finding results that found in Kazakhstan study (Zhumabayev et al. 2022).

**Table (4.28): The relationship between the score of Quality of life and etiology of hearing loss variables (N=224)**

| Variable | | According to family | | Mean | F | Sig. | According to file | | Mean | F | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Freq. | % | | | | Freq. | % | | F | 0.68 |
| Etiology of Hearing disability | Unknown reasons | 60 | 26.8% | 3.89 | F | 0.68 | 62 | 27.7% | 3.88 | | |
| | Congenital | 87 | 38.8% | 3.89 | | | 88 | 39.3% | 3.88 | | |
| | Medication use during pregnancy | 3 | 1.3% | 3.52 | | | 3 | 1.3% | 3.52 | | |
| | trauma | 15 | 6.7% | 3.78 | | | 14 | 6.3% | 3.80 | | |
| | ICU admission>5days | 13 | 5.8% | 3.94 | | | 13 | 5.8% | 3.94 | | |
| | Jaundice with blood exchange | 5 | 2.2% | 3.92 | | | 5 | 2.2% | 3.92 | | |
| | Infection during mother pregnancy | 9 | 4% | 4.11 | | | 9 | 4% | 4.11 | | |
| | Infection during child age (Meningitis) | 32 | 14.3% | 3.91 | | | 30 | 13.4% | 3.94 | | |

### 4.3.7 Associations between associated disease variables and health related quality of life ratings:

The diseases associated variables were not statistical significantly correlated with the QoL mean score in this study, and this is mainly related to that most of children who underwent CI not diagnosed as have associated disease, and only small number have establishes diagnoses of associated disease.

**Table (4.29): The relationship between the score of Quality of life and associated disease variables (N=224)**

| Variable | | Frequency | mean | factor | Sig. |
|---|---|---|---|---|---|
| Diseases associated | Nothing | 206 | 3.9196 | F | .071 |
| | MR+CP | 10 | 3.7402 | | |
| | Epilepsy | 3 | 3.4746 | | |
| | other | 5 | 3.5314 | | |

### 4.3.8 Associations between pre-operative hearing assessment (HL) variables and health related quality of life ratings:

The pre-operative HL (category) at operated ear (p value<.001), pre-operative HL (dB HL) at operated ear (p value <.001), Pre-operative HL (category) at non-operated (p value <.001), and pre-operative HL (dB) at non-operated (p value <.001) was statistical significantly correlated with the total QoL score. With highest mean score of QoL for profound (>91 dB) group (3.97) comparison with NA data group.

**Table (4.30): The relationship between the score of Quality of life and pre-operative hearing assessment (HL) variables (N=224)**

| Variable | | Frequency | Mean | Factor | Sig. |
|---|---|---|---|---|---|
| Pre-operative HL(category) operated ear | Profound | 193 | 3.9703 | t | <.001* |
| | NA | 31 | 3.4405 | | |
| Pre-operative HL:(dB HL) operated ear | >91dB | 193 | 3.9703 | t | <.001* |
| | NA | 31 | 3.4405 | | |
| Pre-operative HL (category) Non-operated | Profound | 193 | 3.9703 | t | <.001* |
| | NA | 31 | 3.4405 | | |
| Pre-operative HL (dB) Non-operated | >91dB | 193 | 3.9703 | t | <.001* |
| | NA | 31 | 3.4405 | | |

### 4.3.9 Associations between clinical data surgery operation variables and health related quality of life ratings:

The approach that used in CI surgery and the site of CI was statistical significantly correlated with the total QoL score (p value<.001). The new approach was statistical significantly increase the QoL (mean: 3.97) in comparison with the old approach (mean: 3.44), and this is for several causes including the old approach of surgery has several complications in comparison of the new one, also the old CI device type that used in the old approach increase the percentage of complications. However, the site of CI at right ear site was statistical significantly increase the QoL (mean: 4.0) in comparison with the left

site CI, but the Tukey post hoc test cannot be done in this condition, because one group have less than two cases. The operation was performed on the left ear for the old approach, which was related to the surgeon, whereas the right ear was operated on in the majority of cases for the new approach, which is related to the surgery because the surgeon preferred to begin his surgery on a side free from complications from earlier surgery that was primarily performed on the left side in the old approach. The surgery on right side consider better than the left side and that can be concluded from several studies include the research carried out in Egypt discovered that speech intelligibility is better with right-ear cochlear implantation than left-ear implantation (Mohammed & Sarwat, 2014). Thus, it is advised to pick the right ear for cochlear implantation in cases of bilateral severe deafness of the same degree and no anatomical difficulties in either of the ears (Mohammed & Sarwat, 2014). Another study shows that in right-handed people, the side of implantation can have a big impact on the brain activity patterns triggered by frequency shifts (Liang et al., 2020). Stronger brain activity in the contralateral hemisphere than in the ipsilateral is the effect of right-ear CIs. For left-ear CIs, such a contralateral dominance was not seen (Liang et al., 2020).

**Table (4.31): The relationship between the score of Quality of life and clinical data surgery operation variables (N=224)**

| Variable | | Frequency | Mean | Factor | Sig. |
|---|---|---|---|---|---|
| Approach used in CI surgery: | New approach | 180 | 3.9703 | t | <.001* |
| | Old approach | 44 | 3.4405 | | |
| site of CI: cofactor | Unilateral (Right) | 177 | 4.0061 | F | <.001* |
| | Unilateral (Left) | 46 | 3.4815 | | |
| | Bilateral (old, new) | 1 | 3.6976 | | |
| The duration of admission post CI(days) | 0-2 | 166 | 3.9018 | t | .390 |
| | 3-10 | 57 | 3.7461 | | |

### 4.3.10 Associations between operation surgery complication variables and health related quality of life ratings:

After re-coding the variable of complication post-CI to become three category: Simple complications that includes (Ear infection, simple wound infection, ear swelling, temporary facial nerve palsy, recurrent ear discharge, Related to skin flap Ulcers, Labyrinthitis, Vestibular, Tinnitus, CSF leaks, Neurological complications), Several Combined complications that includes: (Related to skin flap Super-infections, Meningitis, Mastoiditis, Tinnitus, Device failure, Tympanic retraction pockets, Cholesteatoma,

Electrode accidental removal, and Post-AOM perforated eardrum,), Nothing means without any complications. Complication related to surgery variable and RE-implantation was statistical significantly correlated with the total QoL score (p value<.001). In general the highest QoL was with groups without any complications with mean (3.96), followed by the group that have minor simple complication with mean (3.89), and finally for the group who have Several combined complication post-surgery with mean (3.40).

RE-implantation was statistical significantly correlated with the total QoL score (p value<.001). RE-implantation post CI surgery variable was statistical significantly and the Tukey post hoc test cannot be done in this condition, because one group have less than two cases. RE-implantation post CI surgery is a big topic to talk about, first of all the highest QoL was with group who not need re-implantation with mean score of QoL (3.94), followed by children who underwent re-implantation with mean score of QoL (3.58), and acutely there was a lot of reasons for that result first of all the Re-implantation that done for the cases of both old and new approach, about the old approach the re-implantation done to improve the outcome of these group of children, on the other hand the child who underwent CI in the new approach was due to technical cause, since there was a technical problem in some of the devices that used in the new approach, and according to that any device developed technical problem and after several investigation to establish the failed of device, the CI device replaced by another one after the agreement of family and rehabilitation seasons.

**Table (4.32): The relationship between the score of Quality of life and operation surgery complication variables (N=224)**

| **Variable** | | **Frequency** | **Mean** | **F** | **Sig** |
|---|---|---|---|---|---|
| Complication related to surgery: | Simple complications | 16 | 3.8953 | F | <.001* |
| | Several Combined complications | 26 | 3.4092 | | |
| | Nothing | 182 | 3.9667 | | |
| RE-implantation | Not-need | 193 | 3.9474 | F | .001* |
| | Need | 1 | 3.4750 | | |
| | Underwent | 29 | 3.5867 | | |
| | Controversial | 1 | 3.5815 | | |

### 4.3.11 Associations between post-operative hearing assessment (HL) variables and health related quality of life ratings:

postoperative hearing assessment (dB HL) at operated ear (p value <.001), postoperative hearing assessment (dB HL) at operated ear (p value <.001), postoperative hearing assessment (category) at non-operated ear (p value <.001), postoperative hearing assessment (dB HL) at non-operated ear (p value <.001), and better-ear pure-tone average (dB HL) (p value .009), was statistical significantly correlated with the total QoL score.

About the postoperative hearing assessment (dB HL) at operated ear, and postoperative hearing assessment (dB HL) at operated ear, the highest QoL score was to group who become have mild SNLH (<26 dB ) post-operation. The children who become have better pure-tone average have higher QoL score in comparison to group who have somewhat improvement, and the Tukey post hoc test cannot be done in this condition, because one group have less than two cases.

**Table (4.33): The relationship between the score of Quality of life and post-operative hearing assessment (HL) variables (N=224)**

| Variable | | Frequency | Percentage | Factor | Sig. |
|---|---|---|---|---|---|
| Postoperative Hearing Assessment (dB HL) operated ear | Mild | 130 | 3.9965 | F | <.001* |
| | moderate | 33 | 3.7195 | | |
| | Moderate - sever | 6 | 3.7384 | | |
| | sever | 1 | 3.6152 | | |
| | Normal | 22 | 4.2502 | | |
| | N.A | 32 | 3.4711 | | |
| Postoperative Hearing Assessment (dB HL) operated ear | <26 dB | 22 | 4.2502 | F | <.001* |
| | 26-40 dB | 130 | 3.9965 | | |
| | 41-55 dB | 33 | 3.7195 | | |
| | 56-70 dB | 6 | 3.7384 | | |
| | 71-90 dB | 1 | 3.6152 | | |
| | N.A | 32 | 3.4711 | | |
| Postoperative Hearing Assessment (category) Non-operated | Profound | 193 | 3.9703 | t | <.001* |
| | N.A | 31 | 3.4405 | | |
| Postoperative Hearing Assessment (dB HL) Non-operated ear | >91dB | 193 | 3.9703 | t | <.001* |
| | N.A | 31 | 3.4405 | | |
| Better-ear pure-tone average (dB HL) | Yes | 210 | 3.9181 | t | .009* |
| | Somewhat | 14 | 3.5802 | | |

### 4.3.12 Associations between rehabilitation service variables and health related quality of life ratings:

Regular visits for rehabilitation after the operation was statistical significantly correlated with the total QoL score (p value<.001). And by doing the Tukey post hoc test it is observe that the highest statically significantly between the (Yes the child has always regular visits for rehabilitation after the operation) group and (No Regular visits for rehabilitation after the operation) group with (p value<.001), also between the (Yes the child has always regular visits for rehabilitation after the operation) group and (Yes the child has sometimes regular visits for rehabilitation after the operation) group with (p value <.001), and with highest mean score of QoL for always regular visits for rehabilitation after the operation group (3.97).

**Table (4.34): The relationship between the score of Quality of life and Rehabilitation service variables (N=224)**

| Variable | | Frequency | Mean | Factor | Sig. |
|---|---|---|---|---|---|
| Regular visits for rehabilitation after the operation? | Yes (always) | 187 | 3.9759 | F | <.001* |
| | Yes (sometimes) | 15 | 3.5513 | | |
| | No | 22 | 3.4616 | | |
| Problems with the maintenance of the external device | Yes | 181 | 3.8675 | t | .055 |
| | No | 43 | 4.0208 | | |

### 4.3.13 Associations between Socio-demographic characteristic variables and Satisfaction level of children families:

Analysis of the sample (N=224) indicated that the age groups of children (p value <.001) and the respondent of questioner (p value <.003) were significantly correlated with the satisfaction level of children families. About the age group by doing the Tukey post hoc test it is observed that the highest statically significantly between the age group (121-215) and age group (0-59) with (p value <.001), and between age group (121-215) and age group (60-120) with (p value <.001) with highest mean score of Satisfaction level for age group (0-59) group (4.72). And the age group (0-59) group have the highest mean score of Satisfaction due to that most the cases underwent CI at age between (2-5) y, and at that time the CI provide a big change in their life and the CI device is still new without the

problem of maintenance of Internal and external device, in comparison to other age groups who become complaining from the problems of maintenance and other problems that related to rehabilitations.

**Table (4.35): The relationship between Satisfaction and Socio-demographic characteristic variables (N=224)**

| Variables | | N | Mean | Factor | Sig. |
|---|---|---|---|---|---|
| Age group | (0-59) | 40 | 4.7208 | F | <.001* |
| | (60-120) | 123 | 4.6409 | | |
| | 121-215 | 61 | 3.0847 | | |
| Gender | Male | 111 | 4.1231 | t | .104 |
| | Female | 113 | 4.3378 | | |
| Respondent | Mother | 166 | 4.3377 | F | .003* |
| | Father | 48 | 3.8380 | | |
| | Both(Mother and Father) | 8 | 4.6667 | | |
| | others specify | 2 | 3.1111 | | |
| Residency | Gaza | 107 | 4.2207 | F | .892 |
| | North | 29 | 4.1916 | | |
| | Middle Area | 27 | 4.2984 | | |
| | Khanyounis | 36 | 4.1373 | | |
| | Rafah | 25 | 4.3867 | | |
| Refugee status | Refuge | 160 | 4.2639 | t | .438 |
| | Non-refuge | 64 | 4.15017 | | |

### 4.3.14 Associations between health services profile variables and Satisfaction level of children families:

The child attendance a hearing disability organization before CI (p value<.001), the site at which the child gets his/her CI services (p value <.001), Regular visits for CI services before surgery (p value <.001), and waiting in each rehabilitation visit (p value <.001) were significantly correlated with the satisfaction level of children families. About the site at which the child gets his/her CI services, by doing the Tukey post hoc test we observe that the highest statically significantly between the (Hamad organization) group and (Hamad and other organization) group with (p value<.001), also between the (Hamad

hospital) group and (other organization) group with (p value <.001), and with highest mean score of satisfaction for Hamad organization group (4.70). And that for several causes including that the CI program of Hamad Hospital includes rehabilitation and evaluation program for all patients who will undergo CI before and after surgery, as any child before undergoing CI must meet the criteria for that, and certain examinations must be completed in order to become qualified for CI. Children who do not meet the criteria are excluded, also all the child in the CI program of Hamad Hospital underwent CI in the new approach with skilled surgeons, also the rehabilitation program after surgery play an important role in increasing the QoL of children who underwent CI.

**Table (4.36): The relationship between Satisfaction and health services profile variables (N=224)**

| **Variable** | | **N** | **Mean** | **Factor** | **Sig.** |
|---|---|---|---|---|---|
| Child attendance a hearing disability organization before CI | Yes | 56 | 3.5407 | t | <.001* |
| | No | 168 | 4.4616 | | |
| The site at which the child gets his/her CI services: | Hamad | 153 | 4.7037 | F | <.001* |
| | Hamad and other | 55 | 3.4152 | | |
| | other | 16 | 2.5208 | | |
| Regular visits for CI services before surgery? | Yes | 180 | 4.5797 | t | <.001* |
| | No | 40 | 2.6292 | | |
| Waiting in each rehabilitation visit | 0-5 | 186 | 4.5329 | t | <.001* |
| | 6-80 | 38 | 2.7558 | | |

### 4.3.15 Associations between clinical data surgery operation variables and Satisfaction level of children families:

The approach that used in CI surgery and the site of CI was statistical significantly correlated with the satisfaction level of children families (P value <.001). The new approach was statistical significantly increase satisfaction level of children families (mean: 4.68) in comparison with the old approach (mean: 2.39), and this is for several causes mainly that the QoL in new approach higher in related to old approach the old approach of surgery, also the old has several complication in comparison of the new one, another thing

to say that the old CI device type that used in the old approach increase the percentage of complications. The site of CI was statistical significantly, but the Tukey post hoc test cannot be done in this condition, because one group has less than two cases.

However site of CI was statistical significantly increase the satisfaction level of children families, but acutely this related to co-factor which is the approach of surgery and the site that prefer by surgeon, in other words most the child who underwent CI in the new approach have their operation at right site, while most of the child who underwent CI in the old approach have their operation at left site.

**Table (4.37): The relationship between Satisfaction and clinical data surgery operation variables (N=224)**

| Variable | | Frequency | Mean | Factor | Sig. |
|---|---|---|---|---|---|
| Approach used in CI surgery: | New approach | 180 | 4.6812 | t | <.001* |
| | Old approach | 44 | 2.3914 | | |
| site of CI: cofactor | Unilateral (Right) | 177 | 4.6648 | F | <.001* |
| | Unilateral (Left) | 46 | 2.5471 | | |
| | Bilateral (old, new) | 1 | 5.0000 | | |
| The duration of admission post CI(days) | 0-2 | 166 | 4.2473 | t | .180 |
| | 3-10 | 57 | 3.7381 | | |

### 4.3.16 Associations between operation surgery complication variables and Satisfaction level of children families:

Complication related to surgery (p value<.001) and RE-implantation (p value.001) were statistical significantly correlated with the satisfaction level of children families. In general the highest level of satisfaction was with groups without any complications with mean (4.50), followed by the group that have minor simple complication with mean (3.95), and finally for the group who have Several combined complication post-surgery with mean (2.50). The highest level of satisfaction of children families with group that not need re-implantation with mean score of satisfaction level (4.39), followed by children who underwent re-implantation with mean score of satisfaction level (3.24), and then with children who need re-implantation with mean score of satisfaction level (3.11), and finally with children that the decision about the re-implantation of them with new device is controversial with mean score of satisfaction level (2.55).

**Table (4.38): The relationship between Satisfaction and operation surgery complication variables (N=224)**

| Variable | | Frequency | Mean | F | Sig |
|---|---|---|---|---|---|
| Complication related to surgery: | Simple complications | 16 | 3.9583 | F | <.001* |
| | Several Combined complications | 26 | 2.5021 | | |
| | Nothing | 182 | 4.5024 | | |
| RE-implantation | Not-need | 193 | 4.3938 | F | .001* |
| | Need | 1 | 3.1111 | | |
| | underwent | 29 | 3.2471 | | |
| | controversial | 1 | 2.5556 | | |

### 4.3.17 Associations between post-operative hearing assessment (HL) variables and Satisfaction level of children families:

postoperative hearing assessment (category of HL) at operated ear (p value <.001), postoperative hearing assessment (dB HL) at operated ear(p value <.001), postoperative hearing assessment (category) at non-operated ear(p value <.001), postoperative hearing assessment (dB HL) at non-operated ear(p value <.001), and better-ear pure-tone average (dB HL) (p value <.001), were statistical significantly correlated with the satisfaction level of children families.

However the postoperative hearing assessment (category of HL) at operated ear (p value <.001), postoperative hearing assessment (dB HL) at operated ear (p value <.001), were statistical significantly, but the Tukey post hoc test cannot be done in this condition, because one group have less than two cases.

About the postoperative hearing assessment (category of HL) at operated ear, we observe that the children who have normal and moderate to severe hearing assessment have the highest score of satisfaction , with mean score around 4.80.

**Table (4.39): The relationship between Satisfaction and post-operative hearing assessment (HL) variables (N=224)**

| Variable | | Frequency | Mean | Factor | Sig. |
|---|---|---|---|---|---|
| Postoperative Hearing Assessment (category HL) operated ear | Mild | 130 | 4.4722 | F | <.001* |
| | moderate | 33 | 4.4242 | | |
| | Moderate - sever | 6 | 4.8056 | | |
| | sever | 1 | 3.7222 | | |
| | Normal | 22 | 4.8030 | | |
| | N.A | 32 | 2.5694 | | |
| Postoperative Hearing Assessment (dB HL) operated ear | <26 dB | 22 | 4.8030 | F | <.001* |
| | 26-40 dB | 130 | 4.4722 | | |
| | 41-55 dB | 33 | 4.4242 | | |
| | 56-70 dB | 6 | 4.8056 | | |
| | 71-90 dB | 1 | 3.7222 | | |
| | N.A | 32 | 2.5694 | | |
| Postoperative Hearing Assessment (category) Non-operated ear | Profound | 193 | 4.5086 | t | <.001* |
| | NA | 31 | 2.5054 | | |
| Postoperative Hearing Assessment (dB HL) Non-operated ear | >91dB | 193 | 4.5086 | t | <.001* |
| | NA | 31 | 2.5054 | | |
| Better-ear pure-tone average (dB HL) | Yes | 210 | 4.2937 | t | <.001* |
| | Somewhat | 14 | 3.2976 | | |

About postoperative hearing assessment (dB HL) at operated ear, we observe that the children who have 56-70 dB hearing assessment have the highest score of satisfaction, with mean score around 4.80. The children who become have better pure-tone average have higher satisfaction level of children families in comparison to group who have somewhat improvement.

### 4.3.18 Associations between Rehabilitation service variables and Satisfaction level of children families:

Regular visits for rehabilitation after the operation (p value<.001), and Problems with the maintenance of the external device were statistical significantly correlated with the

satisfaction level of children families. And by doing the Tukey post hoc test it is observe that the highest statically significantly between the (Yes the child has always regular visits for rehabilitation after the operation) group and (No Regular visits for rehabilitation after the operation) group with (p value<.001), also between the (Yes the child has always regular visits for rehabilitation after the operation) group and (Yes the child has sometimes regular visits for rehabilitation after the operation) group with (p value <.001), and with highest mean score of satisfaction level of children families for always regular visits for rehabilitation after the operation group (4.50). About the problems with the maintenance of the external device, the child who have no problems in maintenance of the external device have higher satisfaction level of children families in comparison to group who have problems in maintenance of the external device.

**Table (4.40): The relationship between Satisfaction and Rehabilitation service variables (N=224)**

| **Variable** | | **Frequency** | **Mean** | **Factor** | **Sig.** |
|---|---|---|---|---|---|
| Regular visits for rehabilitation after the operation? | Yes (always) | 187 | 4.5086 | F | <.001* |
| | Yes( sometimes) | 15 | 3.4037 | | |
| | No | 22 | 2.4394 | | |
| Problems with the maintenance of the external device | Yes | 181 | 4.1252 | t | .001* |
| | No | 43 | 4.6783 | | |

### 4.3.19 Associations between distribution of the study population according to stages of difficulties and Satisfaction level of children families:

The stages of difficulties during the process of CI surgery have statistical significantly correlated with the satisfaction level of children families (p value.001).

The highest level of satisfaction of children families with group of Pre-CI stage with mean score of satisfaction level (4.53), followed by CI stage with mean score of satisfaction level (4.29), and then Post-CI stage with mean score of satisfaction level (4.12), and the least mean score of satisfaction level with group of children whose their family decide that all stage of CI process was difficult (2.33).

**Table (4.41): The relationship between Satisfaction and Distribution of the study population according to stages of difficulties. (N=224)**

| Variable | | Frequency | Mean | Factor | Sig. |
|---|---|---|---|---|---|
| Which of the following stage has the most difficult for you and your child who has a CI? | Pre-CI stage | 67 | 4.5323 | F | .001* |
| | Cochlear implant stage | 13 | 4.2906 | | |
| | Post-CI stage | 130 | 4.1291 | | |
| | Pre and post CI stage | 11 | 4.0556 | | |
| | All stages | 3 | 2.3333 | | |

## 4.4 Qualitative result and analysis

### 4.4.1 Key's person perceptions about CI service:

The Gaza Strip community's need was examined in three dimensions (Availability of CI service, Exploring the current needs, and Limitations / weakness and opportunity for providing of CI service).

**-Availability of CI service:**

Availability of CI service was divided into two questions, first "What is your opinion about the availability of CI service?" (Pre-CI rehabilitation services, post-CI rehabilitation services and integration of children into the community after CI service for patients), and the second question was "What do you think about the necessary needs to provide CI Service" (Experienced team, instrument, and equipment sufficiency).

The CI program officer in the governmental sector commented "*previously there was no comprehensive program for CI in Gaza strip, and the cases of CI were referred to neighboring country to get their CI services, and then a project that were provided as private project from 2009 and 2011 as donation from Qatar country, and under supervision of M.O.H about 119 cases of CI was done, and this stage represent the first time that CI done in Gaza strip, but here the surgeons was not Palestinian, and there was a lot of defects in this stage, including the lack of pre and post rehabilitation program, and the old version of CI device*".

CI services at this stage does not meet the full expectations of patients such as to getting pre and rehabilitation program and support for maintenance of cochlear device, however for some children families it was like miracle, in which their children become able to hear and communicate with their parents and surrounding world, and that corresponding to quantitative part that we clarify previously that the new approach was statistical significantly increase the QoL , in comparison with the old approach, and this is for several causes including the old approach of surgery has several complications in comparison of the new one, also the old CI device type that used in the old approach increase the percentage of complications, also the new approach done by high qualified skilled surgical team.

The program officer also commented "*then at 2017y, the CI service transferee to another high point, since at this stage and by coordination between Hamad hospital (the launch of the Qatari program for CI) and governmental sector, the program of CI become provide comprehensive services including pre and post rehabilitation services for CI, with audiological and speech rehabilitation services, then at 2021y the Palestinian local surgical teams have succeeded for the first time to implant cochlear in Gaza, the operation performed on a two-and-a-half-year-old girl who had a hearing impairment due to complications after birth, and at this point local cadre of surgeons and audiologists and speech specialists became able to carry out operations, follow-up and rehabilitate by themselves, this make the satisfaction about CI at other point ".*

And that corresponding to our quantitative result in which the approach that used in CI surgery was statistical significantly correlated with the satisfaction level of children families.

Regarding program evaluation , the program officer stated: "*Currently, the children received CI service since 2017 through Hamad hospital including the program for evaluation if the patients meet with criteria for CI, then preparation for surgery, and CI surgery at al Quds hospital, and finally the rehabilitation programs"*

In non-governmental sector however, there is several sites for rehabilitation and speech therapy, there is one center that provide comprehensive CI service "Sheikh Hamad Bin Khalifa Al-Thani Hospital for Rehabilitation and Prosthetics in Gaza" provides CI service for patients who have HL since 2013, the main aim is to provide comprehensive

sustainable program for patients who need CI, and to rehabilitate these children to become as normal member of their family and society.

Where, The CI program that support by Qatar country through Hamad hospital is the best Medical Center that specializes in Gaza Strip in delivering of customer CI service. This service is characterized by high quality, higher matching between CI program and patients needed ' and provide higher patients' satisfaction about the delivered service" (Head unit of Rehabilitation Speech at Hamad hospital)

**- Affordability of CI**

And according to the affordability of CI specialist and its needs that are related to CI service in public and private sector, hospital manager and hospital medical director manager commented " *there is the only one Palestinian surgeons in Gaza Strip who have comprehensive qualified ( scientifically and technically practices) to do CI surgery, and according to that here we talk about critical point, since we need to support program of training of surgeons to become have the ability to do CI alone without support with other nationality surgeons*".

Also commented "*However, the program of CI services that run in Hamad hospital, is by coordination with M.O.H, and according to data that sent from the screening program of newborn about HL, but the need to support from governmental sector in several filed still needed*"

And that corresponding with our quantitative result about that the CI not covered by health insurance, since the health insurance not statistically significant related to QoL post CI and to satisfaction level post-CI.

Head of audiological department at Hamad hospital expressed his feeling by saying :" *we provide the best services in CI including the pre and post evaluation and rehabilitation, not only at level of Gaza strip and at level of middle east, we compare the children who came from outside and the result from our services and that from the outside*".

And acutely this is corresponding with our quantitative result, since having the CI at the program of Hamad hospital statistically significant related to QoL post CI, and that for several causes including that the CI program of Hamad Hospital includes a rehabilitation

and evaluation program for all patients who will undergo CI before and after surgery, as any child before undergoing CI must meet the criteria for that, and certain examinations must be completed in order to become qualified for CI. Children who do not meet the criteria are excluded, also all the child in the CI program of Hamad Hospital underwent CI in the new approach with skilled surgeons, also the rehabilitation program after surgery play an important role in increasing the QoL of children who underwent CI.

Also committed" *we provide a maintenance service for some certain damage to cochlear device, but we can't cover the entire broken device, or all the damage that may occur to device, mainly when this damage is recurrent*."

Here our quantitative results show that a lot of children families show that they are not satisfy about the problems that happened to the external device of cochlear, however the problems with the maintenance of the external device not show significant association with QoL post CI, but the child who have no problems in maintenance of the external device have higher satisfaction level of children families in comparison to group who have problems in maintenance of the external device.

Although the satisfaction as whole was great, there were some complaints about the financial aspects, because Hamad Hospital is financially supported partially, not completely, and this causes problems for families of children, as the economic conditions are difficult and deteriorating in the Gaza Strip, and requires them to pay part of the costs, and the price of Spare parts are expensive, and not always available. This made two questions in quantitative part, " I feel confident that I can get the health care I need without being set back financially", " I have to pay for more of my health care than I can afford " have less mean scores.

The head of the Qatari medical delegation said in previous interview on 30 January 2022,"*that they are proud of the target they have reached, which is to achieve sustainable development in this field after the local cadre of surgeons and audiologists and speech specialists became able to carry out operations, follow-up and rehabilitate by themselves. Also he added that although the challenge was great due to the harsh conditions experienced by the health sector in Gaza, the will of the local staff to train and learn was stronger, and it achieved great success in CI, stressing that developing the capabilities of Gaza doctors will remain a primary goal for the Qatari medical delegation towards*

*upgrading it to its best performance. He continued that one of the main objectives of the Hospital is to develop all the services provided and the medical staff in terms of education and training to reach a high-quality service according to international standards. The next phase will witness matching the standards of Hamad Medical Corporation (HMC) in all specialties, he stressed*. (QNA, 2022)

That corresponding with our quantitative result, since having the CI at the program of Hamad hospital statistically significant related to QoL post CI, and that for several causes that clarify before, also the level of satisfaction show statistically significant in related to Hamad program of CI.

The CI program officer in the governmental sector added "*Current critical situation of Gaza strip and MOH with devastating fragmentation contribute to the deterioration of enabling work conditions, in limitation the ability to develop national governmental program for CI services*."

As we talk in previous quantitative part, the children families show that they have decrease in the satisfaction about financial part in satisfaction questioner, and they mainly related to that the health insurance not cover CI.

But in NGOs including mainly Hamad hospital the Head of speech rehabilitation commented "*Hamad hospital has devolved a global protocol for dealing with children that need CI, this protocol is supported from the M.O.H and depend of rehabilitation protocol that use in Qatar, and the surgery done by high professionalism and competitive experience surgeons, and the rehabilitation done by professionalism team of speech rehabilitation*".

And that corresponding with the satisfaction level of families about the CI program, as the result of patients satisfaction with CI services at Gaza strips, and according to the results included excellent improvement and the results were positive according to the families' answers, and the results were moving towards (strongly agree). About the questions of Patients Satisfaction with CI services at Gaza strips, both questions (Health care providers act too businesslike and impersonal toward me), (My health care provider treats me in a very friendly and courteous manner) have the highest mean scores with mean respectively, these are excellent results for satisfaction with health providers, especially those who work

in Hamad Hospital. They used to clear and explain everything to parents, Parents of children feel good when they see them treat their children with love, credibility, efficiency, and impersonally, in addition to that reaching to them was easy and at any time and they give The child sufficient time in all his sessions and visits to them, and they easily booked appointments for them, and the hospital was committed to those appointments, meaning that the satisfaction towards the health care providers in Hamad Hospital was very good, and had appropriate equipment, laboratories, reception room, and clinical examination rooms to provide a satisfactory service and best service quality to the children with CI ."

- **Current needs For CI services:**

To exploring the current needs were tested by three questions, the first one was "What do you think about the children's feelings and hopes with SNHL? (Their suffering, the number who are eligible for CI, and the criteria for surgery eligibility" the second question was "What is your opinion about the possible changes of CI services? (Teams, law, how to improve the impact of CI)" the third question" what are the solutions that you suggest to support CI services cost and needs? (Many children's parents suffer from maintenance costs and the lack of all requirements such as wires, batteries, and spare parts. And it is very expensive)

Providing CI services is crucial for Gaza Strip residents and children with HL who haven't discovered a treatment option like CI, according to both the managers of the government and NGO sectors. In addition, CI treatments are seen as medical rehabilitation programs focusing on reducing psychological and social strains and fostering better interactions between patients and their families, and communities in order to achieve a high degree of community integration.

Along with the previously mentioned criteria, additional comments included "*cost of this service compared to situations of living standards for CI patients and negative effects resulting from the absence of this service and its consequence like social isolation*."

And that clarify what we mentioned in the qualitative part, that the CI as whole have significant affect the QoL , including the all subdominants (Communication, General functioning, Self-reliance, Social relations, Education, Effects of implantation, Supporting the child). And an example for that the final question (S/he is become able to cope in new

situations) in general function part in quality quantitative part, have the lowest mean score with mean and that for several causes including the parents of children are afraid that the external device will be broken, or damaged as a result of their integration and coping with new situations for the first time, so they try to avoid such situations in order to preserve the external device from malfunctioning, because the word “internal device failure” is not an easy word for parents, as this costs them a lot financially. Morally and psychologically, for several reasons we mentioned earlier about the difficulty of repairing the problems related to the external device, and also because the child’s long stay without an external device affects him negatively from many aspects, and the efforts of the parents for many months may go to waste once the external device damaged , and they are forced to repeat many rehabilitation sessions with their children, for these reasons, parents are afraid and try not to put their children in new situations to protect them and the device as well , In addition, the child after CI needs time to complete his cognitive development compared to other children of his age.

Regarding to reasons for necessarily of implementations CI service, The CI program officer in the governmental sector commented "*The main reasons for implementation of CI service in Gaza strip are following :-numbers of the children who needs CI in Gaza strip were increased regarding to the screening programs that done by NGO and governmental health clinics, and this is for several risk factors, the other main reason is the continuing siege on Gaza Strip and the continuing closure of borders with Israeli, result in limitation in viability of continuous spare parts for Cochlear device, also the lack of fully financial support for Spare parts for Cochlear device, increase the load on family children.*

Also commented *"there is no clear protocol for children with CI to become easy integration into governmental education, the children with CI needs joint cooperation between all ministries, including the ministry of education and higher education, MOH, and other NGO, CI service not included in regulations of health insurance."*

Also added *"The children with CI need continuous psychological, educational, emotional support even after the end of rehabilitation programs* "

And these words corresponding to what we clarify in previous quantitative part mainly about, for example in communication subdominant, we conclude that communication need rehabilitation and good guidance and appropriate practice, and according to that it is seem

that the concern about the quality of speech still a main problem for most of the children families, since most of the participants answered that there is concerned about the quality of speech (NO Quality speech concern), and that related to several factors including that the children need frequent rehabilitation seasons, the development in speech clearly different from each child to another, the effort and follow up by child parents have an important role, the problem that may happened in electrical device and their effect, the limitation of education program that corresponding with the activation age of children, and other problems, and in other example that some children may show signs of frustration in their behavior for several reasons: as the child faces difficulties to integrate into society after CI, and becomes frustrated when making a great effort to explain what he wants from people, so he prefers to withdraw, and this makes him depressed and his psychological condition deteriorates. That was shown when we asked (S/he DONT shows signs of frustration in her behavior), this question have the lowest mean score with mean in the quality quantitative part of study.

NGOs sectors' managers agreed about the needed of governmental program that supported by the M.O.H, and added an extra comment " *CI patients are important sector of our community and need a special care from every one including: the family, the society, the M.O.H, and ministry of education, difficult financial situation in Gaza Strip and the high cost of having of customer CI service, negatively psychological impact on the children families and feeling of children with isolations in their society, and developmental growth in speech with children who need to repeat visits because of CI devices with Spare parts for Cochlear device*".

First, "What are the main obstacles or limitations to the provision of CI service in the organizations? (Cost, experts, new project)" was asked in relation to the limitations / weaknesses and opportunities for providing CI service. What are the current and future plans to provide CI services for patients? The second question received the most comments, with the majority referring to the public sector's "lack of comprehensive CI services in governmental sector, including the cooperation between the M.O.H. and ministry of education and higher education, and the lack of financial support for this sector, including that CI service should be included in regulations of health insurance, and no program for follow-up of these patients."

While NGOs medical center manager commented "*a high cost of CI device and high cost of spare parts for Cochlear device, result in limitation the ability to provide continuous services of some children who their device broken down, and lack of support from manufacturing company* ".

Others comments were " *The rising number of children with CI resulted in an increasing number of CI patients who were unable to afford CI device spare parts, a lack of government or non-governmental attention to CI patients, particularly those who underwent CI using an outdated approach, and challenges in gaining access to materials and equipment needed for the maintenance of Cochlear device spare parts due to the siege on Gaza Strip* ".

- **Futures plans for CI service**

And about the futures plans for CI service hospital manager and medical director manager commented *"Providing CI services in governmental hospital, cooperating services agreement with private medical sector or with NGOs organizations to provide customer CI service, and increase awareness or participation with charitable medical institutions to highlighting about the importance of providing comprehensive, sustainable CI service in Gaza Strip*."

Once the child implants the cochlea, he can hear well and also communicate well with people close to him and with the community, but the problem remains that the child cannot easily form relationships and friendships because despite the implantation, there are many factors that prevent him from doing it , including Cognitive development is not mature enough like other children, and also the parents' fear for him, he is exposed to bullying from other people, he is now not with the hearing disability community, and at the same time he is not a completely normal person, and this exposes him to difficulty in forming relationships and friendships because he differs from them in the way and speed of speech and manner of behavior, which exposes him to criticism and insults. This was shown when we asked (S/he make friends easily outside the family), this question have the lowest mean score of social relation at the quality quantitative part of study.

The CI program officer in the governmental sector commented ended the interview by these words" *Last but not least, the introduction of customer CI service through Hamad*

*Hospital is regarded as a national accomplishment in the Palestinian healthcare system. In order to provide CI patients with satisfactory and long-lasting healthcare, we hope to create operational frameworks through the* PMOH *and Hamad Hospital.*."

While the manager of an NGO medical center hopes to "increase attention and support to the CI patients' sector with a focus on alleviating the suffering of patients who are brought on by difficulties in community fusion, as well as we are seeking to attract financing funds and directing the supporting resources to sponsor this necessary service, that leads to an increase in the number of CI patients' beneficiaries."

### 4.4.2 Patients perceptions about CI service:

The questions that were asked to all CI children's families were about: the Effect of HL or fitting CI service on the children communication and social relation life, the effect of HL or fitting CI service on the children on well-being and happiness, and finally the effect of HL or fitting CI service on the children educational status. While in importance of CI service's questions were if the children have the ability for dispensing of cochlear device (or in future), or if they concerned feeling about getting CI or acceptable CI services, if the child had a verbal or actual comments aim to mocking from him as child with cochlear device, if getting CI give your child confidence in himself and in front of others, and finally do you think that should be improved in CI services.

**-The Effect of HL and fitting CI service on the children**

The majority of CI children families from both responses commented that before CI, we can communicate with our children only through Sign language, and that make us sad, our children was isolated from society and they expose from bullying by other children, they become depressed, they escape from people and hate to face the other children in society.

After the CI the majority of CI children families from both responses (mother and father), especially mother expressed that the CI provide the life for their children, one of the children mother commented "*my child born again by the CI surgery it is miracle", And another child mother commented " My life's ' aspiration was to become my child as a normal member in community, and this achieved by CI*".

Another woman commented while she crying "My *child has his CI at age of 5y, and he say to me that the best voice that i hear is your voice."*

Father of another child commented "I *give the best gift in the world to my child, my child become hearing me and hearing the surrounding world, thanks to Allah."*

Another father of child commented "*However the decision to CI to my girl was very hard for me with a lot of thinking, but it is the best decision in my life, she become normal like other children."*

And that correspond with the result of patients satisfaction with CI services at Gaza strips, and according to the results included, the Total mean was high meaning that there was an excellent improvement post CI, and the results were positive according to the families' answers, and the results were moving towards strongly agree, this confirms that the families have noticed the significant improvement of the Patients Satisfaction with CI services at Gaza strips.

Some parents was with different opinion and commented " *There is improvement but the problem remains that the child cannot easily form relationships and friendships because despite the implantation, there are many factors that prevent him from doing it , including cognitive development is not mature enough like other children, and also we fear for him, he is exposed to bullying from other people, he is now not with the* hearing disability *community, and at the same time he is not a completely normal person, and this exposes him to difficulty in forming relationships and friendships because he differs from them in the way and speed of speech and manner of behavior, which exposes him to criticism and insults*".

That clarify what we explained previously about social relational the quantitative part, however the hearing improve post CI and communicate become easy with people close to him and with the community, but the problem remains that the child cannot easily form relationships and friendships because despite the implantation, this was shown when we asked (S/he make friends easily outside the family), this question have the lowest social mean score.

Most of the families have a big problem with their children behavioral and well-being before CI and they commented "*our children were shy, avoid to contact with people, and*

*that mainly that they did not want the society to know that they are have hearing disability.*"

Another mother commented "Every *single day my child came crying from his Kindergarten, and finally i sent him to special organization for* hearing disability *with sign language."*

Another mother commented" *No one can believe my feeling when i see all my children speak with except one of them, can't speak and communicate with me by sign language, it make me sad*".

The families have noticed the improvement of their children in well-being and happiness, and this mainly due to development in cognitive-behavioral, and this are thanks to the CI surgery, the successful rehabilitation sessions.

One mother commented" *The improvement and development of everything related to the child from the auditory, cognitive, behavioral and verbal aspects, improve my child behavioral as whole.*"

However that another families have another opinion and commented "*My child show signs of frustration in their behavior for several reasons: as the child faces difficulties to integrate into society after CI, and becomes frustrated when making a great effort to explain what he wants from people, so he prefers to withdraw, and this makes him depressed and his psychological condition deteriorates*".

Some families added" *Our kids expressed that they frequently encountered hurtful remarks and derogatory behavior, particularly from children on the street or when they accompanied us or walked alone through markets.*"

And these comments established our results in quantitative part, that was shown when we asked (S/he DONT shows signs of frustration in her behavior), this question have the lowest mean score with mean in Well-being and happiness subdominants.

During we filling the questionnaires of our study it is observe that the families of children who underwent CI commented that the most important and critical problem for them was the education, before and even after CI.

**-Fitting CI service on the children**

One of the mother child commented "Before *CI i consider that my girl was dead, because of the community looks to* her as hearing disability *child, she will not complete her education, and she will not married*"

Another families added: "*The primary cause of our children's failure to complete their education or its negative effects on them while they were still enrolled in school was HL. Other factors for leaving school included their poor psychological well-being as a result of being teased in class or their inability to focus while studying due to their lower hearing sensitivity compared to others.".*

Another mother commented" *I want to forget that my child was communicate to me with sign language, he asked to explain everything for him by sign language, it was a matter that difficult to explain*"

One of children mother commented "*the most something I hated in my life was going my child to school, everyone was looking at him as strange one, and I heard bad comments that were mocking from him, so I decide he should leave school forever*"

According to qualitative results of children's Education after CI, and according to the results that included show improvement in QoL and the results were approximately positive by according to the families' answers. This confirms that the families have noticed some improvement of their children in education However, the percentage is considered low compared to the rest of the other subdomains, for reasons that we will explain later.

About the questions of quality of education , the seventh question (S/he is totally reliant on her implant at school) have the highest mean score, their great use and their total dependence on the external device at school indicates that the CI surgery was successful, and the child is in dire need of the device to be able to hear and communicate in order to understand what is being said and explained to him, as the child without the external device is like a hearing disability child, and therefore he relies heavily on implants to benefit from his going to school.

After CI, the families commented" *Our children totally dependence on the CI and external device at school indicates that the CI surgery was successful, and the child is in dire need*

*of the device to be able to hear and communicate in order to understand what they are learning in school*"

- **Fitting CI on the children status**

Another mother commented" *My son become like everyone in community, i want him to completed his education, go to the university and get a good job as well*"

But when looking at the quality of education in general for children who underwent CI, most of negative comments was in this section, due to many difficulties that faces the children.

And the families commented that "*Our children have a restriction ability to engage with governmental education because of immature cognitive development and function, and if they become member of governmental education they will faces several of difficulties later, so most of them will leave the education*."

Another mother commented" *even if our children enter a special organization of education, we are unable to give financial requirements for these organizations*"

One of the child father commented" *Why the school teacher didn't understand that the children who has an implant needs special guidance during their study and a special curriculum at the beginning of their school life ,also they need a pattern of specific questions and exams that are compatible with their abilities, which need a lot of time to developed*"

Another mother commented "*It is difficult to our children to integrate into public education, so our children need continuous psychological and educational support, and private education is financially costly"*

Another father commented "My *child daily sit alone in his room and continuously crying, because his friends comments and mockery on him, because he is slow in speech, even after CI"*

And that improve what we concluded from the quantitative part of our study since the education section results were moving towards neutral in comparison to other sections. The answers to the question are "I am not concerned about her/his future school placement" has

the lowest mean score with education subdominant. As it is natural for parents to be concerned about the academic future of their children because they know all the difficulties and problems they face.

**Regarding to importance of CI service, the parents comment as the following:**

All child families said that it is improbable that CI services will be abandoned, therefore they can't see their children growing up without cochlear devices.

The biggest fear among parents is the damage of the implanted cochlea, because they know its importance to their children and their total dependence on it in all aspects of life, and the biggest fear has become that it may malfunction one day, because they know its great role in improving the lives of their children and improving their cognitive, social and psychological abilities.

Also, many families were complaining about the continuous defects of the device's parts, for example the connecting wires, batteries, and hooks, in addition to the lack of spare parts for them in the Gaza Strip, and this requires them to wait for a long time, and this negatively affects their children from a psychological point, and also from a rehabilitation point. Also, as a child who has a malfunction in his external device may be forced to stay without an external device for a long time, which makes him lose many of the skills he acquired during the period in which he, was using the device.

So they try to avoid such situations in order to preserve the external device from malfunctioning, because the word "external device damage" is not an easy word for parents, as this costs them a lot financially.

So one of mother said "*Until we gave my child a new one, which was seen as a new gate for his life, he spent three months in his room and became an isolated person when his external device broke down.*"

Some of the impressive comments we heard from parents: one of them says, *"I am reading the Qur'an on the external device, and I pray to Allah that it does not break." The other says, "I feel like my heart is broken when the device is broken.*" "*I say, in the name of Allah, before I carry the device and before I hold it in my hand." "I have nightmares and see the device is broken,"* and many other sentences that hurt our hearts.

So they hope that, the MOH or charities organization will provide support in maintenance of cochlear device, or it become as part of the health insurance, or to get support from manufacturing companies.

Also one of most important thing that asked by families of children to be coordinate between the M.O.H and schools, in order to support their children education."

Finally, the CI was a quantum leap by all standards, and the children who underwent CI become more confidence about themselves and more confidence in front of others, and give them a gate of hope to continue their lives normally like others.

One of CI family's children summarizes the benefits of CI by this gold statement:

***"CI like a miracle, it opens a new gate of hope for their life and brings the smile back to their face after a long time of absence."***

***So "If there's a defect on the soul, it cannot be corrected on the face. But if there is a defect on the face & one heals it, it heals the soul…" (NareshShetty, 2012)***

# Chapter Five

## Conclusion and Recommendation

### 5.1 Conclusion

This is the first study in Palestine and the Gaza Strip that aims mainly to evaluate the effect of CI service among children in the Gaza Strip and takes place in Sheikh Hamad Bin Khalifa Al-Thani Hospital for Rehabilitation and Prosthetics in Gaza Strip.

Hearing impairment has multidimensional aspects of life; communication, general functioning, self-reliance, well-being, social relations, education, effects of implantation, and supporting the child, where these factors significantly improve a person's QoL , ability to work, and ability to participate in their families, communities, and society at large, such as with people who do not have disabilities.

#### 5.1.1 Quality of Life:

The study showed improvement in all subdominants of the QoL for CI patients; the total weighted mean of QoL for all CI patients was 77.77%, and Mean ratings were greater than three for all eight HRQoL subdomains on a 5-point Likert scale (mean = 3.89, range = 3.34–4.25), indicating that parents considered their child's HRQoL as either average or more positive than negative .

The most affected aspect of QoL post-CI is 'Social relations' which received the highest ratings, followed by General functioning', 'Effects of implantation' and 'Self-reliance'. 'Supporting the child' , 'Well-being', and 'Communication' also rated positive. The 'Education' received the least positive ratings. Education and communication were the least scores of Qol post-CI, both of these aspects are continuous processes in the life of children, and need effort at all levels from the family reach to the coordination between high-level ministries to the established national program for rehabilitation and support of children with CI to reach the normal fusion with society.

This study showed that there are significant differences in scores of QoL among CI participants in relation to several factors. In the socio-demographic section, several factors were tested, the age of the children, and the educational years of the child's father were the only ones correlated with the total QoL score, in the age of the children factor

significantly mainly related to another factor including the approach of surgery and rehabilitation time. In the income and health insurance profile, the family income only factor that correlated with the total QoL score and gives us a warning that the CI services lack governmental financial support, and affect by the financial conditions of the family, and need both governmental and private section support.

In the health profile information variables, several factors were tested, Duration of HL, and the activation age were the only ones correlated with the total QoL score, and that gives us important about the early screening programs for HL detection in governmental and NGO clinics, also the needed for the clear national program with clear criteria and clear schedules time for CI surgery.

In the educational information variables, several factors were tested, the age of the child at first grade, and educational institutions attended by the child were the only ones correlated with the total QoL score, which guide us to the importance of the early fusion of children with the education system and the importance of multi-sectorial support that can give to the child to keep them in a regular process of education.

In the health services profile variables, having a regular visit for rehabilitation before surgery, waiting for a short time on each visit, and being with the CI program under the supervision of Hamad Hospital are correlated with the total QoL score, and that reach us to the success of the coordination between the M.O.H and CI program of Hamad Hospital.

The pre and post-operation hearing assessment are important factors to make controlling the inclusion and exclusion criteria of the CI program, and also an important role to evaluate the efficacy of CI surgery and program.

In the clinical data surgery operation profile, the children who underwent the CI surgery with the new approach have a significant increase in all subdominant of Qol with fewer post-operation complications than the old approach, and that is mainly related to the skilled surgeons and new CI devices. However, the successful process of Re-implantation of CI related to skilled surgeons, the level the of Qol decrease in comparison to children who did not need Re-implantation, children who underwent Re-implantation were in a significant number and the process as a whole affects the QoL , which guides us to the important role of the type of device that should be selected for CI surgery, the needed for national

authority for communication with manufacturing companies, more studies should be done on this aspect.

The regular rehabilitation visits post-CI play an important role in the development of all subdominant of QoL for children and support the fusion of them in society, which leads us to the conclusion that rehabilitation should be in the coordination of multi-sectorial section.

### 5.1.2 Satisfaction with CI Service:

Patients' satisfactions with CI service were very good, this confirms that the families have noticed the significant improvement in their child post-CI, and make them satisfied with the services of CI at Gaza strips. Most of the dominants of satisfaction level show positive results, except for the financial part which shows the least satisfaction level, because the CI is not covered by health insurance and cochlear device need regular maintenance and Spare parts are expensive, and however Hamad Hospital is financially supported, but in some conditions, the damage to cochlear devices not completely cover, and this causes problems for families of children, as the economic conditions are difficult and deteriorating in the Gaza Strip.

This study showed that CI families' satisfaction increased in correlation to the site at which the child gets CI services with the highest level of satisfaction at Hamad Hospital, followed by the services given by Hamad in association with other organizations, and finally with the least satisfaction level to other organizations, however, our study takes place at Hamad hospital that may affect the opinions of families, but acutely Hamad hospital provides comprehensive services for CI, and consider as a good example for private sector support for the government health sector.

The children who underwent the CI surgery with the new approach had a highly significant increase in satisfaction level in comparison with the old approach, and that was mainly due to fewer complications and new CI devices that were used in the new approach.

The complications post-surgery profile shows the lowest level of satisfaction due to ear swelling, and severe combined complications, which are both related to the old approach that become not used in the process of CI surgery at the level of the Gaza Strip. However, the process of re-implantation is related to significantly decreasing the level of satisfaction in comparison who do not need re-implantation, the successful process of re-implantation

of CI which is related to skilled surgeons makes the process less harmful to families' children.

Regular visits for rehabilitation after the CI operation, and problems with the maintenance of the external device were statistically significantly correlated with the satisfaction level of children's families. The child who has no problems in the maintenance of the external device has higher satisfaction levels in children families in comparison to the group who have problems in the maintenance of the external device, and that guides us to the need to support this profile from the government health sector, private sector, and manufacturing companies.

### 5.1.3 Conclusion of qualitative finding:

The qualitative part of the study shows that providing CI service in Gaza Strip is a necessity for children with HL who meet the criteria for CI. The continuity of the Gaza siege and economic conditions prevents the development of the national government program for CI.

The study showed the presence of a CI program for CI service in the Gaza Strip through Hamad Hospital as a national achievement in the Palestinian health care system where that hospital is the first one in Gaza Stripe that provided comprehensive CI service.

The CI service is an important community need due to the continuous increase in the numbers of diagnosed congenital cases of HL by the national screening program and through screening programs in other NGO organizations, and due to acquired HL regarding infection, toxic drugs, trauma, war wounded from Israeli aggressions, and other causes.

In addition, the study showed that the Governmental sector lacks CI services, where lacking the necessary equipment and medical instruments, and rehabilitation services, while NGOs provide high-quality CI services and have well-trained stuff and needed equipment.

Furthermore, the study showed the load caused by the financial part of the cochlear device mainly the spare parts that are needed in a continuous pattern with the absence of governmental support in this aspect, many stories and comments were expressed through CI children's families where they had negatively affected their life.

## 5.2 Recommendations

The suggestions listed below are meant to help disabled people more generally and children who have undergone CI particularly integrate into their communities. Children with HL are disabled people and require ongoing support after CI.

### 5.2.1 Policy Work and Coordination:

Enhance coordination and aid in the operationalization of action plans by:

1. Develop national disability strategies that document a government commitment to a rights-based approach that outlines objectives, targets, and indicators for achievement.
2. Ensure that the needs of individuals with disabilities and CI children are adequately mainstreamed into all policies in order to enable fair access to education, , and healthcare. In addition, making sure that everyone has the same chance to live independently and be as happy as possible.
3. The PLC must exert more supervision over how the administration implements disability regulations and, if necessary, make the necessary legal changes. Such changes are expected to adhere to international standards and challenge those in charge of the inability to put this law into effect and enforce it.
4. MOH: establishing special health departments to provide full health care and devices needed to CI children. These departments must have the needed equipment and instrument for CI service.
5. Ministry of Education: Develop integration of the CI children with in general schools, by a clear strategy that includes the curriculum, assessment exam, ways of explanation, and qualified teachers for them, this should be in a rehabilitation program for children in coordination with M.O.H.

### 5.2.2 Health sector:

1. The M.O.H should be develop it is national program for CI, including well qualified skilled surgeons, assessment tools, equipment, and other resources.
2. Strengthen the screening program for hearing disability in the both the governmental and private sectors, to ensure early detection of cases, and development of rapid response, in order to schedule to CI.

3. Increase the number of rehabilitation therapies covered by health insurance, such as CI service for CI patients.
4. Establish efficient internal and external referral processes as well as cooperative initiatives between UNRWA, NGOs, and the MOH's medical and rehabilitation care providers.
5. Looking forward to offering CI services to customers inside MOH facilities.

### 5.2.3 Social and Communication Sector:

To motivate CI patients and individuals with disabilities to actively engage in their local communities with the aid of their families and neighbors.

1. Encourage societal recreation facility providers to encourage the involvement of CI patients in larger activities and programs.
2. Strengthen community groups' capacity to provide CI patients with specialized support and equip them with the abilities necessary to take part equitably.
3. Encourage CI patients to overcome their limitations and regain their roles in society by offering incentives.
4. Assist civil society and NGOs in the family and social rehabilitation process to increase public awareness and dispel stigmas associated with persons with disabilities.

### 5.2.4 NGOs and Private Sector:

1. Increasing awareness of the importance of offering and supplying CI services in the Gaza Strip by becoming associated with charitable medical groups.
2. Developing and implementing initiatives to educate the public about the most effective approaches to address the issues of CI patients.
3. The elimination of all types of prejudice against CI patients and persons with disabilities via the advancement of equality, will motivate both groups to adapt so they may achieve more independence and actively participate in all facets of life.
4. Planning conferences and seminars to increase knowledge of CI patients' rights as persons in need of help, as well as monitoring and supervising actions aimed at protecting such rights.

### 5.2.5 Cooperation between Otolaryngologist surgeon, Rehabilitation and speech technician, Audio rehabilitation technician, and CI patients:

1. Close collaboration of the Otolaryngologist surgeon and the Rehabilitation and speech technician, Audio rehabilitation technician is necessary to ensure the best long-term rehabilitation of the patients concerned.
2. Close collaboration to ensure the application criteria for inclusion and exclusion for children to enter the program CI.
3. Close collaboration to choose the best cochlear device, that achieves the best results, and with less malfunctioning.
4. To enhance regular meetings between all CI field workers field to exchange experiences and knowledge, discuss ideas and develop solutions.
5. Provides clear instruction for families' children to maintain the permanence of the device.
6. Regular check-ups for functioning in the cochlear device, and the development of children according to activation age, even after the child is discharged from the CI program.
7. Device maintenance and upgrading with the latest versions to coop with smart technology advances.
8. An ideal regime of maintenance and cleaning of the external device of the cochlear should be preferred by specialists in trust organizations.
9. Daily charging of batteries should be done to ensure the best quality of the external device

### 5.2.6 Recommendation for future research:

1. Health professionals and researchers should be doing more research on the CI efficacy in education and communication parts.
2. The Palestinian Ministry of Higher Education needs to work jointly with MOH to investigate the needs of patients post CI, mainly in the educational field.
3. The Re-implantation and the causes for that need more studies.
4. The national program for Palestinian CI program is necessary.
5. The relationship between the hearing assessment and post-CI outcome needs more study.

## References


Abu Hamad, B. (2011). Newborn (0-6 months) Hearing Screening Pilot Project in Southern and Northern Parts of the Gaza Strip. Gaza: World Bank.

Alnuhayer, O., Alshawi, Y., Julaidan, B. S., Alromaih, N. I., AlAkeel, N. S., & Alballaa, A. (2020). Quality of life and cochlear implant: results in Saudi children. Cureus. https://doi.org/10.7759/cureus.11968

Alzhrani, F., Babkour, A., Almuhawas, F., & Sanosi, A. A. (2019). Value of routine magnetic resonance imaging for the preoperative assessment of cochlear implant candidates. Cureus. https://doi.org/10.7759/cureus.6279

American Speech-Language-Hearing Association. (2022.). Degree of hearing loss. https://www.asha.org/public/hearing/degree-of-hearing-loss/

Anne, S., Schwartz, S., McCoy, J. L., Haberkamp, T. J., Hoffer, M. E., & David, H. M. S. L. (2021). Cochlear Implants in Neurologically Impaired Children: A Survey of Health-Related Quality of Life. Otolaryngology-Head and Neck Surgery, 165(5), 731–738. https://doi.org/10.1177/0194599821989642

Archbold S., Sach T., O'Neill C., Lutman M., Gregory S. (2008). Outcomes from cochlear implantation for child and family: parental perspectives. Deaf. Educ. Int. 10, 120–142. doi: 10.1179/146431508790559751

Archbold, S., Lutman, M. E., Gregory, S., O'Neill, C., & Nikolopoulos, T. P. (2002). Parents and their deaf child: their perceptions three years after cochlear implantation. Deafness & Education International, 4(1), 12–40. https://doi.org/10.1002/dei.114

Archbold, S., Sach, T., Ciaran, O., Neill, D. B., Lutman, M. E., & Gregory, S. (2006). Deciding to have a cochlear implant and subsequent after-care: parental perspectives. Deafness & Education International. https://doi.org/10.1002/dei.201

Asfour, L., Friedmann, D. R., Shapiro, W. H., Roland, J. T., & Waltzman, S. B. (2018). Early experience and health related quality of life outcomes following auditory brainstem implantation in children. International Journal of Pediatric Otorhinolaryngology, 113, 140–149. https://doi.org/10.1016/j.ijporl.2018.07.037

Benchetrit, L., Ronner, E. A., Anne, S., & Cohen, M. S. (2021). Cochlear implantation in children with Single-Sided Deafness. JAMA Otolaryngology-- Head & Neck Surgery, 147(1), 58. https://doi.org/10.1001/jamaoto.2020.3852.

Bhatia, K., Gibbin, K. P., Nikolopoulos, T. P., & O'Donoghue, G. M. (2004). Surgical complications and their management in a series of 300 consecutive pediatric cochlear implantations. Otology & Neurotology, 25(5), 730–739. https://doi.org/10.1097/00129492-200409000-00015

Bjornson, K., & McLaughlin, J. F. (2001). The measurement of health-related quality of life (HRQL) in children with cerebral palsy. European Journal of Neurology, 8(s5), 183–193. https://doi.org/10.1046/j.1468-1331.2001.00051.x

Breckell, P. (2015). Hearing Matters. London: Action on Hearing Loss.

Brewis B, le Roux T, Schlemmer K, Nauta L, Vinck B. Health-related quality of life in South African children who use cochlear implants. Int J Audiol. 2020;59:132–9.

Brown, C. J. (2003). Clinical uses of electrically evoked auditory nerve and brainstem responses. Current Opinion in Otolaryngology & Head and Neck Surgery, 11(5), 383–387. https://doi.org/10.1097/00020840-200310000-00013

Bruijnzeel, H., Wammes, E., Stokroos, R. J., Topsakal, V., & De Graaff, J. C. (2020). A retrospective cohort study of adverse event assessment during anesthesia-related procedures for cochlear implant candidacy assessment and cochlear implantation in infants and toddlers. Pediatric Anesthesia, 30(9), 1033–1040. https://doi.org/10.1111/pan.13944

Byckova J., Simonaviciene J., Mickeviciene V., Lesinskas E. (2018). Evaluation of quality of life after paediatric cochlear implantation. Acta Med. Litu. 25, 173–184. doi: 10.6001/actamedica.v25i3.3865, PMID:

Cejas, I., Coto, J., Sarangoulis, C., Sanchez, C., & Quittner, A. L. (2021). Quality of Life-CI: Development of an Early Childhood Parent-Proxy and Adolescent version. Ear And Hearing, 42(4), 1072–1083. https://doi.org/10.1097/aud.0000000000001004

Centers for Disease Control and Prevention. (2015, 10 23). Hearing Loss in Children. Retrieved from enters for Disease Control and Prevention: https://www.cdc.gov/ncbddd/hearingloss/facts.html retrived on 23.4.2018

Cohen, N. L., & Hoffman, R. A. (1991). Complications of cochlear implant surgery in adults and children. Annals of Otology, Rhinology, and Laryngology, 100(9), 708–711. https://doi.org/10.1177/000348949110000903

Côté, M., Ferron, P., Bergeron, F., & Bussières, R. (2007). Cochlear reimplantation: causes of failure, outcomes, and audiologic performance. Laryngoscope, 117(7),1225–1235. https://doi.org/10.1097/mlg.0b013e31805c9a06

Courbage, Y., Abu Hamad, B., & Zagha, A. (2016). Demographic Transition in Palestine and What it Means for Development. Ramallah: Prime Minister Office – State of Palestine, United Nations Population Fund, UNFPA.

Damen, G. W. J. A., Krabbe, P. F. M., Archbold, S., & Mylanus, E. a. M. (2007). Evaluation of the Parental Perspective instrument for pediatric cochlear implantation to arrive at a short version. International Journal of Pediatric Otorhinolaryngology, 71(3), 425–433. https://doi.org/10.1016/j.ijporl.2006.11.008

Dazert, S., Thomas, J. P., Loth, A., Zahnert, T., & Stöver, T. (2020). Cochlear implantation: diagnosis, indications, and auditory rehabilitation results. Deutsches Arzteblatt International. https://doi.org/10.3238/arztebl.2020.0690

De Almeida, R. P., Matas, C. G., Couto, M. I. V., & De Carvalho, A. C. M. (2015). Quality of life evaluation in children with cochlear implants. CoDAS, 27(1), 29–36. https://doi.org/10.1590/2317-1782/20152014129

Dia, A., Nogueira, J. F., O'Grady, K., & Redleaf, M. (2014). Report of endoscopic cochlear implantation. Otology & Neurotology, 35(10), 1755–1758. https://doi.org/10.1097/mao.0000000000000510

Donabedian A (1988)." The quality of care. How can it be assessed?" JAMA. 30, 260(12):1743-8. doi: 10.1001/jama.260.12.1743. PMID: 3045356.

Dutt, S., Ray, J., Hadjihannas, E., Cooper, H., Donaldson, I., & Proops, D. W. (2005). Medical and surgical complications of the second 100 adult cochlear implant patients in Birmingham. Journal of Laryngology and Otology, 119(10), 759–764. https://doi.org/10.1258/002221505774481291

Eliades, S. J., & Tsunada, J. (2019). Marmosets in auditory research. In The Common Marmoset in Captivity and Biomedical Research (pp. 451-475). Academic Press.

Erbasi, E., Scarinci, N., Hickson, L., & Ching, T. Y. C. (2016). Parental involvement in the care and intervention of children with hearing loss. International Journal of Audiology, 57(sup2), S15–S26. https://doi.org/10.1080/14992027.2016.1220679

European consensus statement on cochlear implant failures and explantations. (2005, November 1). PubMed. https://pubmed.ncbi.nlm.nih.gov/16272922/

Farinetti, A., Gharbia, D. B., Mancini, J., Roman, S., Nicollas, R., & Triglia, J. (2014). Cochlear implant complications in 403 patients: Comparative study of adults and children and review of the literature. European Annals of Otorhinolaryngology, Head and Neck Diseases, 131(3), 177–182. https://doi.org/10.1016/j.anorl.2013.05.005

Fortunato, S., Forli, F., Guglielmi, V., De Corso, E., Paludetti, G., Berrettini, S., & Fetoni, A. R. (2016). A review of new insights on the association between hearing loss and cognitive decline in ageing. Acta Otorhinolaryngologica Italica, 36(3), 155.

Fortunato-Tavares, T., Befi-Lopes, D. M., Bento, R. F., & De Andrade, C. R. F. (2012). Children with cochlear implants: communication skills and quality of Life. Brazilian Journal of Otorhinolaryngology, 78(1), 15–25. https://doi.org/10.1590/s1808-86942012000100003

Franz B K, Clark G M, Bloom D M. Surgical anatomy of the round window with special reference to cochlear implantation. J Laryngol Otol. 1987;101(02):97–102

Franz, B., Clark, G. M., & Bloom, D. M. (1987). Surgical anatomy of the round window with special reference to cochlear implantation. Journal of Laryngology and Otology, 101(2), 97–102. https://doi.org/10.1017/s0022215100101343

German Federal Ministry for Economic Cooperation. (2014). Country Report on The Solid Waste Management in Occupied Palestinian Territories. Bonn: Internationale Zusammenarbeit.

Ghaffari, F., Shourab, N., Jafarnejad, F., and Esmaily, H.,(2014), " Application of Donabedian Quality-of-care Framework to Assess the Outcomes of Preconception Care in Urban Health Centers, Mashhad, Iran in 2012", Journal of Midwifery and reproductive health, 2,1, 50-59 DOI 10.22038/JMRH.2013.1924

Girotto, G., Mezzavilla, M., Abdulhadi, K., Vuckovic, D., Vozzi, D., Alkowari, M. K., Gasparini, P., & Badii, R. (2014). Consanguinity and hereditary hearing loss in Qatar. Human Heredity. https://doi.org/10.1159/000360475

Global costs of unaddressed hearing loss and cost-effectiveness of interventions. (2017). A WHO Report. https://apps.who.int/iris/bitstream/handle/10665/254659/9789241512046-eng.pdf

Güneri, E. A., & Olgun, Y. (2018). Endoscope-Assisted cochlear implantation. Clinical and Experimental Otorhinolaryngology, 11(2), 89–95. https://doi.org/10.21053/ceo.2017.00927

Hamamoto M, Murakami G, Kataura A. Topographical relationships among the facial nerve, chorda tympani nerve and round window with special reference to the approach route for cochlear implant surgery. Clin Anat 2000; 13:251–256.

Hashemi, S. A., & Monshizadeh, L. (2012). A Comparison Between the Mothers of Cochlear Implanted Children and Mothers of Children with Hearing Aid in the Level of Depression, Anxiety and Stress. Biomedical and Pharmacology Journal, 5(2), 241–245. https://doi.org/10.13005/bpj/350

Hassuji, R. M. (2019). Parental Perspective Pre- and Post-Cochlear implantation in Tanzania. Scholarly Journal of Otolaryngology, 3(2). https://doi.org/10.32474/sjo.2019.03.000156

HH Sheikh Hamad Hospital in Gaza Launches Electronic Limbs Project - occupied Palestinian territory. (2022, April 4). ReliefWeb. https://reliefweb.int/report/occupied-palestinian-territory/hh-sheikh-hamad-hospital-gaza-launches-electronic-limbs

Huber M. (2005). Health-related quality of life of Austrian children and adolescents with cochlear implants. Int. J. Pediatr. Otorhinolaryngol. 69, 1089–1101. doi: 10.1016/j.ijporl.2005.02.018, PMID.

Huddle MG, Goman AM, Kernizan FC, Foley DM, Price C, Frick KD, et al. The economic impact of adult hearing loss. JAMA Otolaryngol Head Neck Surg. 2017. October 1;143(10):1040–8. 10.1001/jamaoto.2017.1243

Huong, T. M., Vung, N. D., & Nguyen, X. T. (2022). Quality of life and associated factors among children with cochlear implants in Vietnam: Results from parents' perception. Clinical Epidemiology and Global Health, 15, 101078. https://doi.org/10.1016/j.cegh.2022.101078

Huttunen K, Rimmanen S, Vikman S, Virokannas N, Sorri M, Archbold S, et al. Parents' views on the quality of life of their children 2–3 years after cochlear implantation. Int J Pediatr Otorhinolaryngol. 2009;73:1786–94.

Incesulu, A., Vural, M., & Erkam, Ü. (2003). Children with cochlear Implants: Parental perspective. Otology & Neurotology, 24(4), 605–611. https://doi.org/10.1097/00129492-200307000-00013

James, S. L., Abate, D., Abate, K. H., Abay, S. M., Abbafati, C., Abbasi, N., Abbastabar, H., Abd-Allah, F., Abdela, J., Abdelalim, A., Abdollahpour, I., Abdulkader, R. S., Zegeye, A., Abera, S. F., Abil, O. Z., Abraha, H. N., Abu-Raddad, L. J., Abu-Rmeileh, N. M. E., Accrombessi, M., . . . Murray, C. J. L. (2018). Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. The Lancet, 392(10159), 1789–1858. https://doi.org/10.1016/s0140-6736(18)32279-7

Jeon, E., Jun, B. C., Song, J., Kim, J., Lee, D. H., & Chang, K. (2013). Surgical and radiologic anatomy of a cochleostomy produced via posterior tympanotomy for cochlear implantation based on three-dimensional reconstructed temporal bone CT images. Surgical and Radiologic Anatomy, 35(6), 471–475. https://doi.org/10.1007/s00276-012-1061-5

Jones, N., Abu Hamad, B., Odeh,, K., Pereznieto, P., Abu Al Ghaib, O., Plank, G., et al. (2016). Every child counts:Understanding the needs and perspectives of children with disabilities in the State of Palestine. Jerusalem: UNICEF.

Keintzel, T., Raffelsberger, T., Niederwanger, L., Gundacker, G., & Rasse, T. (2023). Systematic literature review and early benefit of cochlear implantation in two pediatric auditory neuropathy cases. Journal of Personalized Medicine, 13(5), 848. https://doi.org/10.3390/jpm13050848

Kim CW, Oh SJ, Kim HS, Ha SH, Rho YS. Analysis of axial temporal bone computed tomography scans for performing a safe posterior tympanotomy. Eur Arch Otorhinolaryngol 2008; 265:887–891.

Kouwenberg M., Rieffe C., Theunissen S. C., de Rooij M. (2012). Peer victimization experienced by children and adolescents who are deaf or hard of hearing. PLoS One 7:e52174. doi: 10.1371/journal.pone.0052174, PMID

Kumar, R., Warner-Czyz, A. D., Silver, C. H., Loy, B., & Tobey, E. A. (2015). American Parent Perspectives on quality of life in Pediatric cochlear implant recipients. Ear And Hearing, 36(2), 269–278. https://doi.org/10.1097/aud.0000000000000108

Lavinsky, L., Lavinsky-Wolff, M., & Lavinsky, J. (2010). Transcanal cochleostomy in cochlear implantation: experience with 50 cases. PubMed, 11(4), 228–232. https://doi.org/10.1179/146701010x486453

Liang, C., Wenstrup, L., Samy, R. N., Xiang, J., & Zhang, F. (2020). The effect of side of implantation on the cortical processing of frequency changes in adult cochlear implant users. Frontiers in Neuroscience, 14. https://doi.org/10.3389/fnins.2020.00368

Lin, F. R., & Niparko, J. K. (2006). Measuring health-related quality of life after pediatric cochlear implantation: A systematic review. International Journal of Pediatric Otorhinolaryngology, 70(10),1695–1706. https://doi.org/10.1016/j.ijporl.2006.05.009

Loy, B., Warner-Czyz, A. D., Tong, L., Tobey, E. A., & Roland, P. S. (2010). The children speak: An examination of the quality of life of pediatric cochlear implant users. Otolaryngology-Head and Neck Surgery, 142(2), 247–253. https://doi.org/10.1016/j.otohns.2009.10.045

Manenti, A., Goyet, C., Reinicke, C., Macdonald, J., & Donald, J. (2016). Report of a Field Assessment of Health Conditions in the Occupied Palestinian territory. Jerusalem: WHO.

Manzoor F, Wei L, Hussain A, Asif M, Shah SIA. Patient Satisfaction with Health Care Services; An Application of Physician's Behavior as a Moderator. Int J Environ Res Public Health. 2019 Sep 9;16(18):3318. doi: 10.3390/ijerph16183318. PMID: 31505840; PMCID: PMC6765938.

Measurements of the facial recess anatomy: implications for sparing the facial nerve and chorda tympani during posterior tympanotomy. (2010, October 1). PubMed. https://pubmed.ncbi.nlm.nih.gov/20981662/

Mental Health and Substance Use. (2012). The World Health Organization Quality of Life (WHOQOL). www.who.int. https://www.who.int/publications/i/item/WHO-HIS-HSI-Rev.2012.03

Ministry of Foreign Affairs and Expatriates (2019). Fundamental issues. Retrieved from http://www.mofa.pna.ps/en-us/fundamentalissues/borders. {Electronically accessed on 15/4/2020}.

Ministry of Health -Gaza: The first fully Palestinian cochlear implant operation,2021, https://www.moh.gov.ps/portal/moh-gaza-the-first-fully-palestinian-cochlear-implant-operation/,Accessed 20 May 2021

Ministry of Health. (2015). People with Disabilities. Gaza: Palestinian Health information Center.

MOH, (2019)" Health status in Palestine, Ministry of health ". Annual Report 2019, Palestinian National Authority: Palestinian health information center.

Mohammed, A. A., & Sarwat, S. A. (2014). The side of cochlear implantation and speech intelligibility in pediatric and adult cochlear implantees. The Egyptian Journal of Otolaryngology. https://doi.org/10.4103/1012-5574.144977

Molla, M., Asha, N. J., & Kamrujjaman, M. (2019). Parents Perceived Quality of Life for Children with Cochlear Implants. International Journal of Otolaryngology and Head & Neck Surgery, 08(01), 13–24. https://doi.org/10.4236/ijohns.2019.81003

Mostafavi, F., Hazavehei, S. M. M., Oryadi-Zanjani, M. M., Rad, G. S., Rezaianzadeh, A., & Ravanyar, L. (2017). Phenomenological needs assessment of parents of children with cochlear implants. Electronic Physician, 9(9), 5339–5348. https://doi.org/10.19082/5339

Naim, A., Al Dalies, H., El Balawi, M., Salem, E., Al Meziny, K., Al Shawwa, R., et al. (2012). Birth Defects in Gaza: Prevalence, Types, Familiarity and Correlation with Environmental Factors. International Journal of Environmental Research and Public Health, 9(5): 1732–1747

Nassar, A. (2015). Potential of Solid Waste Composting in the Gaza Strip-Palestine. Journal of Agriculture and Ecology Research, 4(1):18-24.

Nicholas, J. G., & Geers, A. E. (2003). Personal, Social, and Family Adjustment in School-Aged Children with a Cochlear Implant. Ear And Hearing, 24(Supplement), 69S-81S. https://doi.org/10.1097/01.aud.0000051750.31186.7a

Niparko, J. K. (2010). Spoken language development in children following cochlear implantation. JAMA, 303(15), 1498. https://doi.org/10.1001/jama.2010.451

NISH - Speech Language Diagnostics. (2022). https://nish.ac.in/speech-language-sciences/speech-language-diagnostics

Nordvik, Ø., Heggdal, P. O. L., Brännström, J., Vassbotn, F., Aarstad, A. K. H., & Aarstad, H. J. (2018). Generic quality of life in persons with hearing loss: a systematic literature review. BMC Ear, Nose and Throat Disorders, 18(1). https://doi.org/10.1186/s12901-018-0051-6

Noroozi, M., Nikakhlagh, S., Angali, K. A., Bagheripour, H., & Saki, N. (2020). Relationship between age at cochlear implantation and auditory speech perception development skills in children. Clinical Epidemiology and Global Health, 8(4), 1356–1359. https://doi.org/10.1016/j.cegh.2020.05.011

Nunes, T., Pretzlik, U., & Ilicak, S. (2005). Validation of a parent outcome questionnaire from pediatric cochlear implantation. Journal of Deaf Studies and Deaf Education, 10(4), 330–356. https://doi.org/10.1093/deafed/eni027

O'Neill C , Lutman ME , Archbold SM et al. Parents and their cochlear implanted child: questionnaire development to assess parental views and experiences . Int J Pediatr Otorhinolaryngol 2004 ; 68.

OCHA. (2018a). Humanitarian Bulletin: Occupied Palestinian territory. Gaza strip, United Nations Office for the Coordination of Humanitarian Affairs.

OCHA. (2018b). Humanitarian Needs Overview 2019. Retrieved March 16, 2019 from https://www.ochaopt.org/content/humanitarian-needs-overview-2019

Olusanya BO, Davis AC, Hoffman HJ. Hearing loss: rising prevalence and impact. Bull World Health Organ. 2019 Oct 1;97(10):646-646A. doi: 10.2471/BLT.19.224683. Erratum in: Bull World Health Organ. 2020 Feb 1;98(2):148. PMID: 31656325; PMCID: PMC6796666.

Olusanya, B., Neumann, K., & Saunders, J. (2014, May 5). The Global Burden of Disabling Hearing Impairment: A Call to Action. Bulletin of the World Health Organization, pp. 309-384.

Omidvar, S., Jeddi, Z., Doosti, A., & Hashemi, S. A. (2020). Cochlear implant outcomes in children with attention-deficit/hyperactivity disorder: Comparison with controls. International Journal of Pediatric Otorhinolaryngology, 130, 109782. https://doi.org/10.1016/j.ijporl.2019.109782

Palestinian Central Bureau of Statistics (PCBS)(2022). on the 74th Annual Commemoration of the Palestinian Nakba https://www.pcbs.gov.ps/post.aspx?lang=en&ItemID=4236 accessed 20 July 2022

Palestinian Central Bureau of Statistics Report. (2019b). Annual statistics, Rammalah, Palestine.

Palestinian Central Bureau of Statistics. (2013). Disabled Individual Census, Gaza Strip, 2012 Main Findings Report. Ramallah: PCBS.

Papsin, B. C., & Gordon, K. A. (2007a). Cochlear Implants for Children with Severe-to-Profound Hearing Loss. The New England Journal of Medicine, 357(23), 2380–2387. https://doi.org/10.1056/nejmct0706268

Papsin, B. C., & Gordon, K. A. (2007b). Cochlear Implants for Children with Severe-to-Profound Hearing Loss. The New England Journal of Medicine, 357(23), 2380–2387. https://doi.org/10.1056/nejmct0706268

PBCS, (2018a). The Labour Force Survey Results first quarter (January– March, 2018) Round. Ramallah, Palestine.

PBCS, (2018b). Preliminary Results of the Population, Housing and Establishments Census, 2017. Ramallah: PCBS.

PBCS, (2019). The Labour Force Survey Results first quarter (January, 2020) Round. Ramallah, Palestine.

PCBS, (2021), Palestinian Central Bureau of Statistics (PCBS), The Labour Force Survey Results 2020, https://www.pcbs.gov.ps/post.aspx?lang=en&ItemID=3924. The Impact of the Coronavirus Pandemic on the Labour Market, 2020, retrivied on (15th March 2023)

Peixoto, M. C., Spratley, J., Oliveira, G., Martins, J. H., Bastos, J. R. M., & Ribeiro, C. (2013). Effectiveness of cochlear implants in children: Long term results. International Journal of Pediatric Otorhinolaryngology, 77(4), 462–468. https://doi.org/10.1016/j.ijporl.2012.12.005

Peker, S. V. S., Korkmaz, F. D. R., & Çukurova, İ. (2020). Quality of life and parental care burden in cochlear implanted children: A case–control study. International Journal of Pediatric Otorhinolaryngology, 136, 110164. https://doi.org/10.1016/j.ijporl.2020.110164

Phelan, C., & Wren, J. (2006). Exploring reliability in academic assessment. UNI Office of Academic Assessment.

Postelmans, J. T. F., Cleffken, B., & Stokroos, R. J. (2006). Post-operative complications of cochlear implantation in adults and children: five years' experience in Maastricht. Journal of Laryngology and Otology, 121(4), 318–323. https://doi.org/10.1017/s0022215106003471

Ramos-Macías, Á., González, J. C. F., Borkoski-Barreiro, S. A., De Miguel, Á. R., Batista, D. S., & Plasencia, D. P. (2016). Health-related quality of life in adult cochlear implant users: a descriptive observational study. Audiology and Neurotology, 21(Suppl. 1), 36-42.

Rodriguez, M. a. B. (2022). Common Speech Language Pathology Assessment Tools. CORP-MSL0 (SPMP). https://speechpathologymastersprograms.com/resources/slp-assessment-tools/

Safi, A. (2015). 2014 War on Gaza Strip: Participatory Environmental Impact Assessment. Gaza: Palestinian Environmental NGOs Network – For Palestine.

Samuel, V., Gamble, C., Cullington, H., Bathgate, F., Bennett, E., Coop, N., Cropper, J., Emond, A., Kentish, R., & Edwards, L. (2016). Brief Assessment of Parental Perception (BAPP): Development and validation of a new measure for assessing paediatric outcomes after bilateral cochlear implantation. International Journal of Audiology, 55(11), 699–705. https://doi.org/10.1080/14992027.2016.1204669

Sarant, J. Z., Harris, D., Galvin, K. L., Bennet, L. A., Canagasabey, M., & Busby, P. A. (2018). Social development in children with early cochlear implants: normative comparisons and predictive factors, including bilateral implantation. Ear And Hearing, 39(4), 770–782. https://doi.org/10.1097/aud.0000000000000533

Sennaroglu, L., & Aydin, E. (2002). Anteroposterior Approach with Split Ear Canal for Cochlear Implantation in Severe Malformations. Otology & Neurotology, 23(1), 39–43. https://doi.org/10.1097/00129492-200201000-00010

Shahmahmood, T. M., Ebadi, A., Rahmani, S., Aghaei, F., Haresabadi, F., Rajati, M., & Niknezhad, H. T. (2020). Translation and validation of parental perspective questionnaire for children with cochlear implant in persian language. International Journal of Audiology, 59(8), 598–605. https://doi.org/10.1080/14992027.2020.1721576

Shield B. Hearing loss numbers and costs. Evaluation of the social and economic costs of hearing impairment. London: Brunel University; 2019. [cited 2022 Aug 2]. Available from: Available from https://www.hear-it.org/sites/default/files/BS%20-%20report%20files/HearitReportHearingLossNumbersandCosts.pdf. (n.d.).

Shojaei, E., Jafari, Z., & Gholami, M. (2016). Effect of early intervention on language development in hearing-impaired children . Iranian Journal of Otorhinolaryngology, 28(84):13–21.

Silva J. M., Yamada M. O., Guedes E. G., Moret A. L. M. (2020). Factors influencing the quality of life of children with cochlear implants. Braz. J. Otorhinolaryngol. 86, 411–418. doi: 10.1016/j.bjorl.2019.01.004, PMID:

Soleimanifar, S. (2015, November 1). Validity and Reliability of "Parental Attitudes of Various Aspects of Cochlear Implantation" questionnaire. PubMed Central (PMC). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4709745/

Sparreboom, M., Snik, A., & Mylanus, E. a. M. (2012). Sequential Bilateral Cochlear Implantation in Children<subtitle>Quality of Life</subtitle> Archives of Otolaryngology-head & Neck Surgery, 138(2), 134. https://doi.org/10.1001/archoto.2011.229

Stefanini, M. R., Morettin, M., Zabeu, J. S., Bevilacqua, M. C., & Moret, A. L. M. (2014). Parental perspectives of children using cochlear implant. CoDAS, 26(6), 487–493. https://doi.org/10.1590/2317-1782/20142014125

Summary of diagnostics among infants not passing hearing screening. (2021, June 16). Centers for Disease Control and Prevention. https://www.cdc.gov/ncbddd/hearingloss/2019-data/06-diagnostics.htm

Teoli, D. (2023, March 27). Quality Of Life. StatPearls - NCBI Bookshelf. https://www.ncbi.nlm.nih.gov/books/NBK536962/#:~:text=Definition%2FIntroduction,a%20specific%20point%20in%20time

The Lancet. Hearing loss: time for sound action. Lancet 2017; 390: 2414

Theunissen S. C., Rieffe C., Netten A. P., Briaire J. J., Soede W., Schoones J. W., et al.. (2014). Psychopathology and its risk and protective factors in hearing-impaired children and adolescents: a systematic review. JAMA Pediatr. 168, 170–177. Doi:10.1177/0014402918754880

Theunissen, S. C. P. M., Rieffe, C., Soede, W., Briaire, J. J., Ketelaar, L., Kouwenberg, M., & Frijns, J. H. M. (2015). Symptoms of Psychopathology in Hearing-Impaired Children. Ear And Hearing, 36(4), e190–e198. https://doi.org/10.1097/aud.0000000000000147

Tokat, T., Catli, T., Bozkurt, E. B., Atsal, G., Muderris, T., & Olgun, L. (2019). Parents' View on Quality of Life after Cochlear Implantation in Children with Auditory Neuropathy. Journal of International Advanced Otology, 15(3), 338–344. https://doi.org/10.5152/iao.2019.6103

Torre, N., & Montoya, R. (2022). Early activation of a late sequential cochlear implant systematic review. Journal of Otolaryngology-ENT Research, 14(3), 90–95. https://doi.org/10.15406/joentr.2022.14.00513

Vincenti, V., Bacciu, A., Guida, M., Marra, F., Bertoldi, B., Bacciu, S., & Pasanisi, E. (2014). Pediatric cochlear implantation: an update. Italian Journal of Pediatrics, 40(1). https://doi.org/10.1186/s13052-014-0072-8

Warner-Czyz A. D., Loy B., Pourchot H., White T., Cokely E. (2018). Effect of hearing loss on peer victimization in school-age children. Except. Child. 84, 280–297. doi: 10.1177/0014402918754880

Warner-Czyz, A. D., Loy, B., Tobey, E. A., Nakonezny, P. A., & Roland, P. S. (2011). Health-related quality of life in children and adolescents who use cochlear implants. International Journal of Pediatric Otorhinolaryngology, 75(1), 95–105. https://doi.org/10.1016/j.ijporl.2010.10.018

Wilson, B. S., Tucci, D. L., Merson, M. H., & O'Donoghue, G. M. (2017). Global hearing health care: new findings and perspectives. The Lancet, 390(10111), 2503–2515. https://doi.org/10.1016/s0140-6736(17)31073-5

World Health Organization. (2012). WHO Global Estimates on Prevalence of Hearing Loss. Geneva: WHO.

World Health Organization. (2016, September). Congenital Anomalies. Retrieved from WHO: http://www.who.int/mediacentre/factsheets/fs370/en/ on 3 march 2022

World Health Organization. (2017). Deafness and Hearing Loss Fact sheet. Retrieved from World Heath Organization: http://www.who.int/mediacentre/factsheets/fs300/en/ on 2 April 2022

World Health Organization. (2018). Addressing the rising prevalence of hearing loss. https://apps.who.int/iris/handle/10665/260336 [cited 2022 Apr 2].

Yang, Y., Gao, J., Du, H., Geng, L., Li, A., Zhao, N., Xu, Y., Liu, X., Qian, X., & Gao, X. (2022). Influence of cochlear implants on hearing-related quality of life: results from Chinese children with cochlear implants entering mainstream education. International Journal of Pediatric Otorhinolaryngology, 160, 111228. https://doi.org/10.1016/j.ijporl.2022.111228

Yorgun, M., Sürmelioğlu, Ö., Tuncer, Ü., Tarkan, Ö., Özdemir, S., Çekiç, E., Çetik, F., & Kıroğlu, M. (2016). Quality of life in pediatric cochlear implantations. Journal of International Advanced Otology, 11(3), 218–221. https://doi.org/10.5152/iao.2015.730

Zach. (2020). Tukey vs. Bonferroni vs. Scheffe: Which Test Should You Use? Statology. https://www.statology.org/tukey-vs-bonferroni-vs-scheffe/

Zaidman-Zait A., Most T. (2005). Cochlear implants in children with hearing loss: maternal expectations and impact on the family. Volta Rev. 105, 129–150.

Zakzouk, S. M., El-Sayed, Y. M., & Bafaqeeh, S. A. (1993). Consanguinity and hereditary hearing impairment among Saudi population. Annals of Saudi Medicine, 13(5), 447–450. https://doi.org/10.5144/0256-4947.1993.447

Zaqqout, R. F., & Hamad, B. A. (2022). Risk factors for hearing impairment in infants and toddlers in the Gaza governorates: a case-control study. The Lancet, 399, S41. https://doi.org/10.1016/s0140-6736(22)01176-x

Zeh, R., & Baumann, U. (2015). Stationäre Rehabilitationsmaßnahmen bei erwachsenen CI-Trägern. Hno, 63(8), 557–576. https://doi.org/10.1007/s00106-015-0037-2

Zhang J., Wei W., Ruimin L., Chen C., Guilan S., Yue W., et al.. (2022). Assessment of postoperative quality of life in children with cochlear implants. J. Clin. Otolaryngol. Head Neck Surg. 32, 1348–1351. doi: 10.13201/j.issn.2096-7993.2020.11.010

Zhao Y, Li Y, Zheng Z, Li J, Nie X, Jin X, et al. Health-related quality of life in mandarin-speaking children with cochlear implants. Ear Hear. 2019;40:605–14.

Zhumabayev, R., Zhumabayeva, G., Kapanova, G., Tulepbekova, N., Akhmetzhan, A., & Grjibovski, A. M. (2022). Quality of life in children with cochlear implants in Kazakhstan. BMC Pediatrics, 22(1). https://doi.org/10.1186/s12887-022-03254-w

# Annexes

## Annex (1): Palestine map

**Annex (2): Population in Palestine by governorate and sex – 2017**

**Annex (3): Helsinki Committee Approval**

المجلس الفلسطيني للبحث الصحي

Palestinian Health Research Council

تطوير 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:** 04/04/2022 **Number:** PHRC/HC/1097/22

**Name:** Mohammed Issam Alaraj 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 Cochlear Implantation program among Children in the Gaza Strip**

The committee has decided to approve the above mentioned research. Approval number PHRC/HC/1097/22 in its meeting on 04/04/2022 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

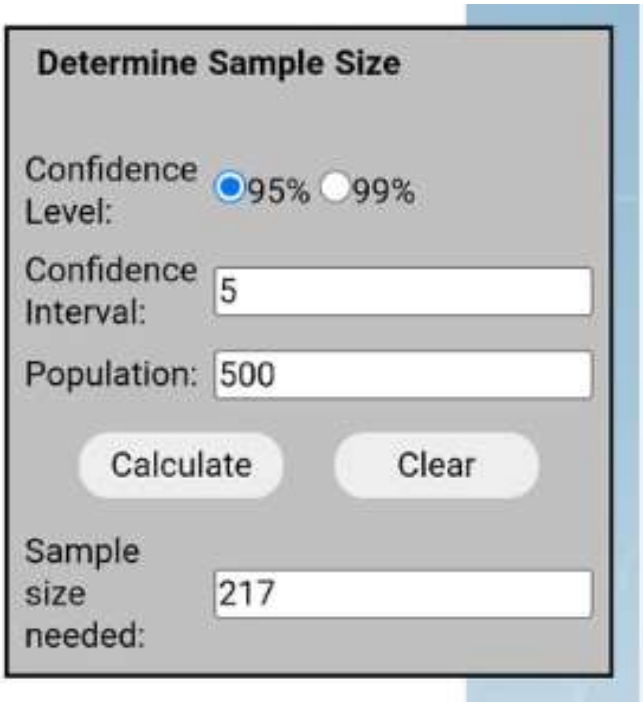
**Annex (4): List of experts who validated the questionnaire**

1. Professor Dr. Yehia Abed — Al-Quds University
2. Dr. Khitam Abu Hamad — Al-Quds University
3. Dr. Mohammed Murad — Al-Shifa Hospital
4. Dr. Issa Muslam — Al-Shifa Hospital
5. Dr. Jaber Abu Amra — Al-Shifa Hospital
6. Dr. Sally Mohammed Salha — Al-Azhar University
7. Dr. Ahmed Al Yazji — Hamad Hospital
8. Mohammed Akela — Hamad Hospital

## Annex (5): Timeline table

| Activity | Feb | March | April | May | June | July | Aug | Sep | Oct | Nov | Dec | Jan | Feb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Proposal writing | | | | | | | | | | | | | |
| Proposal Discussion and approval | | | | | | | | | | | | | |
| Development of instruments | | | | | | | | | | | | | |
| Experts check for validity of instruments | | | | | | | | | | | | | |
| Update instruments | | | | | | | | | | | | | |
| Data collection | | | | | | | | | | | | | |
| Data entry | | | | | | | | | | | | | |
| Data Analysis | | | | | | | | | | | | | |
| Writing report | | | | | | | | | | | | | |

**Annex (6): Calculation of sample size**



**Annex (7): Description of key managers' managerial positions:**

| Manager | Managerial position |
|---|---|
| Dr. Mohammed Murad | The CI program officer in the governmental sector at AL-Shifa Medical Complex |
| Dr. Issa Muslam | The Head Of the Otolaryngologist department at Al- Quds Hospital |
| Noureddine Salah | Hospital Medical Director at Hamad Hospital |
| Dr. Mohammed Akela | The Head of Audiological department at Hamad Hospital |
| Dr. Jaber Abu Amra | The Head of Audiological department at at AL-Shifa Medical Complex |
| DR.Hiathem ALEjla | Deputy Director CI program officer at Al-Quds hospital |

**Annex (8): Questionnaire**

**Questionnaire for evaluation of Cochlear Implantation Program among Children in the Gaza Strip - 2022**

**Dear brother/dear sister:**

Peace, mercy, and blessings of God

This research is a graduation requirement for obtaining a master's degree in epidemiology from the College of Public Health - Al-Quds University.

The research study entitled "Evaluation of Cochlear Implantation Program among Children in the Gaza Strip" aims to evaluate the cochlear implant service in the Gaza Strip to know the impact of cochlear implantation on the quality of the patient's lives and the extent of its benefit and meeting the needs of hearing disability children in the Gaza Strip, which gives the researcher an opportunity to know the strengths and weaknesses of the cochlear implant service to make the necessary recommendations for its development and improvement of its quality, which will benefit the children who have undergone for the cochlear implant procedure. The information provided will be used for scientific research purposes only.
Therefore, please kindly answer all the questions in the questionnaire to come up with results and recommendations that contribute to improving the quality of service.
We thank you for your consent to participate in this research, as your honorable person was chosen after you met all the criteria for selecting the sample for this research.

**Important Notes:**

- Your participation in filling out this questionnaire is of great importance, and the information will be strictly confidential for all personal data contained in the questionnaire.
- Filling out this questionnaire is optional and not obligatory, so if you feel uncomfortable, you can withdraw without embarrassment.
- It takes approximately 20 minutes to fill out the questionnaire.

Thank you for your cooperation
**Researcher/ Muhammad Issam Muhammad Al-Araj**

**Quantitative part**
**(* pointed to reverse question)**

| |
|---|
| A- Data collected from the patient's file: |
| 1-Name: |
| 2-Telephone or mobile: |
| 3 .Patient ID: |
| 4-Pre-operative Hearing loss:(dB HL)<br>Operated ear: □mild □moderate □severe □profound<br>Non-operated ear: □mild □moderate □severe □profound |
| 5- Pre-operative Hearing Assessment:(dB HL)<br>Operated ear: □mild □moderate □severe □profound<br>Non-operated ear: □mild □moderate □severe □profound |
| 6- Postoperative Hearing Assessment:(dB HL)<br>Operated ear: □mild □moderate □severe □profound<br>Non-operated ear: □mild □moderate □severe □profound |
| A-Demographic data ( socioeconomic): |
| 1. Serial number: |
| 2. Age of child: |
| 3.Gender of child: □ Boy □ Girl |
| 4-Locality(Residential) Type: □ camp □city □village |
| 5-Respondent: □ Mother □Father □Both □others specify |
| 6- Residency: □ North □ Gaza □ Middle Area □ Khanyounis □ Rafah |
| 7- Refugee status: □Refugee □non-refugee |
| 8-Type of health issuance:<br>□governmental health insurance □private health insurance □both<br>□other type of health insurance □does not have health insurance |
| 9- The number of educational years of the child's Mother:…….. |
| 10- The number of educational years of the child's Father:……. |
| 11- Are there a history consanguinity between the parents of child?<br>□Yes □NO |
| 12-Family income:<br>□less 1000 Shekel<br>□1000-2500Shekel □More than 2500 Shekel |
| 13-Health insurance covers the Cochlear implant services:<br>□Yes □NO |
| B-variables regarding Cochlear implant surgery(clinical Data) |
| 1-Etiology of Hearing disability:<br>□Unknown reasons<br>□Congenital |

| |
|---|
| □Acquired:<br>□Medication use during pregnancy □ trauma<br>□ICU admission>5days □ Jaundice with blood exchange<br>□Infection during mother pregnancy □Infection during child age(Meningitis) |
| 2-At which age did you detect that your child has hearing loss (years) …….. |
| 3- Age at assessment(diagnosis) (months): |
| 4-Duration of hearing Loss (years) ……. |
| 5-Age of a child at cochlear implantation surgery(years)……. |
| 6-The approach that used in cochlear implantation surgery:<br>□Old approach(classic facial recess approach)(2009y-2011y)<br>□New approach(Endoscopic permeatal approach)(2017y-2022y) |
| 7- Did the child attend a hearing disability school before cochlear implantation:<br>□Yes □NO |
| 8- Did the child enter the first grade, how old was he/she (years):…… |
| 9-Special educational institutions attended by the child::<br>□Kindergarten □Speech therapy center<br>□Did not attend any educational institution or school |
| 10-The site at which the child gets his/her cochlear implant services::<br>□Al-Quds hospital □Hamad hospital □My right to hear MOH □other |
| 11-Does your child has regular visits for cochlear implantation services before the surgery?<br>□Yes □NO<br>If no, then why? |
| 12-what is the site of cochlear Implantation:<br>□Unilateral (Right, Left) □Bilateral(old, new) |
| 13-The duration of admission post cochlear implantation :( days) …….. |
| 14-Complication related to surgery:<br>□Loss of taste to the front two-thirds of the tongue. □Ear infection<br>□Electrode migration/misplacement/accidental removal □ear pain<br>□Permanent vertigo/dizziness □Persistent pain/discomfort<br>□wound Infection □ear swelling<br>□Facial nerve palsy □Recurrent ear discharge<br>□Eardrum perforation □others<br>□nothing |
| 15-Better-ear pure-tone average (dB HL)<br>□Yes □No □I don't know |
| 16-Does your child use the external device after cochlear implantation:<br>□always □usually □often □sometimes □Never<br>the reasons: |
| 17-Are there regular visits for rehabilitation after the operation:<br>□Yes(always-sometimes) □No |

| | | | | | |
|---|---|---|---|---|---|
| 18- How long should you wait in each rehabilitation visit after cochlear implantation to receive health care?<br>…… minutes | | | | | |
| 19-Do you face several problems with the continuous maintenance of the external device of the cochlear implant:<br>□Yes □No<br>the reasons: | | | | | |
| C- Quality of life in children with cochlear implants<br>In this part of the questionnaire, we will ask a set of questions that will determine the extent of improvement in the quality of life of the child who has undergone cochlear implants, including the aspect of communication, general performance, self-reliance, well-being, social relations, education and other factors. | | | | | |
| 1-Communication | | | | | |
| Communication is difficult with known people * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| The quality of her/his speech gives me cause for concern * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| We can now chat even when s/he cannot see my face | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| I find it easier to communicate with her/him by speaking | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| Her/his use of spoken language has developed greatly | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| Now s/he is talkative and engages others in conversation | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| 2-General functioning | | | | | |
| Before implantation s/he obtained no benefit at all from her hearing aids | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he is totally reliant on implant all the time | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he knows when I want her because she can hear me Call | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he can now amuse herself listening to music or watching TV or playing games | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| I can now let her/him play outside as she is aware of the sound of traffic | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he is still unable to cope in new situations * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| 3-Self-reliance | | | | | |
| I can seldom leave her/him to do something on own * | □Strongly agree | □Agree | □Neither agree nor | □Disagree | □Strongly disagree |

| | | | | | |
|---|---|---|---|---|---|
| | | | disagree | | |
| change has been detected in her/his confidence | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he was very dependent on us before the implantation | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he is as independent as most other children of her age | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| 4-Well-being | | | | | |
| S/he shows signs of frustration in her behavior * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| Her/his behavior has improved since she had her implant | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he has become argumentative since getting her implant | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he is less frustrated than before she had the implant | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he continues to be a happy child and good fun to be with. | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| 5-Social relations | | | | | |
| S/he does not have a close relationship with her grandparents * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he was socially isolated before getting her implant * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he does not make friends easily outside the family * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he is sociable within the family | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he shares in family situations more than before implantation | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he takes part in family relationships on an equal footing with other members | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| Her/his relationship with brothers and sisters has improved | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| 6-Education | | | | | |
| S/he is unable to cope with mainstream schooling * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he is keeping up well with children of her own age at | □Strongly agree | □Agree | □Neither agree nor | □Disagree | □Strongly disagree |

| | | | | | |
|---|---|---|---|---|---|
| school | | | disagree | | |
| The local school and support services adequately meet all our needs concerning the use of her/his implant at school | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| I am concerned about her/his future school placement * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| Parents should have a choice in the use of sign language at school * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| I am happy about her/his progress at school | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he is totally reliant on her implant at school | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| 7-Effects of implantation | | | | | |
| Immediately after implantation her/his ability to communicate was poorer * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| I worry that the implant will break down | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| Progress during the first few months seemed very slow * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| I worry that s/he will blame me for my decision for her to have an implant * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| I am concerned that my child with hearing disability will be rejected by the hearing disability community because of the implant * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| Progress after implantation has exceeded my expectations | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| Other children in the family resented the time and attention taken up by the implant * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| 8-Supporting the child | | | | | |
| The help I gave her/him has become more productive now s/he has her/his implant | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| S/he has needed more help from me since she received her/his implant* | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| A lot of help at first means a child needs less help later | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| I get more time to myself | □Strongly | □Agree | □Neither | □Disagree | □Strongly |

| | | | | | |
|---|---|---|---|---|---|
| because of her/his increased independence | agree | | agree nor disagree | | disagree |
| A parent of a child with an implant needs to be patient as benefits may take time to show | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| I give the same amount of help as before her implant * | □Strongly agree | □Agree | □Neither agree nor disagree | □Disagree | □Strongly disagree |
| D-Patients satisfaction with cochlear implantation services at Gaza strips | | | | | |
| 1. Cochlear implant health care providers are good about explaining the reason for medical tests | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 2. I think my health care provider's office has everything needed to provide complete medical care. | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 3. The health care I have been receiving is just about perfect. | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 4. Sometimes health care providers make me wonder if their diagnosis is correct. * | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 5. I feel confident that I can get the health care I need without being set back financially | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 6. When I go for Cochlear implant health care, the provider is careful to check everything when treating and examining me. | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 7. I have to pay for more of my health care than I can afford * | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 8. I have easy access to the Cochlear implant medical specialists I need. | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 9. Where I get Cochlear implant health care, people have to wait too long for emergency treatment. * | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 10. Health care providers act too businesslike and impersonal toward me. | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 11. My health care provider treats me in a very friendly and courteous manner. | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 12. Those who provide my health care sometimes hurry too much when they treat me. * | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |

| | | | | | |
|---|---|---|---|---|---|
| 13. Health care providers sometimes ignore what I tell them. * | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 14. I have some doubts about the ability of the Cochlear implant health care providers who treat me. * | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 15. Health care providers usually spend plenty of time with me. | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 16. I find it hard to get an appointment for health care right away. * | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 17. I am dissatisfied with some things about the health care. * | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| 18. I am able to get health care whenever I need it. | □Strongly Agree | □Agree | □Uncertain | □Disagree | □Strongly Disagree |
| - Which of the following stage has the most difficult for you and your child who has a Cochlear implant?<br>□Pre-Cochlear implant stage □Cochlear implant stage □Post-Cochlear implant stage<br>Causes: | | | | | |

**Qualitative part**

**Key Manager Interviews Questions.**

Name of organization ……: Name of the manager……

**Availability of CI service**

1- What is your opinion about the Cochlear implantation service?
( pre-CI rehabilitation services, post-CI rehabilitation services and integration of children into the community after CI service for patients)

……
……

2- What do you think about the necessary needs to provide CI Service? (experienced team - instrument and equipment sufficiency)

……
……

**The current needs for CI services**

3- What do you think about the children with SNHL? (their suffering, the number who are eligible for CI, and the criteria for surgery eligibility)

……
……

4- What is your opinion about the possible changes of CI services?(Teams, law, how to improve the impact of CI)

……
……

5-what are the solutions that you suggest to support CI services cost? (Many children's parents suffer from maintenance costs and the lack of all requirements such as wires, batteries, and spare parts. And it is very expensive)

……

**Limitations / weakness and opportunists for providing of CI service**

6- What are the main obstacles or limitations to provision of CI service in the organizations?(cost, expert, new project)

……

7- What are the current and future plans to provide CI service for patients?

……

**Other additions: ……**

**Annex (9): Questionnaire – Arabic**

**استبيان تقييم برنامج زراعة القوقعة الصناعية لدى الأطفال في قطاع غزة – 2022**

الأخ العزيز/الأخت العزيزة:

السلام عليكم ورحمة الله وبركاته
أنا الطالب/ محمد عصام محمد الأعرج ، طالب ماجستير في كلية الصحة العامة جامعة القدس/ مسار علم الأوبئة. أنا أعمل على أطروحة الماجستير الخاصة بي والتي تعد مطلبًا لإكمال برنامج الماجستير في الصحة العامة.

نشكركم على موافقتكم على المشاركة في هذا البحث، حيث تم اختيار شخصكم الكريم بعد استيفاء كافة معايير اختيار العينة لهذا البحث.
تهدف الدراسة البحثية بعنوان "تقييم برنامج زراعة القوقعة الصناعية لدى الأطفال في قطاع غزة" إلى تقييم خدمة زراعة القوقعة الصناعية في قطاع غزة لمعرفة تأثير زراعة القوقعة الصناعية على جودة حياة المريض ومدى فائدتها وتلبيتها احتياجات الأطفال ذوي الإعاقة السمعية في قطاع غزة مما يتيح للباحث فرصة التعرف على نقاط القوة والضعف في خدمة زراعة القوقعة الصناعية لتقديم التوصيات اللازمة لتطويرها وتحسين جودتها مما سيستفيد منه الأطفال الذين خضعوا لها لإجراء عملية زراعة القوقعة الصناعية. سيتم استخدام المعلومات المقدمة لأغراض البحث العلمي فقط.
لذا يرجى التكرم بالإجابة على كافة الأسئلة الواردة في الاستبيان للخروج بنتائج وتوصيات تساهم في تحسين جودة الخدمة.
ملاحظات هامة:
•إن مشاركتك في تعبئة هذا الاستبيان لها أهمية كبيرة، وستكون المعلومات سرية للغاية بالنسبة لكافة البيانات الشخصية الواردة في الاستبيان.
•تعبئة هذا الاستبيان اختيارية وليست إجبارية، فإذا شعرت بعدم الارتياح يمكنك الانسحاب دون حرج.
•يستغرق ملء الاستبيان حوالي 20 دقيقة.

**شكرا لتعاونكم**
**الباحث/ محمد عصام محمد الأعرج**

**الجزء الكمي**

| |
|---|
| أ- البيانات المحصلة من ملف المريض: |
| 1-الاسم: \| 2-رقم الهاتف: |
| 3 - هوية المريض: |
| 4-مقدار فقدان السمع قبل الجراحة: (ديسيبل HL)<br>□الأذن التي خضعت لعملية جراحية: خفيف ، معتدل ، شديد ، عميق<br>□الأذن غير الخاضعة للعملية: خفيف ، معتدل ، شديد ، عميق |
| 5- تقييم السمع قبل الجراحة: (dB HL)<br>□الأذن التي خضعت لعملية جراحية: خفيف ، معتدل ، شديد ، عميق<br>□الأذن غير الخاضعة للعملية خفيف ، معتدل ، شديد ، عميق |
| 6- تقييم السمع بعد الجراحة: (dB HL)<br>□الأذن التي خضعت لعملية جراحية: خفيف ، معتدل ، شديد ، عميق<br>□الأذن غير الخاضعة للعملية خفيف ، معتدل ، شديد ، عميق |
| ب- البيانات الديموغرافية (الاجتماعية والاقتصادية): |
| 1-الرقم التسلسلي: |
| 2 - عمر الطفل: |
| 3- جنس الطفل:<br>□طفل □طفلة |
| 4-نوع التجمع السكني : □ مخيم □مدينة □ قرية |
| 5 – المجيب عن الاستبيان:<br>□الأم □الأب □ كلاهما □ اخرون |
| 6- الإقامة:<br>□الشمال □غزة □المنطقة الوسطى □خانيونس □رفح |
| 7- وضع اللجوء:<br>□لاجئ □غير لاجئ |
| 8- نوع التامين الصحي:<br>□ تأمين صحي حكومي □تأمين صحي خاص □كلاهما □تامين من نوع اخر □لا يملك تامين صحي |
| 9. ما هو عدد السنوات التعليمية لأم الطفل: ..... .. |
| 10- ما هو عدد السنوات التعليمية لأب الطفل: ..... .. |
| 11- هل هناك تاريخ من القرابة بين والدي الطفل؟<br>□ نعم □ لا |
| 12- دخل الأسرة:<br>□أقل من 1000 شيكل □ 1000-2500 شيكل □ أكثر من 2500 شيكل |
| 13- يغطي التأمين الصحي خدمات زراعة القوقعة:<br>□ نعم □ لا |
| ج-المتغيرات المتعلقة بجراحة غرسة القوقعة الصناعية (البيانات السريرية) |
| 1- مسببات الإعاقة السمعية:<br>□ أسباب غير معروفة<br>□ أمراض وراثية خلقية<br>□ مكتسب:<br>□ استعمال الأدوية أثناء الحمل □التعرض لإصابة<br>□ عدوى أثناء حمل الأم. □ عدوى في سن الطفولة (التهاب السحايا).<br>□اليرقان الناتج عن تبادل الدم □دخول وحدة العناية المركزة اكثر من 5 ايام |
| 2- في أي عمر اكتشفت أن طفلك يعاني من ضعف السمع (بالسنوات)..... |

| |
|---|
| |
| 3- العمر عند التشخيص (شهور) ..... |
| 4-الفترة الزمنية منذ تشخيص الصمم (سنوات) ..... |
| 5-عمر الطفل عند اجراء جراحة زراعة القوقعة (سنوات) ..... |
| 6- الطريقة(الاسلوب) المتبعة في جراحة زراعة القوقعة:<br>□النهج القديم(2009-20011) □ النهج جديد(2017-2022) |
| 7- هل ارتاد الطفل مدرسة للصم او ذوي الاعاقة السمعية قبل زراعة القوقعة:<br>□ نعم □ لا |
| 8- هل التحق الطفل بالدراسة في مقاعد الصف الأول , كم كان عمره(سنوات):..... |
| 9-المؤسسات التعليمية الخاصة التي ارتادها الطفل:<br>□روضة أطفال □مركز علاج النطق □ لم يحضر أي مؤسسة تعليمية أو مدرسة |
| 10-الموقع الذي يحصل فيه الطفل على خدمات زراعة القوقعة:<br>□مستشفى القدس □مستشفى حمد □ مبادرة من حقي سماع(وزارة الصحة □مؤسسة آخري |
| 11-هل يقوم طفلك بزيارات منتظمة لخدمات زراعة القوقعة (قبل الجراحة)؟<br>□ نعم □ لا<br>إذا كانت الإجابة "لا" ، فلماذا إذن؟ |
| 12- الجهة التي تمت بها عملية زراعة القوقعة:<br>□ أحادي الجانب (يمين ، يسار) □ ثنائي (قديم ، جديد) |
| 13- مدة المكوث في المستشفى بعد اجراء عملية زراعة القوقعة: (أيام) ..... |
| 14-المضاعفات المتعلقة بالجراحة:<br>□فقدان حاسة التذوق في الثلثين الأماميين من اللسان. □عدوى الأذن<br>□هجرة الأقطاب الكهربائية / وضعها في غير موضعها / إزالتها بشكل عرضي ألم في الأذن<br>□دوخة / دوار دائم □ألم وعدم راحة باستمرار □ التهاب الجرح<br>□انتفاخ الاذن □ شلل العصب الوجهي □ إفرازات متكررة من الأذن<br>□ ثقب طبلة الأذن □ مضاعفات اخرى □ لا شيء |
| 15- هل يوجد تحسن سمعي أفضل للأذن (dB HL)<br>□ نعم □ لا □ لا أعلم |
| 16-هل يستخدم طفلك الجهاز الخارجي بعد زراعة القوقعة:<br>□ دائمًا □ عادةً □ غالبًا □أحيانًا<br>□ أبدًا<br>الأسباب: |
| 17-هل هناك زيارات منتظمة لمركز التأهيل السمعي بعد اجراء العملية:<br>□ نعم(دائما-أحيانا) □ لا |
| 18- كم من الوقت يجب أن تنتظر في كل زيارة إعادة تأهيل بعد زراعة القوقعة لتلقي الرعاية الصحية؟<br>..... الدقائق |
| 19-هل هناك مشكلة في اجراء الصيانة المستمرة للجهاز الخارجي للسماعة:<br>□ نعم □ لا<br>الاسباب: |
| د- جودة الحياة عند الأطفال الذين يستخدمون غرسات القوقعة الصناعية:<br>في هذا الجزء من الاستبيان ، سنطرح مجموعة من الأسئلة التي ستحدد مدى التحسن في نوعية حياة الطفل الذي خضع لزراعة القوقعة ، بما في ذلك جانب التواصل والأداء العام والاعتماد على الذات ، حسنًا- يجري والعلاقات الاجتماعية والتعليم وعوامل أخرى. |
| 1-التواصل |

| | | | | | |
|---|---|---|---|---|---|
| التواصل صعب مع الأشخاص المعروفين | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| جودة الحديث لدى الطفل تثير قلقي | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| يمكننا الآن الدردشة حتى عندما لا يتمكن من رؤية وجهي | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| أجد أنه من السهل التواصل معه/معها من خلال الحديث | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| تحسنت قدرته على الكلام والحديث بشكل ملحوظ | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| الآن هو / هي ثرثار ويشرك الآخرين في المحادثة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 2-الأداء العام | | | | | |
| قبل الزراعة لم يحصل على أي فائدة على الإطلاق من معيناتها السمعية | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| هو / هي تعتمد كليًا على القوقعة المزروعة طوال الوقت | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| هو /هي يعرف متى أريد اهتمامها لأنها تسمعني عندما اناديها | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| يمكنه الآن تسلية نفسه بالاستماع إلى الموسيقى أو مشاهدة التلفزيون أو ممارسة الألعاب | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| يمكنني الآن السماح لها / لها باللعب في الخارج لأنها على دراية بصوت حركة المرور | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| لا يزال غير قادر على التعامل مع المواقف الجديدة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 3-الاعتماد على الذات | | | | | |
| نادرا ما أتركه / أتركها أن تفعل شيئا بمفرده | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| كان التغيير الكبير هو تحسين ثقته / ثقتها | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| كان يعتمد علينا كثيرًا قبل عملية الزراعة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| هو / هي مستقلة مثل معظم الأطفال الآخرين في سنها | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 4- الصحة والسلوك(الرفاه) | | | | | |
| لا يزال يظهر عليه علامات الإحباط في سلوكه | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| لقد تحسن سلوكه / سلوكها منذ أن خضعت لعملية الزراعة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| لقد أصبح هو/ هي جدلية منذ خضوعها لعملية الزراعة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| هو / هي أقل إحباطًا مما كانت عليه قبل إجراء عملية الزراعة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| يستمر في كونه طفلًا سعيدًا ويسعده أن يكون معه. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 5-العلاقات الاجتماعية | | | | | |
| ليس لديه/لديها علاقة وثيقة مع | □ أرفض | □ أرفض | محايد□ | □ موافق | □موافق بشدة |

| | | | | | |
|---|---|---|---|---|---|
| أجدادها | بشدة | | | | |
| تم عزله اجتماعيًا قبل إجراء عملية الزراعة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| لا يقوم بتكوين صداقات بسهولة خارج الأسرة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| هي / هو اجتماعي داخل الأسرة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| يشارك في المواقف الأسرية أكثر من قبل عملية الزراعة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| يشارك في العلاقات الأسرية على قدم المساواة مع الأعضاء الآخرين | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| تحسنت علاقتها/علاقته مع إخوته وأخواته | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 6- التعليم | | | | | |
| هي/ هو غير قادر على التعامل مع التعليم العادي | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| هو / هي تواكب الأطفال في سنها بشكل جيد في المدرسة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| تلبي المدرسة المحلية وخدمات الدعم بشكل مناسب جميع احتياجاتنا فيما يتعلق باستخدام الغرسة في المدرسة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| أنا قلق بشأن انتسابها للمدرسة في المستقبل | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| يجب أن يكون للوالدين خيار استخدام لغة الإشارة في المدرسة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| أنا سعيد بتقدمها في المدرسة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| هو/هي يعتمد كليًا على القوقعة المزروعة (جهاز خارجي) في المدرسة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 7- الأثار المترتبة على عملية زراعة القوقعة: | | | | | |
| مباشرة بعد عملية الزراعة كانت قدرته على التواصل أضعف | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| أخشى أن تتعطل الغرسة (القوقعة المزروعة) | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| بدا التقدم خلال الأشهر القليلة الأولى بطيئًا للغاية | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| أخشى أن يلومني / تلومني على قراري أن يكون لها غرسة(زراعة القوقعة) | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| أشعر بالقلق من أن يتم رفض طفلي الأصم من قبل مجتمع الصم بسبب عملية الزراعة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| تجاوز التقدم بعد عملية الزراعة توقعاتي | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| استاء الأطفال الآخرون في الأسرة من الوقت والاهتمام اللذين تتطلبا لعملية الزراعة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 8- الدعم الموجه للطفل | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| أصبحت المساعدة التي قدمتها له / لها أكثر إنتاجية الآن لأنه / لديه / لديها زراعه قوقعة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| لقد احتاج/احتاجت إلى مزيد من المساعدة مني منذ أن تلقت الغرسة(زراعة القوقعة) | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| الكثير من المساعدة في البداية يعني أن الطفل يحتاج إلى مساعدة أقل لاحقًا | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| أحصل على مزيد من الوقت لنفسي بسبب استقلاليته المتزايدة | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| يحتاج أحد الوالدين لطفل لديه غرسة إلى التحلي بالصبر لأن الفوائد قد تستغرق وقتًا لتظهر | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| أقدم نفس القدر من المساعدة كما كان قبل الزرع | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| ه- رضا المرضى عن خدمات زراعة القوقعة في قطاع غزة | | | | | |
| 1. يجيد مقدمو الرعاية الصحية لغرسات القوقعة الصناعية شرح سبب الفحوصات الطبية | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 2- أعتقد أن مكتب مقدم الرعاية الصحية الخاص بي لديه كل ما يلزم لتقديم رعاية طبية كاملة. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 3. الرعاية الصحية التي تلقيتها هي مثالية تقريبًا. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 4. أحيانًا يجعلني مقدمو الرعاية الصحية أتساءل عما إذا كان تشخيصهم صحيحًا. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 5. أشعر بالثقة في أنه يمكنني الحصول على الرعاية الصحية التي أحتاجها دون أن أتراجع ماليًا | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 6. عندما أذهب للحصول على الرعاية الصحية لزراعة القوقعة ، يكون مقدم الخدمة حريصًا على فحص كل شيء عند علاجي وفحصي. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 7. يجب أن أدفع مقابل رعاية صحية أكثر مما أستطيع تحمله | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 8. يمكنني الوصول بسهولة إلى المتخصصين الطبيين الذين أحتاجهم في زراعة قوقعة الأذن. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 9. عندما أحصل على رعاية صحية لزراعة القوقعة ، يتعين على الناس الانتظار لفترة طويلة للحصول على العلاج في حالات الطوارئ. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 10. يتصرف مقدمو الرعاية الصحية بشكل عملي جدًا وغير | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |

| | | | | | |
|---|---|---|---|---|---|
| شخصي تجاهي. | | | | | |
| 11. مقدم الرعاية الصحية الخاص بي يعاملني بطريقة ودية للغاية ولطف. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 12. أولئك الذين يقدمون لي الرعاية الصحية في بعض الأحيان يتعجلون كثيرا عندما يعالجونني. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 13. يتجاهل مقدمو الرعاية الصحية أحيانًا ما أقوله لهم. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 14. لدي بعض الشكوك حول قدرة مقدمي الرعاية الصحية لغرسات القوقعة الصناعية الذين يعالجونني. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 15. عادة ما يقضي مقدمو الرعاية الصحية الكثير من الوقت معي. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 16. أجد صعوبة في الحصول على موعد للرعاية الصحية على الفور. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 17. أنا غير راضٍ عن بعض الأمور المتعلقة بالرعاية الصحية. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |
| 18. أنا قادر على الحصول على رعاية صحية متى احتجت إليها. | □ أرفض بشدة | □ أرفض | محايد□ | □ موافق | □موافق بشدة |

- أي من المراحل التالية هي الأصعب بالنسبة لك ولطفلك الذي خضع لعملية زراعة قوقعة؟

□مرحلة ما قبل زراعة القوقعة

□مرحلة غرسة القوقعة

□مرحلة ما بعد زراعة القوقعة

الأسباب:

# الجزء النوعي

**أسئلة مقابلات المدراء الرئيسيون**

اسم المنظمة .....: اسم المدير .....

• توافر خدمات زراعة القوقعة

1- ما رأيك في خدمات زراعة القوقعة ؟

(خدمات إعادة التأهيل قبل CI ، وخدمات إعادة التأهيل بعد CI ودمج الأطفال في المجتمع بعد خدمة CI للمرضى)

.....

.....

2- ما رأيك في الاحتياجات الضرورية لتقديم خدمة CI (فريق ذو خبرة - كفاية الأجهزة والمعدات)؟

.....

• الاحتياجات الحالية لخدمات CI

3- ما رأيك في الأطفال المصابين الذين يعانون من اعاقة سمعية؟ (معاناتهم ، وعدد المؤهلين للحصول على CI ، ومعايير الأهلية للجراحة)

.....

4- ما رأيك في التغييرات المحتملة لخدمات CI؟ (الفريق المسؤول ، القوانين ، كيفية تحسين تأثير CI)

.....

5- ما هي الحلول التي تقترحها لدعم تكلفة خدمات CI؟ (يعاني الكثير من آباء الأطفال من تكاليف الصيانة وعدم توفر جميع المتطلبات مثل الأسلاك والبطاريات وقطع الغيار. وهي مكلفة للغاية)

.....

.....

• القيود / الضعف والخطوات المهمة لتقديم خدمة زراعة القوقعة

6- ما هي أهم المعوقات أو القيود التي تحول دون تقديم خدمة زراعة القوقعة في المنظمات؟(تكلفة ، خبراء ، مشروع جديد)

.....

.....

7- ما هي الخطط الحالية والمستقبلية لتقديم خدمة CI للمرضى؟

.....

.....

الإضافات الأخرى: .....

## Annex (10): Chi-square- Statistical significant between old and new approach in related to complications

| Chi-Square Tests | | | |
|---|---|---|---|
| | **Value** | **df** | **Asymptotic Significance (2-sided)** |
| Pearson Chi-Square | 119.908[a] | 8 | .000 |
| Likelihood Ratio | 103.428 | 8 | .000 |
| Linear-by-Linear Association | 21.380 | 1 | .000 |
| N of Valid Cases | 224 | | |

a. 14 cells (77.8%) have expected count less than 5. The minimum expected count is .20.

**عنوان الدراسة: تقييم برنامج زراعة القوقعة لدى أطفال قطاع غزة**

**إعداد: محمد عصام محمد الأعرج**

**إشراف: أ.د. يحيى عابد**

**الملخص:**

تؤثر زراعة القوقعة الصناعية على جوانب الحياة متعددة الأبعاد ؛ الجوانب الجسدية والمرضية والنفسية والمالية والرفاهية والتواصل والاعتماد على الذات والجوانب الاجتماعية. تساهم هذه الجوانب بشكل كبير في رفع جودة الحياة والقدرات الإنتاجية وظهورها بالطريقة المعتادة داخل أسرهم ومجتمعاتهم مثل الأشخاص غير المعوقين. هذه الدراسة هي الأولى في قطاع غزة والتي تهدف بشكل أساسي إلى تقييم آثار خدمة زراعة القوقعة في قطاع غزة فيما يتعلق بنوعية حياة الأطفال ، ورضا الأطفال ، وتصور خدمات زراعة القوقعة ، والاحتياجات الحالية لخدمة زراعة القوقعة، وهموم أسر الأطفال.

كان تصميم الدراسة مثلثًا كميًا ونوعيًا مع اختيار منهجي. تشمل الدراسة مجموعتين من السكان. المجموعة الاولى للجزء الكمي هم آباء جميع الأطفال الذين خضعوا لزراعة قوقعة الأذن في قطاع غزة من عام 2007 حتى الآن ولديهم برنامج ملفات زراعة القوقعة الموصى به ، والذي تم تغطيته من خلال استبيانات الموافقة على المقابلات لمتلقي زراعة القوقعة (CCIPP). المجموعة الثانية للجزء النوعي هي ستة مدراء مخبرين رئيسيين في المنظمات الحكومية والمنظمات غير الحكومية التي تمت تغطيتها من خلال المقابلات. ويتم التعبير عن تصورات المريض من خلال مجموعة من الأسئلة المفتوحة المدرجة في الاستبيان.

كان مكان الدراسة بشكل رئيسي في مستشفى الشيخ حمد بن خليفة آل ثاني للتأهيل والأطراف الصناعية في قطاع غزة. تم استخدام الحزمة الإحصائية لبرنامج العلوم الاجتماعية (SPSS) لتحليل البيانات.

النتائج: فيما يتعلق بنوعية الحياة لمتلقي زراعة القوقعة ، أظهرت الدراسة تحسنًا في جميع السلالات الفرعية لنوعية الحياة لمتلقي زراعة القوقعة. كان إجمالي المتوسط المرجح لجودة الحياة لجميع متلقي زراعة القوقعة 77.77٪ ، وكان متوسط التصنيفات أكبر من ثلاثة نقاط لجميع النطاقات الفرعية الثمانية HRQoL على مقياس ليكرت المكون من 5 نقاط (المتوسط = 3.89 ، النطاق = 3.34–4.25) ، كان اكثر الجوانب تأثرا من جودة الحياة بعد زراعة القوقعة هو "العلاقات الاجتماعية" التي حصلت على أعلى التصنيفات (المتوسط = 4.25) ، يليها الأداء العام "(المتوسط = 4.09) ،" آثار الانغراس "(المتوسط = 4.05) و" الاعتماد على الذات '(المتوسط = 3.92) ،' دعم الطفل '(المتوسط = 3.90) ،' الرفاه '(المتوسط = 3.87) ، و' الاتصال '(المتوسط = 3.74) حصل أيضًا على تقييم إيجابي ، وحصل' التعليم 'على أقل تقدير إيجابي. التصنيفات (يعني = 3.34).

كان رضا المرضى عن خدمة زراعة القوقعة جيدًا جدًا بمتوسط مرجح إجمالي للرضا بلغ 84.6٪.

فيما يتعلق بالجزء النوعي ، أوضحت الدراسة أن خدمة زراعة القوقعة هي حاجة مجتمعية مهمة بسبب الزيادة المستمرة في عدد الأطفال ذوي الإعاقات السمعية. علاوة على ذلك ، أظهرت الدراسة أن المنظمات الأهلية لها دور رئيسي في خدمة زراعة القوقعة مقارنة بالقطاع الحكومي. بالإضافة إلى ذلك ، أظهرت التعليقات التي عبر عنها متلقو زراعة القوقعة أهمية خدمة زراعة القوقعة والأثر الضار لخلل جهاز القوقعة والوضع التعليمي بعد زراعة القوقعة واستكشاف الحاجة إلى تطوير خدمة زراعة القوقعة في قطاع غزة.

الخلاصة: في خدمة زراعة القوقعة بشكل عام ، وخاصة خدمة مستشفى حمد ، تعمل على تحسين جودة الحياة لمتلقي زراعة القوقعة، وتحسن رضا متلقي زراعة القوقعة ، وتقلل من مخاوف متلقي زراعة القوقعة بشأن تأثير فقدان السمع. تلبي خدمة زراعة القوقعة في منظمة غير حكومية احتياجات المجتمع كأفضل خدمة إعادة تأهيل لمتلقي زراعة القوقعة، على الرغم من أنها لا تزال بحاجة إلى مزيد من العمل للوصول إلى الاستدامة في خدمات زراعة القوقعة.