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Faculty of graduate studies and scientific research

**Assessment of mother knowledge and attitude
regarding care of child with hearing loss
In international advanced center for hearing**

A Thesis submitted for requirement for master degree in pediatric nursing

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قال تعالى:

اعوذ بالله من الشيطان الرجيم

(وَلَا تَقْفُ مَا لَيْسَ لَكَ بِهِ عِلْمٌ إِنَّ السَّمْعَ وَالْبَصَرَ وَالْفُؤَادَ كُلُّ أُولَئِكَ كَانَ عَنْهُ مَسْئُولًا (36))

صلى الله العظيم

الايه (36)

سورة الاسراء

DEDICATION

To

My big family

My small family

For their blessing and support

Acknowledgement

Firstly, with great appreciation I would like to thank shandi university faculty of graduate studies and scientific research and faculty of nursing science.

I would like to express special thank to my supervisor Dr.mariammohamedelnajeeb for her continuous guidance ,close supervision and sustained advice during this study.

Immense gratitude to general manager of international advanced hearing center in Khartoum to offering me permission to carried out this study.

Great thank to all my colleagues in university and my team work in ahmedgasim hospital for pediatrics.

ABSTRACT

Hearing impairment is an impairment in hearing, whether permanent or fluctuating, that adversely affects a child's educational performance. This descriptive study design done to assess knowledge and attitude of mother regarding care of child with hearing loss in international advanced hearing center from November 2017 to April 2018.

Total coverage(50) mothers who were available during study period . the study focused mainly on knowledge of mothers regarding hearing loss , how shehelp child with hearing loss to learn and communication with child as first way to care him.

Data was collected by questionnaire and analyzed by computer using spss program. The study showed that less than half(44.6%)of mother had poor knowledge regarding hearing loss .

Study showed that more than half of participants had good knowledge about communication and attitude when notice the problem (61.3%-96%) respectively, and(47.3%) of them had poor knowledge about education of child with hearing loss.

Thestudy recommended that for ministry of healthprovide education program for mothers who had child with hearing loss about suitable type of education and suitable place that can their children learn in.

الملخص

ضعف السمع هو خلل في السمع ، دائماً أو متقلباً ، يؤثر سلباً على الأداء التعليمي للطفل. تم تصميم هذه الدراسة الوصفية لتقييم معرفة وموقف الأمهات فيما يتعلق برعاية الطفل فاقد السمع في المركز الدولي المتقدم للسمع من نوفمبر 2017 إلى أبريل 2018.

مجموع العينات (50) من الأمهات اللاتي كن متوفرات خلال فترة الدراسة. ركزت الدراسة بشكل أساسي على معرفة الأمهات فيما يتعلق بفقدان السمع ، وكيف تساعد الأطفال الذين يعانون من فقدان السمع على التعلم وكيفية التواصل مع الطفل كوسيلة أولى لرعايته.

تم جمع البيانات عن طريق الاستبيان وتحليلها عن طريق الكمبيوتر باستخدام برنامج SPSS. وأظهرت الدراسة أن (44.6%) من الأمهات لديهن معرفة ضعيفة فيما يتعلق بفقدان السمع.

أظهرت الدراسة أن أكثر من نصف المشاركين لديهم معرفة جيدة حول الاتصال والمواقف عند ملاحظة المشكلة (61.3% - 96%) على التوالي، (47.3%) لديهم معرفة ضعيفة حول تعليم الطفل فاقد السمع.

أوصت الدراسة بأن تقوم وزارة الصحة بتوفير برنامج تعليمي للأمهات اللواتي لديهن اطفال فاقد السمع عن النوع المناسب من التعليم والمكان المناسب الذي يمكن لأطفالهن التعلم فيه.

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list of abbreviations

IDEA	The Individuals with Disabilities Education Act
NIOSH	The National Institute for Occupational Safety and Health
dB	Decibel (metric unite of hearing)
NIHL	Noise-induced hearing loss
Hz	Hertz
HIV	Human immunodeficiency virus
AIDS	Acquired immunodeficiency syndrome
NSAIDs	Non-steroidal anti-inflammatory drugs
FDA	Food and Drug Administration
(SSD	Single-sided deafness
BIAP	International Bureau Audiophonology
TTY	Text Telephone or teletypewriter

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CHAPTER ONE

Introduction

Justification

Objectives

1.1Introduction:

Hearing loss, also known as hearing impairment, is a partial or total inability to hear.⁽¹⁾ A deaf person has little to no hearing.⁽²⁾ Hearing loss may occur in one or both ears.⁽³⁾ In children hearing problems can affect the ability to learn spoken language and in adults it can cause work related difficulties.⁽¹⁾ In some people, particularly older people, hearing loss can result in loneliness. Hearing loss can be temporary or permanent.⁽³⁾

At any age, disabling hearing impairment has a profound impact on interpersonal communication, psychosocial well-being, quality of life and economic independence. According to the World Health Organization's estimates, the number of people with such impairment increased from 42 million in 1985 to about 360 million in 2011. This last figure includes 7.5 million children less than 5 years of age.⁽⁴⁾

About 2 to 3 out of every 1,000 children in the United States are born with a detectable level of hearing loss in one or both ears.

More than 90 percent of deaf children are born to hearing parents.⁽³⁾

As of December 2012, approximately 324,200 cochlear implants have been implanted worldwide. In the United States, roughly 58,000 devices have been implanted in adults and 38,000 in children.⁽⁵⁾

Five out of 6 children experience ear infection (otitis media) by the time they are 3 years old.⁽⁶⁾

1.2Justification:

the World Health Organization's estimates, the number of people with such impairment increased from 42 million in 1985 to about 360 million in 2011. This last figure includes 7.5 million children less than 5 years of age.⁽⁴⁾these children need special care and the mother is nearest one for her child because of this mother must be knowledgeable about this care.

1.3General OBJECTIVE:

This research conduct to:

Assess mothers knowledge and attitude regarding child with hearing loss

specific objectives:

To assess mother knowledge regarding hearing loss problem.

-To assess mothers attitude regarding her child when appeared with hearing loss.

-To assess how mother canhelp her child for education.

-To assess mother knowledge about communication with child who have hearing loss.

CHAPTER TWO
literature review

2.LITETRATURE REVIEW

2.1Definition:

Hearing impairment as a disability category is similar to the category of deafness, but it is not the same. The official definition of a hearing impairment by the Individuals with Disabilities Education Act (IDEA) is “an impairment in hearing, whether permanent or fluctuating, that adversely affects a child’s educational performance but is not included under the definition of ‘deafness.’” Thus, knowing the definition of deafness is necessary to understand what sort of disabilities are considered hearing impairments. A hearing loss above 90 decibels is generally considered deafness, which means that a hearing loss below 90 decibels is classified as a hearing impairment.⁽⁷⁾ A person who is not able to hear as well as someone with normal hearing – hearing thresholds of 25 dB or better in both ears – is said to have hearing loss. Hearing loss may be mild, moderate, severe, or profound. It can affect one ear or both ears, and leads to difficulty in hearing conversational speech or loud sounds.⁽⁶⁾

2.2Pathophysiology

From a neurobiological perspective, there are three reasons that could cause a person to have hearing loss: either there is something wrong with the mechanical portion of the process, meaning the conductive portions of the ear (external and middle ear), or there is something wrong with the sensory portion of the process (inner ear or cochlea and related structures) or there is something wrong with the neural portion of the process, meaning the nerves or brain.

The process of understanding how sound travels to the brain is imperative in understanding how and why disease can cause a person to develop hearing loss. The process is as follows: sound waves are transmitted to the outer ear, sound waves are conducted down to ear canal, bringing the sound waves to the eardrum which they cause to vibrate, these vibrations are now passed through the 3 tiny ear bones in the middle ear, which transfer the vibrations to the fluid in the inner ear, the fluid moves the hair cells, the movement of the hair cells cause the vibrations to be converted into nerve impulses, the nerve impulses are taken to the brain by the auditory nerve,⁽³⁾ the auditory nerve takes the impulses to the medulla oblongata, the brainstem send the impulses to the midbrain, which finally goes to the auditory cortex of the temporal lobe to be interpreted as sound.⁽⁸⁾

This process is complex and involves several steps that depend on the previous step in order for the vibrations or nerve impulses to be passed on. This is why if anything goes wrong at either the mechanical or neural portion of the process, it could result in sound not being processed by the brain, hence, leading to hearing loss.

Lesions to the auditory association cortex produced by physical trauma can result in deafness and other problems in auditory perception. The place where the lesion occurs on the auditory cortex plays an important role in what type of hearing deficit will occur in a person. A study conducted by Clarke et al. (2000) tested three subjects for the ability to identify a produced environmental sound, the source of the sound, and whether or not the source is moving. All three subjects had trauma to different parts of

the auditory cortex, and each patient demonstrated a different set of auditory deficits, suggesting that different parts of the auditory cortex controlled different parts of the hearing process. This means, lesion one part of auditory cortex and it could result in one or two deficits.[clarification needed] It would take larger lesions at the right parts to produce deafness. ⁽⁹⁾

2.3 Signs and symptoms:

- child seems to hear fine some of the time and then not respond at other times
- child wants the TV volume louder than other members of the family
- child says "What?" more often
- child moves one ear forward when listening, or he complains that he can only hear out of his "good ear" • .
- child's grades fall or their teacher notes that they do not seem to hear or respond as well in the classroom as other children.
- child says that they didn't hear you. This may seem obvious, but many parents assume that their children are not paying attention when in fact there may be an unidentified hearing loss.
- It seems as though child is just not paying attention.
- child starts to speak more loudly than previously.
- If child looks at you intensely when you speak to them, as if concentrating, they may be depending more on visual cues for interpreting speech.
- just have a feeling, but you can't put your finger on what your concern is. ⁽⁵⁾

2.4 Causes of hearing loss in children:

1-Noise

Noise exposure is the cause of approximately half of all cases of hearing loss, causing some degree of problems in 5% of the population globally.[4] The National Institute for Occupational Safety and Health (NIOSH) recognizes that the majority of hearing loss is not due to age, but due to noise exposure. By correcting for age in assessing hearing, one tends to overestimate the hearing loss due to noise for some and underestimate it for others.⁽¹⁰⁾

Hearing loss due to noise may be temporary, called a 'temporary threshold shift', a reduced sensitivity to sound over a wide frequency range resulting from exposure to a brief but very loud noise like a gunshot, firecracker, jet engine, jackhammer, etc. or to exposure to loud sound over a few hours such as during a pop concert or nightclub session.⁽¹⁾ Recovery of hearing is usually within 24 hours, but may take up to a week.⁽³⁾ Both constant exposure to loud sounds (85 dB(A) or above) and one-time exposure to extremely loud sounds (120 dB(A) or above) may cause permanent hearing loss.⁽⁸⁾

Noise-induced hearing loss (NIHL) typically manifests as elevated hearing thresholds (i.e. less sensitivity or muting) between 3000 and 6000 Hz, centered at 4000 Hz. As noise damage progresses, damage spreads to affect lower and higher frequencies. On an audiogram, the resulting configuration has a distinctive notch, called a 'noise' notch. As aging and other effects contribute to higher frequency loss (6–8 kHz on an

audiogram), this notch may be obscured and entirely disappear. Various governmental, industry and standards organizations set noise standards.⁽⁹⁾

The U.S. Environmental Protection Agency has identified the level of 70 dB(A) (40% louder to twice as loud as normal conversation; typical level of TV, radio, stereo; city street noise) for 24-hour exposure as the level necessary to protect the public from hearing loss and other disruptive effects from noise, such as sleep disturbance, stress-related problems, learning detriment, etc.⁽⁵⁾ Noise levels are typically in the 65 to 75 dB (A) range for those living near airports of freeways and may result in hearing damage if sufficient time is spent outdoors.⁽¹¹⁾

Hearing loss due to noise has been described as primarily a condition of modern society.⁽¹⁰⁾

2-Genetic

Hearing loss can be inherited. Around 75–80% of all these cases are inherited by recessive genes, 20–25% are inherited by dominant genes, 1–2% are inherited by X-linked patterns, and fewer than 1% are inherited by mitochondrial inheritance.⁽⁶⁾

When looking at the genetics of deafness, there are 2 different forms, syndromic and nonsyndromic. Syndromic deafness occurs when there are other signs or medical problems aside from deafness in an individual. This accounts for around 30% of deaf individuals who are deaf from a genetic standpoint.⁽¹²⁾ Nonsyndromic deafness occurs when there are no other signs or medical problems associated with an individual other than deafness. From a genetic standpoint, this accounts for the other 70% of cases, and represents the majority of hereditary hearing loss.⁽¹³⁾ Syndromic cases occur with diseases such as Usher syndrome, Stickler syndrome, Waardenburg syndrome, Alport's syndrome, and neurofibromatosis type 2.⁽³⁾

3-Perinatal problems

- Fetal alcohol spectrum disorders are reported to cause hearing loss in up to 64% of infants born to alcoholic mothers, from the ototoxic effect on the developing fetus plus malnutrition during pregnancy from the excess alcohol intake.
- Premature birth can be associated with sensorineural hearing loss because of an increased risk of hypoxia, hyperbilirubinaemia, ototoxic medication and infection as well as noise exposure in the neonatal units. The risk of hearing loss is greatest for those weighing less than 1500 g at birth.

4-Disorders

- viral - viral infections of the ear can cause sensorineural hearing loss usually as the consequence of a labyrinthitis. The patient may be generally unwell at the time.
 - Measles may cause auditory nerve damage but usually gives rise to a chronic middle ear problem giving rise to a mixed hearing loss.
 - Mumps (Epidemic parotitis) may result in profound sensorineural hearing loss (90 dB or more), unilateral (one ear) or bilateral (both ears).

- congenital rubella (also called German measles) syndrome, can cause deafness in newborns
- several varieties of herpes viruses that cause other diseases can also infect the ear, and can result in hearing loss: congenital infection with cytomegalovirus is responsible for deafness in newborn children and also progressive sensorineural hearing loss in childhood; herpes simplex type 1, oral herpes associated with cold sores; Epstein Barr virus that causes mononucleosis; varicella zosteroticus that causes facial paralysis (Ramsay Hunt syndrome)⁽⁵⁾
- People with HIV/AIDS may develop hearing problems due to medications they take for the disease, the HIV virus, or due to an increased rate of other infections.⁽¹⁰⁾
- West Nile virus, which can cause a variety of neurological disorders, can also cause hearing loss by attacking the auditory nerve
- Meningitis may damage the auditory nerve or the cochlea.
- Syphilis is commonly transmitted from pregnant women to their fetuses, and about a third of infected children will eventually become deaf.
- inherited
- People with Down syndrome are more likely to have hearing loss. This is usually due to middle ear effusions in childhood but towards the end of the second decade they may develop a high frequency sensorineural hearing loss which can get progressively worse with time.
- Autoimmune disease is recognized as a cause for cochlear damage. Although rare, it is possible for autoimmune processes to target the cochlea specifically as a first presentation. Granulomatosis with polyangiitis is one of the autoimmune conditions that may precipitate hearing loss. Cogan's syndrome commonly presents with hearing loss.⁽¹¹⁾
- Otosclerosis is a condition that can cause fixation of the stapes (or stirrup) in the middle ear preventing its movement and causing a conductive hearing loss.
- Vestibular schwannoma, erroneously known as Acoustic neuromas, and other types of brain tumors can cause hearing loss by infringement of the tumor on the vestibulocochlear nerve
- Congenital problems
 - Superior semicircular canal dehiscence, a gap in the bone cover above the inner ear, can lead to low-frequency conductive hearing loss, autophony and vertigo.
- recurring ear infections or concomitant secondary infections (such as bacterial infection subsequent to viral infection) can result in hearing loss⁽³⁾

5-Medications

Some medications may reversibly affect hearing. These medications are considered ototoxic. This includes loop diuretics such as furosemide and bumetanide, non-steroidal anti-inflammatory drugs (NSAIDs) both over-the-counter (aspirin, ibuprofen, naproxen) as well as prescription (celecoxib, diclofenac, etc.), paracetamol, quinine, and macrolide antibiotics. The link between NSAIDs and hearing loss tends to be greater in women, especially those who take ibuprofen six or more times a week.⁽¹²⁾ Others may cause permanent hearing loss. The most important group is the aminoglycosides (main member gentamicin) and platinum based chemotherapeutics such as cisplatin and carboplatin.[medical citation needed]⁽⁸⁾

On October 18, 2007, the U.S. Food and Drug Administration (FDA) announced that a warning about possible sudden hearing loss would be added to drug labels of PDE5 inhibitors, which are used for erectile dysfunction.⁽¹⁰⁾

6-Chemical

In addition to medications, hearing loss can also result from specific chemicals: metals, such as lead; solvents, such as toluene (found in crude oil, gasoline⁽¹³⁾ and automobile exhaust,⁽¹⁰⁾ for example); and asphyxiants.⁽²⁾ Combined with noise, these ototoxic chemicals have an additive effect on a person's hearing loss.⁽¹¹⁾

Hearing loss due to chemicals starts in the high frequency range and is irreversible. It damages the cochlea with lesions and degrades central portions of the auditory system.⁽⁸⁾

7-Physical trauma

There can be damage either to the ear itself or to the brain centers that process the aural information conveyed by the ears. People who sustain head injury are especially vulnerable to hearing loss or tinnitus, either temporary or permanent.⁽⁹⁾

2.5Types of hearing loss in children :

1-Conductive hearing loss

This type of loss is caused by a blockage in the outer or middle ear. Hearing aids will have to increase the loudness to force sound through this blockage to the inner ear and this may cause the sound to become distorted and unclear. Some children are also born without an ear canal, making hearing aids impossible to use. Baha® bone conduction implants are an established, effective and long-term solution for conductive hearing loss. The Baha System converts sound to vibrations that are sent to the inner ear through the bone, bypassing any blockage in the outer or middle ear. This is a natural way of hearing and much of the sound your child hear every day, like its own voice, is heard partly via the same phenomenon. Your child may get a clearer sound with less distortion compared to a hearing aid, as the Baha System bypasses the blockage in the outer or middle ear.⁽³⁾

2-Sensorineural hearing loss in both ears

Although it's sometimes referred to as 'nerve deafness', sensorineural hearing loss is caused by damage to the inner ear or cochlea, not the hearing nerve. Hearing aids amplify sound, but for children with a severe to profound sensorineural hearing loss, the amplified input will often sound very distorted. A cochlear implant is an established, effective and long-term solution for children with profound sensorineural hearing loss. It is an electronic device that is surgically implanted - so it bypasses the damaged inner part of the ear to stimulate the hearing nerve directly. Unlike hearing aids, cochlear implants don't make sounds louder. They convert sound waves to electrical impulses and send them to the inner ear in a way that mimics natural

hearing. This is why cochlear implants can give children with severe to profound hearing loss the real ability to hear sounds and better understand speech.

Sensorineural hearing loss in one ear

Profound hearing loss on one side is also called single-sided deafness (SSD). Some children are born with SSD, or it can be triggered by factors such as illnesses, trauma and exposure to loud noises. Left untreated, this limited ability to discern sounds can impact on your child's progress at school. It may delay development of their vital language and speech skills¹, which can in turn lead to learning and behavioural problems². Cochlear implants and Baha bone conduction implants can be an effective treatment for children with SSD. They can help to improve a child's speech understanding - making it easier for them to engage with their schoolwork and communicate with their teachers and classmates.⁽⁴⁾

3-Central deafness

Damage to the brain can lead to a central deafness. The peripheral ear and the auditory nerve may function well but the central connections are damaged by tumour, trauma or other disease and the patient is unable to hear.

4-Mixed hearing loss

- Mixed hearing loss is a combination of conductive and sensorineural hearing loss. Chronic ear infection (a fairly common diagnosis) can cause a defective ear drum or middle-ear ossicle damages, or both. In addition to the conductive loss, a sensory component may be present.⁽¹¹⁾

2.6Examination

- otoscopy, visual examination of the outer ear, ear canal, eardrum, and middle ear (through the translucent eardrum) using an optical instrument inserted into the ear canal called an otoscope
- tympanometry
- differential testing - the Weber, Rinne, Bing and Schwabach tests are simple manual tests of auditory function conducted with a low frequency (usually 512 Hz) tuning fork that can provide a quick indication of type of hearing loss: unilateral/bilateral, conductive, or other

Laboratory testing

In case of infection or inflammation, blood or other body fluids may be submitted for laboratory analysis.

Hearing tests

Hearing loss is generally measured by playing generated or recorded sounds, and determining whether the person can hear them. Hearing sensitivity varies according to

the frequency of sounds. To take this into account, hearing sensitivity can be measured for a range of frequencies and plotted on an audiogram.

Another method for quantifying hearing loss is a speech-in-noise test. As the name implies, a speech-in-noise test gives an indication of how well one can understand speech in a noisy environment. A person with a hearing loss will often be less able to understand speech, especially in noisy conditions. This is especially true for people who have a sensorineural loss – which is by far the most common type of hearing loss. As such, speech-in-noise tests can provide valuable information about a person's hearing ability, and can be used to detect the presence of a sensorineural hearing loss. A recently developed digit-triple speech-in-noise test may be a more efficient screening test.⁽¹⁾

Otoacoustic emissions test is an objective hearing test that may be administered to toddlers and children too young to cooperate in a conventional hearing test. The test is also useful in older children and adults.

Auditory brainstem response testing is an electrophysiological test used to test for hearing deficits caused by pathology within the ear, the cochlear nerve and also within the brainstem. This test can be used to identify delay in the conduction of neural impulses due to tumours or inflammation but can also be an objective test of hearing thresholds. Other electrophysiological tests, such as cortical evoked responses, can look at the hearing pathway up to the level of the auditory cortex.⁽¹¹⁾

Scans

MRI and CT scans can be useful to identify the pathology of many causes of hearing loss. They are only needed in selected cases.⁽⁴⁾

2.7 Classification

Hearing loss is categorized by type, severity, and configuration. Furthermore, a hearing loss may exist in only one ear (unilateral) or in both ears (bilateral). Hearing loss can be temporary or permanent, sudden or progressive.

Severity

The severity of a hearing loss is ranked according to ranges of nominal thresholds in which a sound must be so it can be detected by an individual. It is measured in decibels of hearing loss, or dB HL. The measurement of hearing loss in an individual is conducted over several frequencies, mostly 500 Hz, 1000 Hz, 2000 Hz and 4000 Hz. The hearing loss of the individual is the average of the hearing loss values over the different frequencies. Hearing loss can be ranked differently according to different organisations; and so, in different countries different systems are in use.

Hearing loss may be ranked as slight, mild, moderate, moderately severe, severe or profound as defined below:[medical citation needed]

- Slight: between 16 and 25 dB HL
- Mild:

- for adults: between 26 and 40 dB HL
- for children: between 20 and 40 dB HL
- Moderate: between 41 and 54 dB HL
- Moderately severe: between 55 and 70 dB HL
- Severe: between 71 and 90 dB HL
- Profound: 91 dB HL or greater
- Totally deaf: Have no hearing at all. This is called anacusis.⁽⁶⁾

The 'Audiometric Classifications of Hearing Impairment' according to the International Bureau Audiophonology (BIAP) in Belgium is as follows:

- Normal or subnormal hearing: average tone loss is below 20 dB HL
- Mild hearing loss: average tone loss between 21 and 40 dB HL
- Moderate hearing loss
 - First degree: average tone loss between 41 and 55 dB HL
 - Second degree: average tone loss between 56 and 70 dB HL
- Severe hearing loss
 - First degree: average tone loss between 71 and 80 dB HL
 - Second degree: average tone loss between 81 and 90 dB HL
- Very severe hearing loss
 - First degree: average tone loss between 91 and 100 dB HL
 - Second degree: average tone loss between 101 and 110 dB HL
 - Third degree: average tone loss between 111 and 119 dB HL
- Total hearing loss or Cophosis: average tone loss is more than 120 dB HL⁽¹³⁾

Hearing loss may affect one or both ears. If both ears are affected, then one ear may be more affected than the other. Thus it is possible, for example, to have normal hearing in one ear and none at all in the other, or to have mild hearing loss in one ear and moderate hearing loss in the other.

For certain legal purposes such as insurance claims, hearing loss is described in terms of percentages. Given that hearing loss can vary by frequency and that audiograms are plotted with a logarithmic scale, the idea of a percentage of hearing loss is somewhat arbitrary, but where decibels of loss are converted via a legally recognized formula, it is possible to calculate a standardized "percentage of hearing loss", which is suitable for legal purposes only.⁽²⁾

2.8 Screening:

The United States Preventive Services Task Force recommends screening for all newborns.⁽¹⁾

The American Academy of Pediatrics advises that children should have their hearing tested several times throughout their schooling:

- When they enter school
- At ages 6, 8, and 10
- At least once during middle school
- At least once during high school⁽³⁾

2.9 Treatment and intervention:

No single treatment or intervention is the answer for every child or family. Good intervention plans will include close monitoring, follow-ups and any changes needed along the way. There are many different options for children with hearing loss and their families.

Some of the treatment and intervention options include:

- Working with a professional (or team) who can help a child and family learn to communicate.
- Getting a hearing device, such as a hearing aid.
- Joining support groups.
- Taking advantage of other resources available to children with a hearing loss and their families.

Early Intervention and Special Education:

Early Intervention (0-3 years):

Hearing loss can affect a child's ability to develop speech, language, and social skills. The earlier a child who is deaf or hard-of-hearing starts getting services, the more likely the child's speech, language, and social skills will reach their full potential.

Early intervention program services help young children with hearing loss learn language skills and other important skills. Research shows that early intervention services can greatly improve a child's development.

Babies that are diagnosed with hearing loss should begin to get intervention services as soon as possible, but no later than 6 months of age.

There are many services available through the Individuals with Disabilities Education Improvement. Services for children from birth through 36 months of age are called Early Intervention or Part C services. Even if your child has not been diagnosed with a hearing loss, he or she may be eligible for early intervention treatment services. The IDEA 2004 says that children under the age of 3 years (36 months) who are at risk of having developmental delays may be eligible for services. These services are provided through an early intervention system in your state. Through this system, you can ask for an evaluation.

Special Education (3-22 years)

Special education is instruction specifically designed to address the educational and related developmental needs of older children with disabilities, or those who are experiencing developmental delays. Services for these children are provided through the public school system. These services are available through the Individuals with Disabilities Education Improvement .⁽⁴⁾

Technology

Many people who are deaf or hard-of-hearing have some hearing. The amount of hearing a deaf or hard-of-hearing person has is called "residual hearing". Technology does not "cure" hearing loss, but may help a child with hearing loss to make the most of their residual hearing. For those parents who choose to have their child use technology, there are many options, including:

- Hearing aids
- Cochlear implants
- Bone-anchored hearing aids
- Other assistive devices⁽⁶⁾

Hearing Aids:

Hearing aids make sounds louder. They can be worn by people of any age, including infants. Babies with hearing loss may understand sounds better using hearing aids. This may give them the chance to learn speech skills at a young age.

There are many styles of hearing aids. They can help many types of hearing losses. A young child is usually fitted with behind-the-ear style hearing aids because they are better suited to growing ears.⁽⁷⁾

Cochlear Implants

A cochlear implant may help many children with severe to profound hearing loss — even very young children. It gives that child a way to hear when a hearing aid is not enough. Unlike a hearing aid, cochlear implants do not make sounds louder. A cochlear implant sends sound signals directly to the hearing nerve.

A cochlear implant has two main parts — the parts that are placed inside the ear during surgery, and the parts that are worn outside the ear after surgery. The parts outside the ear send sounds to the parts inside the ear.

Bone-Anchored Hearing Aids

This type of hearing aid can be considered when a child has either a conductive, mixed or unilateral hearing loss and is specifically suitable for children who cannot otherwise wear 'in the ear' or 'behind the ear' hearing aids.⁽⁵⁾

Other Assistive Devices

Besides hearing aids, there are other devices that help people with hearing loss. Following are some examples of other assistive devices:

- FMSystem
An FM system is a kind of device that helps people with hearing loss hear in

background noise. FM stands for frequency modulation. It is the same type of signal used for radios. FM systems send sound from a microphone used by someone speaking to a person wearing the receiver. This system is sometimes used with hearing aids. An extra piece is attached to the hearing aid that works with the FM system.

- Captioning
Many television programs, videos, and DVDs are captioned. Television sets made after 1993 are made to show the captioning. You don't have to buy anything special. Captions show the conversation spoken in soundtrack of a program on the bottom of the television screen.
- Other devices
There are many other devices available for children with hearing loss. Some of these include:
 - Text messaging
 - Telephone amplifiers
 - Flashing and vibrating alarms
 - Audio loop systems
 - Infrared listening devices
 - Portable sound amplifiers
 - TTY (Text Telephone or teletypewriter).⁽⁹⁾

Medical and Surgical

Medications or surgery may also help make the most of a person's hearing. This is especially true for a conductive hearing loss, or one that involves a part of the outer or middle ear that is not working in the usual way.

One type of conductive hearing loss can be caused by a chronic ear infection. A chronic ear infection is a build-up of fluid behind the eardrum in the middle ear space. Most ear infections are managed with medication or careful monitoring. Infections that don't go away with medication can be treated with a simple surgery that involves putting a tiny tube into the eardrum to drain the fluid out.

Another type of conductive hearing loss is caused by either the outer and or middle ear not forming correctly while the baby was growing in the mother's womb. Both the outer and middle ear need to work together in order for sound to be sent correctly to the inner ear. If any of these parts did not form correctly, there might be a hearing loss in that ear. This problem may be improved and perhaps even corrected with surgery. An ear, nose, and throat doctor (otolaryngologist) is the health care professional who usually takes care of this problem.

Placing a cochlear implant or bone-anchored hearing aid will also require a surgery⁽¹¹⁾.

Learning Language

Without extra help, children with hearing loss have problems learning language. These children can then be at risk for other delays. Families who have children with

hearing loss often need to change their communication habits or learn special skills (such as sign language) to help their children learn language. These skills can be used together with hearing aids, cochlear implants, and other devices that help children hear.⁽⁷⁾

Family Support Services

For many parents, their child's hearing loss is unexpected. Parents sometimes need time and support to adapt to the child's hearing loss.

Parents of children with recently identified hearing loss can seek different kinds of support. Support is anything that helps a family and may include advice, information, having the chance to get to know other parents that have a child with hearing loss, locating a deaf mentor, finding childcare or transportation, giving parents time for personal relaxation or just a supportive listener.⁽⁴⁾

Family care for child with hearing loss:

The earlier hearing loss it is discovered and audiological care is provided, the greater is the opportunity for your child to acquire spoken language and develop at an age-appropriate rate. Knowing the symptoms of childhood hearing loss and staying alert to these are in the interest of your child's hearing health. Here is how:

1-Know what to look for: Even when your baby is still an infant, you should try to maintain eye contact when speaking to him or her. The feedback from your child should match the surrounding sounds. Your child, regardless of age, should react to loud noises such as fireworks, dog barking, doors slamming etc.

2-Get your child tested: If you suspect your child may have hearing loss or suffer from an ear infection, make sure to get your child tested by a pediatrician, an ear-nose & throat specialist or a pediatric audiologist immediately. The clinician should be testing both ears.

3-Support your child on the hearing journey

Confronted with a child's hearing loss, many parents intuitively see tremendous difficulty for the future of their child. This does not reflect modern reality. Your child with hearing loss has infinite perspectives in life – but to unlock the full potential he or she will be needing your full support. Here is how:

Once diagnosed, inform yourself and stay in the loop: Once your child has been diagnosed, understanding hearing loss is half the solution. Seek information pro-actively and continuously from professionals. The latest research and technology – hearing aids, cochlear implants, hearing assistive technology and more – open up the possibilities for a child with hearing loss.

Be open and pro-active: be engaged and pro-active in helping your child to become confident in life. Inform the people around your child about hearing loss. Children with hearing loss will thrive and develop when their families and other caretakers are

aware of the impact of hearing loss on learning and development. Invite an open dialogue and meet ignorance with facts.

Get professional help: Whether it involves hearing aids or cochlear implants, the most effective therapeutic measures involve professional audiologists. Make sure to get an experienced audiologist whom you and your child trust.

Encourage ownership of hearing aids: If your child is benefitting from new hearing aids or cochlear implants, encourage your child to take ownership of his or her hearing instruments.

4-Encourage your child to communicate

Children with hearing loss acquired at a very early stage in life and who receive appropriate interventions within six months of age are par with their hearing peers in terms of language development by the time they are five years old. In most aspects of your everyday interaction with your child, using small tricks will support successful language development. Here is how:

Be patient: For a child with hearing loss, learning to speak and to listen is difficult. Be patient and establish a stress-free space for the child to communicate.

Set your stage before talking: It is important in day-to-day communication to get the full attention of the child before starting to talk. Position yourself correctly by facing the child and minimize any background noise.

Speak in a relaxed manner & use body language: Don't shout. Speak clearly, at moderate pace and try to avoid over-emphasizing words. Try not to hide your mouth, chew food, gum or smoke while talking. Use facial expressions, body language and gestures to underline your points.

Check balance comprehension: Encourage a sign to use when your child or you have not understood a sentence. Encourage even at a young age, a comprehension feedback such as nodding. If you are not understood, patiently reword your sentence.

Humour disarms: Maintaining a sense of humour, a positive and relaxed attitude when talking to your child helps to disarm and build confidence. This attitude will rub off on the child. A relaxed atmosphere helps your child to focus on the conversation instead of tensing up.

5-Help your child to master school life

Regardless if a child is born with hearing loss or have developed it at a later age, appropriate intervention in pre-school and school can help limiting its adverse impact. Here is how:

Build confidence: For a child with hearing loss, attending school can be an everyday challenge, both academically as well as socially. To overcome this, help your child to build self-confidence and take ownership for the condition of hearing loss.

Be open: be engaged and pro-active in sustaining your child through the school age. Inform the educators and class mates about hearing loss and hearing aids – maybe together with your child. Invite an open dialogue and meet ignorance with facts.

Get aid: Appropriate aiding systems for the classroom, could help your child hear or access and understand classroom instruction. An appropriate solution such as a wireless microphone systems, should be implemented in close collaboration with qualified professionals. Professional planning and providing services should collaborate with the child, family and/or caregivers and educators to ensure the highest possible success of the intervention program.

Get specific therapy: There are many different options of therapy for children with hearing loss to develop their speech and comprehended language skills. Speech-, language- and music therapy are the most common ones. Seek information about the options for your child and make sure to choose a therapy form together with your child.

Exchange with and learn from others: if possible seek contact to other families in the same situation. Try to encourage contact between children with hearing loss. Learn coping strategies from other families and inform yourself about local resources, laws and rights which may protect and support your child.⁽⁷⁾

2.10 Prevention:

It is estimated that half of cases of hearing loss are preventable.⁽¹⁾ A number of preventative strategies are effective including: immunization against rubella to prevent congenital rubella syndrome, immunization against H. influenza and S. pneumoniae to reduce cases of meningitis, and avoiding or protecting against excessive noise exposure.⁽⁶⁾ The World Health Organization also recommends immunization against measles, mumps, and meningitis, efforts to prevent premature birth, and avoidance of certain medication as prevention.⁽³⁾

Noise exposure is the most significant risk factor for noise-induced hearing loss that can be prevented. Different programs exist for specific populations such as school-age children, adolescents and workers.⁽⁸⁾ Education regarding noise exposure increases the use of hearing protectors.⁽⁶⁾ The use of antioxidants is being studied for the prevention of noise-induced hearing loss, particularly for scenarios in which noise exposure cannot be reduced.⁽⁷⁾

CHAPTER THREE

Methodology

3.methodology:

3.1 Study design:

Descriptive study design done to assess knowledge and attitude of mothers regarding care of child with hearing loss in international advanced hearing center

3.2 study area

Study was carried out in Khartoum middle insouthwestward of elneelain diagnostic center

Study setting:

international advanced hearing center.in this center the audiologist and staff are committed to providing personalized caring services for the prevention, identification and rehabilitation of the hearing loss.

3.3 study population:

Participants who were coming with their children for follow up and speech therapy.

3.4 sample size:

50 mother was taken during study period(total coverage).

3.5 data collection technique and tool:

Data collected by questionnaire field by researcher which consist of four part (socio-demographic data – knowledge of mother about hearing loss – knowledge of mother about communication with child who have hearing loss – how mother can help child to learn).

3.6 data analysis:

The data analyzed by computer using spss program.

3.7 ethical consideration:

Official letter from shindy university (Khartoum center) to mangerof international advanced hearing center in Khartoum.and oral permission from participants.

3.8 scoring system:

The result about knowledge of mother in range as follow:

-if mothers at degree 3 and above (4) the score consider good.

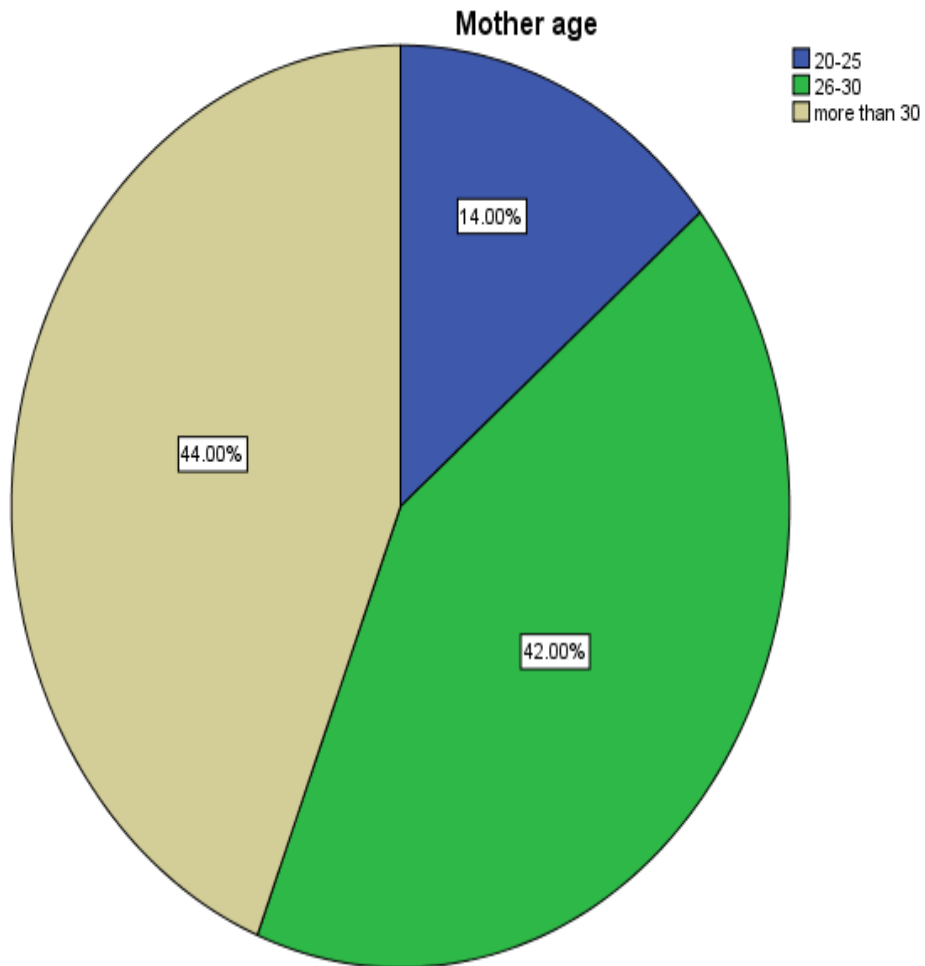
-the score consider fair if degree 2.

-less than 2 consider poor.

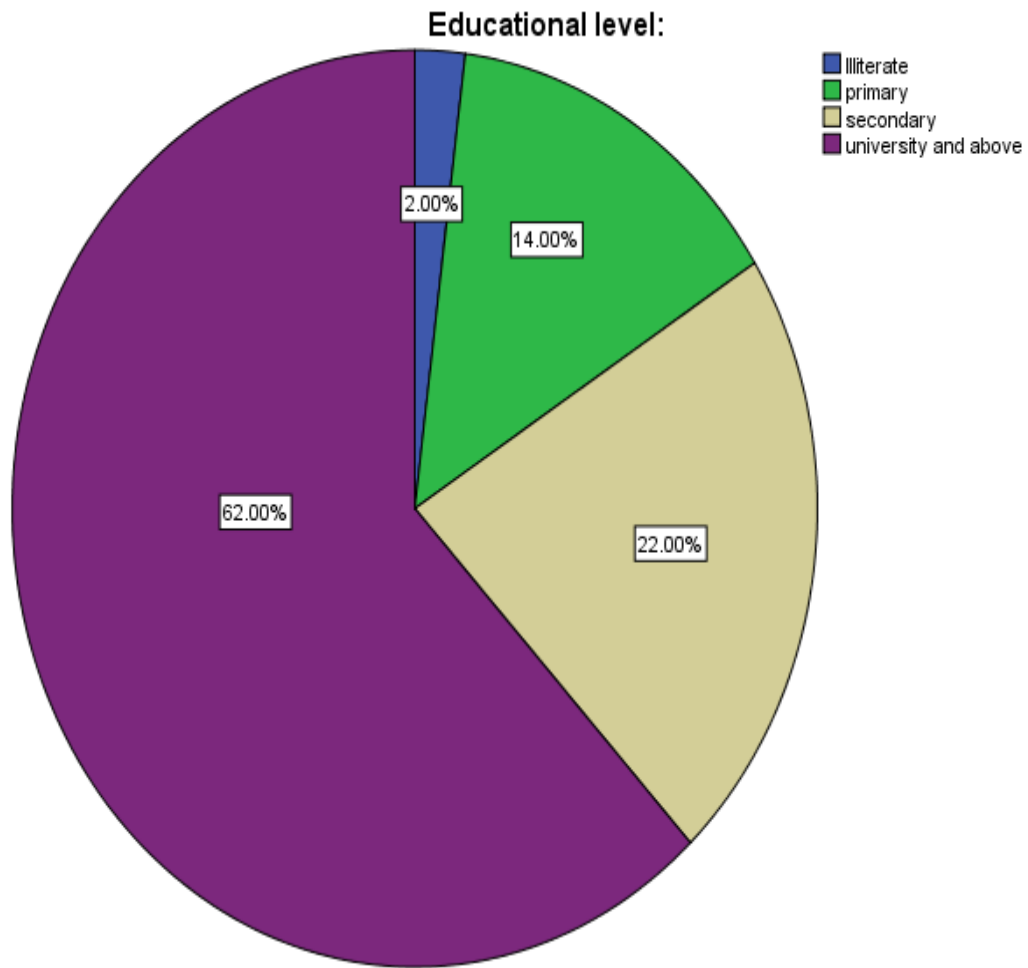
CHAPTER FOUR

Result

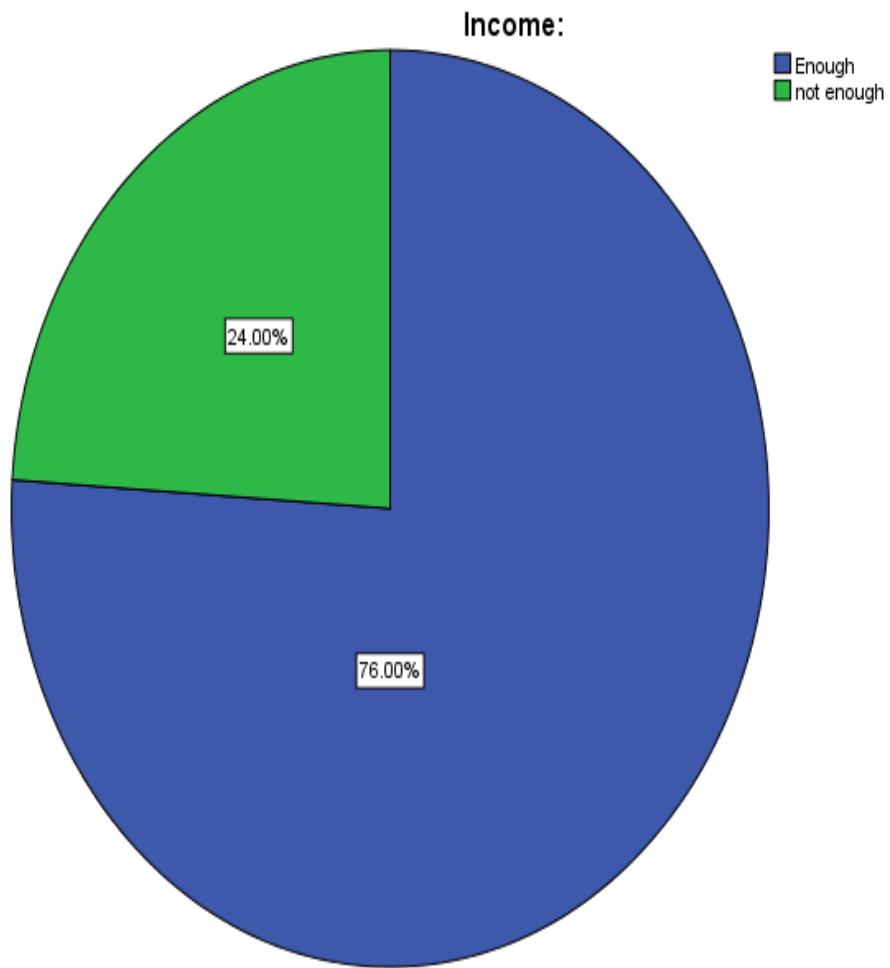
4.Result



Fig(1):distribution of mothers according to their age.



Fig(2):distribution of mothers according their educational level.



Fig(3):distribution of mothers according to their income.

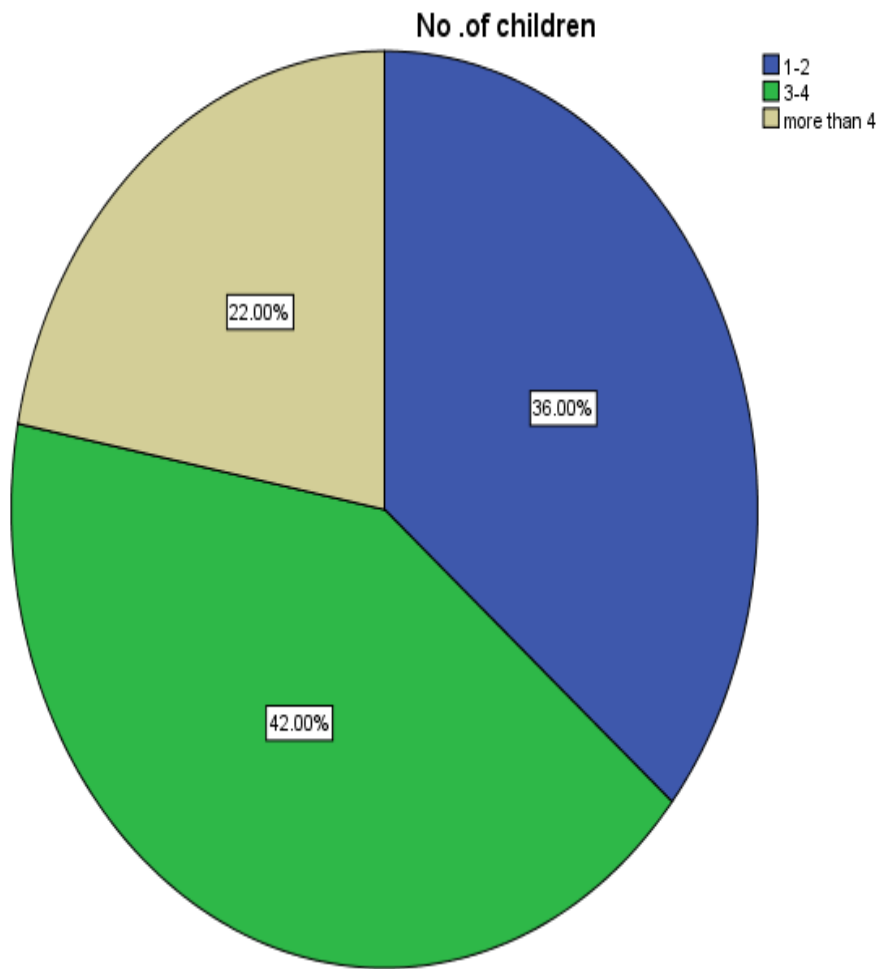


Fig (4):distribution of mothers according to number of their children.

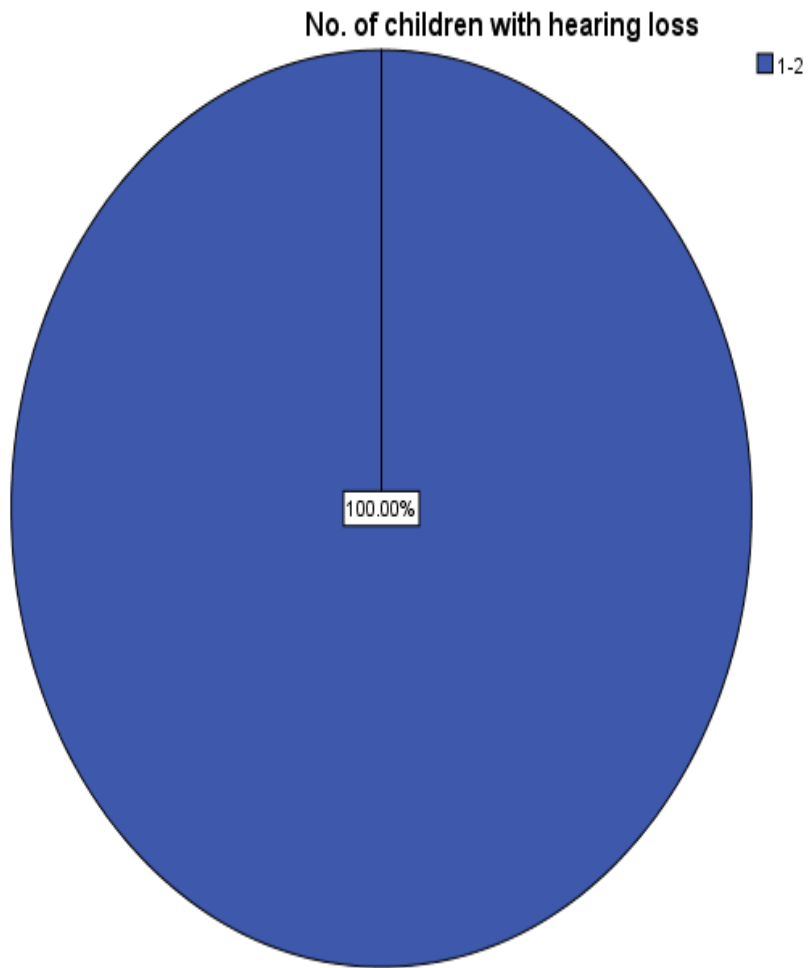


Fig (5):distribution of mothers according to number of their children with hearing loss.

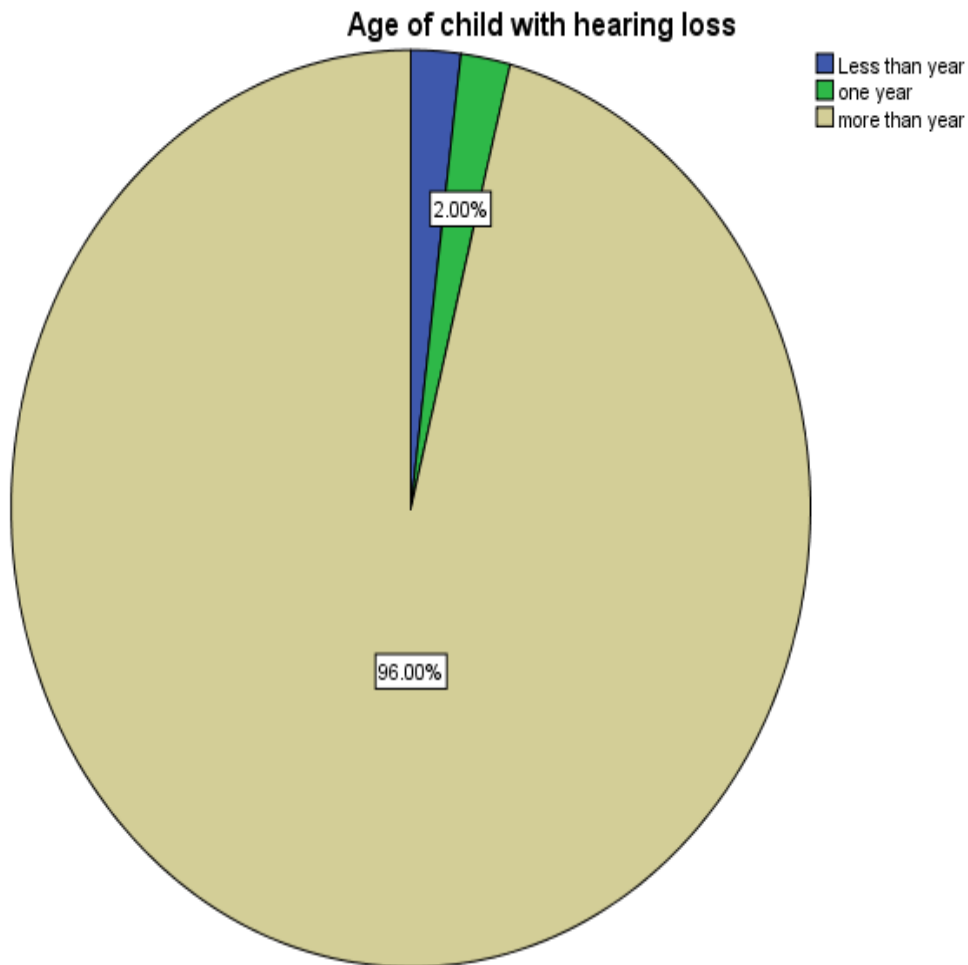


Fig (6):distribution of children with hearing loss according to their age.

Table(1):distribution of mothers according to their knowledge about Signs of hearing loss

Items	frequency	Percent
Good	19	38.0
Fair	10	20.0
Poor	21	42.0
Total	50	100%

Table(1):showed that 42% had poor knowledge ,38% had good knowledge and 20 had fair knowledgeabout Signs of hearing loss

Table(2):distribution of mothers according to their knowledge about Causes of hearing loss

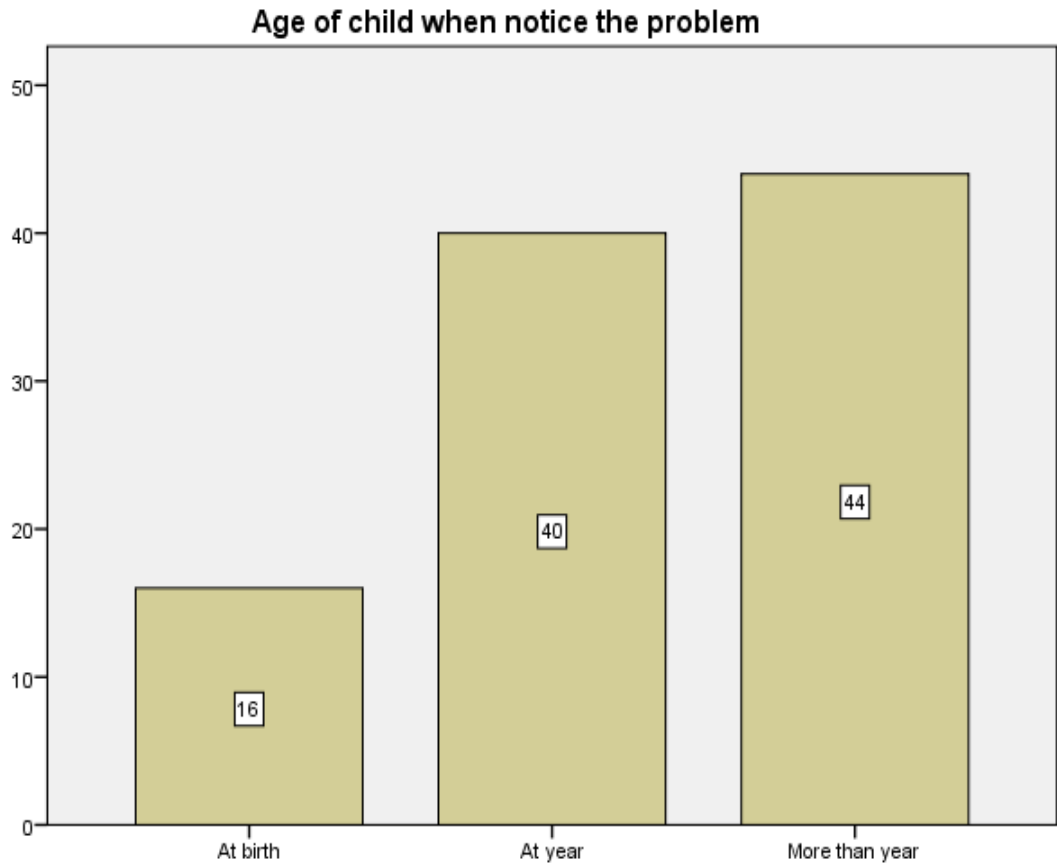
Items	frequency	percentage
Good	16	32.0
Fair	6	12.0
Poor	28	56.0
Total	50	100%

Table(2):explain that 56% had poor knowledge, 32% had good knowledge, 12% had fair knowledgeabout Causes of hearing loss.

Table(3): distribution of mothers according to their knowledge about Prevention of child from hearing

Items	frequency	percentage
Good	25	50.0
Fair	7	14.0
Poor	18	36.0
Total	50	100%

Table(3):showed that 50% had good knowledge,36% had poor knowledge and 14% had fair knowledgeabout Prevention of child from hearing



Fig(7):distribution of children according to his age when notice the problem.

Table(4): distribution of mother according to their knowledge about action done After notice the problem

Items	frequency	percentage
Good	48	96.0
Fair	0	0.0
poor	2	4.0
Total	50	100%

Table(4):showed that 96% had good knowledge,0% had fair knowledge and 4% had poor knowledgeabout action done After notice the problem

Table(5): distribution of mother according to their knowledge about Other type for treatment

Items	frequency	percentage
Good	10	20.0
Fair	10	20.0
Poor	30	60.0
Total	50	100%

Table (5):showed that 60% had poor knowledge ,20% had poor knowledge and 20% had good knowledgeabout Other type for treatment

Table(6): distribution of mother according to their knowledge about where child with hearing loss can learn

Items	frequency	percentage
Good	12	24.0
Poor	38	76.0
Fair	0	0.0
Total	50	100%

Table (6):showed that 24%had good knowledge,0% had poor knowledge and 76% had poor knowledgeabout where child with hearing loss can learn

Table (7): distribution of mother according to their knowledge about how attending school can help child with hearing loss

Items	frequency	percentage
Good	30	60.0
Fair	5	10.0
Poor	15	30.0
Total	50	100%

Table(7):explained that 60% had good knowledge,30% had poor knowledge and 10% had fair knowledgeabout how attending school can help child with hearing loss

Table(8): distribution of mother according to their knowledge about how help child to success academically

Items	frequency	percentage
Good	29	58.0
Fair	3	6.0
Poor	18	36.0
Total	50	100%

Table(8):showed 58% had good knowledge,36% had fair knowledge and 36% had poor knowledge about how help child to success academically

Table(9): distribution of mother according to their knowledge about Communication with child with hearing loss

Items	frequency	percentage
Good	46	92.0
Fair	0	0.0
Poor	4	8.0
Total	50	100%

Table(9):explain that 92% had good knowledge,0% had fair knowledge and 8% had poor knowledgeabout Communication with child with hearing loss

Table(10): distribution of mother according to their knowledge about technique to talk with child with hearing loss

Items	frequency	percentage
Good	23	46.0
Fair	8	16.0
Poor	19	38.0
Total	50	100%

Table (10):showed that 46% had good knowledge , 38% had fair knowledge and 16 had poor knowledgeabout technique to talk with child with hearing loss

Table (11): distribution of mother according to their knowledge about how get full attention of the child with hearing loss

Items	frequency	percentage
Good	23	46.0
Fair	0	0.0
Poor	27	54.0
Total	50	100%

Table(11):explain that 54% had poor knowledge and 46% had good knowledge.about how get full attention of the child with hearing loss

Table (12): distribution of mother according to their knowledge about trial done To Exchange with and learn from others

Items	frequency	percentage
Good	14	28.0
Fair	0	0.0
Poor	36	72.0
Total	50	100%

Table(12):explained that 72% had poor knowledge, 0% had fair knowledge and 28% had good knowledge about trial done To Exchange with and learn from others.

Table (13) Educational level: * signs of hearing loss Cross tabulation

Level of education	Signs of hearing loss			Total	p-value
	Good	Fair	Poor		
Illiterate	0	2	0	2%	0.093(c)
primary	4	4	6	14%	
secondary	18	0	4	22%	
University and above	16	14	32	62%	
Total	38%	20%	42%	100%	

p-value=0,005

Table (13):showed that there are no relation between level of education and knowledge of mothers about signs of hearing loss.

Table (14) Educational level: * causes of hearing loss Cross tabulation

Level of education	Causes of hearing loss			Total	p-value
	Good	Fair	Poor		
Illiterate	2	0	0	2%	0.529(c)
primary	4	0	10	14%	
secondary	12	6	4	22%	
University and above	22	6	34	62%	
Total	40%	12%	48%	100%	

Table (14):showed that there are no relation between level of education and knowledge of mother about causes of hearing loss.

Table (15) Educational level: * prevention of child from hearing loss Cross tabulation

Level of education	prevention of child from hearing loss			Total	p-value
	Good	Fair	Poor		
Illiterate	2	0	0	2	0.510(c)
primary	6	2	6	14%	
secondary	12	2	8	%22	
University and above	30	10	22	62%	
Total	50%	14%	36%	100%	

Table (15):showed that there are no relation between level of education and knowledge of mothers about prevention of child from hearing loss.

CHAPTER FIVE

Discussion

Conclusion

Recommendation

5.1 Discussion:

Hearing impairment as a disability category is similar to the category of deafness, but it is not the same. .

The study revealed that less than half(44%)of participants their age above 30 years and most of them (76%) had enough income. The study also showed that less than half of participants (42%)had number of children range from 3-4 and all of them (100%) had children with hearing loss range from 1-2.

According to level of education the study showed that more than half of participant (62%)complete their university and above, and statistically the present study revealed there was no significant relation between educational level of mothers and their knowledge about signs, causes and prevention of hearing loss p-value equal (0.093(c) , 0.529(c) , 0.510(c)) respectively.

The study explained that less than half(42%) of participant had poor knowledge about signs of hearing loss,(56%)poor knowledge about causes and about prevention (36%)had poor knowledge.the mean of poor knowledge about hearing loss equal $(42+56+36)/3=44.6\%$

The study showed that most of participant (96%)had good attitude about action done after notice the problem but(44%) of them notice the problem when child age more than an year.

The study explain that (76%) of participants had poor knowledge where children with hearing loss can learn and(30%)had poor knowledge about how attending school can help these children and(36%)had poor knowledge about how can help these children to success academically ,so the mean of poor knowledge of participants about learning of children with hearing loss equal $(76+30+36)/3=47.3\%$

About communication most participants(92%) had good knowledge about how to communicate with child with hearing loss ,and(46%) had good about technique done to talk with these children and (46%)had good knowledge about how get full attention of children before start to talk with them ,so the mean of good knowledge about communication equal $(92+46+46)/3=61.3\%$

5.2 Conclusion:

based on the study result,the study showed that mothers had poor knowledge regarding hearing loss and about education of child with hearing loss. And they had good knowledge about communication with child with hearing loss and good attitude about action done after notice the problem.

5.3 Recommendations:

Based on the study result, the study recommended that for ministry of health:

1. Educate mothers who are risk for born child with hearing loss about sign of hearing loss and about the usefulness of early detection of the problem.
2. Inform mothers of children with hearing loss about suitable type of education and suitable place that their children can learn in according to their hearing problem.
3. recommended that for ministry of social welfare to care institutions of children with hearing loss.

Appendix

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Questionnaire about assessment of mothers knowledge and attitude regarding care of child with hearing loss

1-Mother age:

a.20-25

b.26-30

c. more than 30

2- Educational level:

a. Illiterate

b. primary

c. secondary. university and above

3-Incom:

a. enough

b. not enough

4-No .of children:

a.1-2

b.3-4

c. more than 4

5-No. of children with hearing loss:

a.1-2

b.3-4

c. more than 4

6-Age of child with hearing loss:

a.less than year

b.an year

c.more than yea

7-Sign of hearing loss:

a.It seems as though child is just not paying attention.

b.child looks at you intensely when you speak to them.

c.child wants the TV volume louder than other members of the family.

d.child starts to speak more loudly.

8-Causes of hearing loss:

a.Inherited.

b.Disorders like otitismedia –minigitis.

c.Perinatal problems

d.Some medications.

9-Prevention of child from hearing:

- a.Immunization.
- b.good follow up during pregnancy.
- c.Nois avoidance.

10-Age of child when notice the problem:

- a. At birth.
- b. An year.
- c. More than year.

11-After notice the problem:

- a. Take the childe to the doctor directly.
- b. After time.

12-Type of treatment given for your child:

- a. Hearing Aids.
- b. Cochlear Implants.

13-Other type for treatment:

- a. Speech therapy.
- b. comprehended language skills.
- c. Music therapy.

14-Child with hearing loss can learn at:

- a. Specific institution.
- b. At school with normal children.

15-For a child with hearing loss, attending school help him :

- a. Build confidence.
- b. Academically.
- c. socially.

16-To help your child to success Academically:

- a. Call with school or institution.
- b. Inform the educators and class mates about hearing loss and hearing aids
- c. Appropriate aiding systems for the classroom.

17-Communication with child with hearing loss by:

- a. Sign language.
- b. Sign language with speaking.

18-before starting to talk with child with hearing loss:

- a. get the full attention of the child .
- b. Position yourself correctly by facing the child.
- c. minimize any background noise.

19-To get full attention of the child with hearing loss:

- a.Maintaining a sense of humour.
- b.a positive and relaxed attitude.

20-To Exchange with and learn from others:

- a.seek contact to other families in the same situation.
- b.inform yourself about local resources, laws and rights which may protect and support your child.