

PREVALENCE OF HEARING IMPAIRMENT AMONG SCHOOL-GOING CHILDREN OF SLUM AREAS OF LAHORE

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HIGHLIGHTS

- Hearing impairment is characterized by the inability to hear if someone is not able to hear within the normal hearing range, which is defined as having hearing threshold of at least 20 dB in both ears.
- An observational cross-sectional study was performed on a sample of 142 adults, both males and females under 4 to 10 years of age visiting two government schools in the slum area of Lahore using convenient sampling.
- Most participants were found with normal hearing which was 88.7% and conductive hearing loss 9.2% while only 2.1% of individuals were diagnosed with sensorineural hearing loss. A total of 142 children participated in this study where 81(57.2%) males and 61(43%) females contributed.
- It also demonstrates the likelihood of hearing loss as a result of a lack of knowledge, poor socioeconomic status and inadequate medical resources

ABSTRACT

Background: Hearing impairment is characterized by the inability to hear if someone is not able to hear within the normal hearing range, which is defined as having hearing threshold of at

least 20 dB in both ears.

Objective: To find out the prevalence of hearing impairment among school children of slum areas of Lahore.

Material & Methods: An observational cross-sectional study was performed on a sample of 142 adults, both males and females under 4 to 10 years of age visiting two public sector schools in the slum areas of Lahore using convenient sampling. Data were collected from October 2021 to March 2022 while otoscope and audiometer were used to collect data and analyzed them. The significant level was set as equal to or less than $p < 0.05$.

Results: Most participants were found with normal hearing which was 88.7%, conductive hearing loss was 9.2% while only 2.1% of individuals were diagnosed with sensorineural hearing loss. A total of 142 children participated in this study where 81(57.2%) males and 61(43%) females contributed.

Conclusion: According to the current study findings, school children in slum regions have hearing impairments. It also demonstrates the likelihood of hearing loss as a result of a lack of knowledge, poorer socioeconomic standing and inadequate medical resources. The participants in this study were also unaware that they had hearing loss. As a result, it was determined that those who had middle ear infections ultimately

develop hearing loss.

Keywords: hearing impairment, children, slum areas

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INTRODUCTION

Hearing impairment (HI) is characterized by the inability to hear if someone is not able to hear within the normal hearing range, which is defined as having hearing thresholds of at least 20 dB in both ears. It can affect one or both ears and it can be mild, moderate, moderately severe, severe or profound. In the twenty-first century, communication impairments, especially hearing impairment is an important public health concern, if untreated then it can have detrimental effects. On a society's financial health in the information age.³ Due to the importance of hearing for the development of speech, language and learning, as well as the fact that HI increases the difficulty in recognizing and discriminating speech, including language deficiencies, the subject ought to be brought to light.⁴ According to estimates, 1.1 billion individuals worldwide may be at risk of hearing damage due to dangerous hearing habits, such as the use of separate audio devices. In children under the age of 15, about 60 percent of hearing loss is caused by preventable factors.⁵

Childhood development, speech, language, auditory processing, listening skills, behavior, self-esteem, quality of life and learning can all be affected by HI.⁶ The three regions with the highest rates of hearing impairment among children aged 5 to 14 were South Asia, sub-Saharan Africa and Asia Pacific. About 12.5 percent or 5.2 million

children in the United States between the ages of 6 and 19 were predicted to have noise-induced hearing threshold alterations in either one or both ears.⁷ Even a little HI (15-24 dB) may necessitate additional auditory and speech accommodations for young toddlers to allow them to function as typical kids. Young children who have mild hearing loss may experience major setbacks in their speech and language development as well as issues with their social and emotional growth and academic success.⁸ Even though hearing loss is fairly frequent in youngsters and can have serious social and academic repercussions, the causes are not well understood.⁹

Over 6% of people worldwide have some form of HI, according to the World Health Organization.¹⁰ Considering how crucial hearing is to communication, this is a major issue regardless of the age at which it manifests. However, it can inhibit linguistic development in children, which in turn results in communication issues, diminished cognitive function, and learning issues. This makes it particularly severe for youngsters.¹¹

An ear condition that affects the middle ear can lead to conductive hearing loss, the inner ear or cochlear nerve can lead to sensorineural hearing loss, or both can lead to mixed hearing loss.⁶ Depending on the source, hearing loss may be permanent or temporary. One of the most prevalent causes of illnesses among those brought on by trauma and chronic illness is hearing loss.¹² Many other chronic disorders including diabetes, dementia and chronic obstructive lung disease, have been graded lower than this dysfunction. Hearing is a crucial sense especially for young children learning in elementary school. When learning to read and write, listening skills are crucial. They also have a significant impact on the growth of social skills. A screening program is valuable when the child is

starting school because hearing impairments can be treated. Hearing screening programs offered at schools offer a chance to lessen the disparities in education between children with and without hearing loss.¹³

About 16 to 25 dB for light HI hearing thresholds is mild, 26 to 40 dB hearing thresholds of 41 to 55 dB are considered moderate; 56 to 70 dB are considered very acute. severe, 71 to 90 dB hearing thresholds and hearing thresholds above 90 decibels are profound.¹⁴ Late-onset conditions that were discovered after the neonatal period were assigned to causes that existed at birth, attributable to etiologies not present at birth, acquired: arises after the neonatal period, Injuries or defects in the cochlea, cochlear nerve, or brainstem routes to the auditory cortex can result in sensorineural hearing loss. Conductive hearing loss resulting from damage to or defects in the ossicles, tympanic membrane, external auditory canal or middle ear cavity.¹⁵ Combined sensorineural and conductive hearing loss is known as mixed hearing loss.¹⁶

MATERIAL AND METHODS

An observational cross-sectional study was performed on a sample of 142 adults, both males and females under 4 to 10 years of age visiting two government schools in the slum area of Lahore using convenient sampling technique. Data were collected from October 2021 to March 2022 and otoscope and audiometer were used to collect data from Govt High School Chamrupur, Government middle girls Chamrupur and Ghamana High School Tupasri. School children of the slum area of Lahore were included and the age limit was 4 to 10 years. Special school children such as mentally retarded, blind, cerebral palsy and also hearing-impaired children were excluded and all cases of congenital hearing loss. Children having current

infection like flu and fever were excluded and also children with hearing aids going into mainstreaming were excluded. The ears were checked by otoscope, tympanometer, and assessed with a standard pure tone audiometer. An otoscope is a hand-held otoscope that can be used to perform a preliminary examination of the ear canal and the tympanic membrane. These instruments include a magnifying lens, a light, and specula with varying diameters to accommodate the size of the meatus. The pure tone audiometer is a tool used to assess the type and severity of a hearing loss. A behavioral test called pure-tone audiometry is used to gauge hearing sensitivity. This test includes both the peripheral and cerebral auditory systems. The weakest sound that a person can hear at least half the time is shown by pure-tone thresholds. Hearing sensitivity is assessed using an audiogram, a graph that displays intensity as a function of frequency. In this, there is a range of pure tones or frequencies starting from 250 Hz to 8000 Hz and -10dB to 120dB respectively. The significant level was set as equal to or less than $p < 0.05$.

RESULTS

A total of 142 children were selected for this study having an age less than 4 years of age, mean age of children was 7.26 with the standard deviation among all children noted as 1.708. Mostly participants were found with normal hearing which was 88.7 % and conductive hearing loss 9.2% while only 2.1% of individuals were diagnosed with sensorineural hearing loss (Table I). A total of 142 children who participated in this study where 81 (57.2 %) males and 61(43%) females contributed (Table 2). All individuals were divided into 7 different categories depending on their age. About 9 (6.3%) children were four years old, 14 (9.9%) children had 5 years, 25(17.6%) 6 years, 33(23.2%) 7 years, 20(14.1%) 8 years, 26(18.3%) were of 9 years and

only 15 (10.3%) children had an age of 10 years.

Table I: Frequencies and Percentage of Types of Hearing Loss

Types of Hearing Loss	Frequency (%)
Normal Hearing	126 (88.7)
Conductive hearing loss	13 (9.2)
Sensorineural hearing loss	3 (2.1)
Total	142 (100)

Table II: Frequencies and Percentage Table of Demographic Variables

Variables	Frequency (%)
Male	81 (57)
Female	61 (43)
Total	142 (100)

Table III: Frequencies and Percentage Table of Demographic Variables

Age (years)	Frequency (%)
4	9 (6.3)
5	14 (9.9)
6	25 (17.6)
7	33 (23.2)
8	20 (14.1)
9	26 (18.3)
10	15 (10.3)
Total	142 (100)

DISCUSSION

This study sought to ascertain the prevalence of hearing impairment among school-aged residents of Lahore's slum regions. A convenient sampling technique was used to collect a sample of 142 kids from government schools in the slums of Lahore, with an equal proportion of

boys and girls. To ascertain the prevalence of hearing damage due to middle ear infections, Badar Munir conducted a study on kids between the ages of 2 and 10. Of the 52 patients, 15 (28.8%) had an ear infection for at least a month, with 37 (71.2%) experiencing it intermittently. 35 individuals (67.3%) were found to have mild hearing loss, 13 (25%) to have moderate, 2 (3.8%) to have severe, and 2 (3.8%) to have normal hearing.¹⁷

The findings of Shanthi Kolavali et al., who investigated 440 students for HL, found that 102 of them had various causes for HL, which support the findings of this study. The age range of youngsters from 5 to 8 years old comprised 22.5% of all children. Wax presence (10.2%), ASOM (5.68%), glue ear (3.4%), and CSOM (3.4%) were among the common causes. Children demonstrated a loss of hearing than 25dB in 39.09 percent of cases. At a district-level hospital, 66.74 percent of the causes were avoidable and treatable.¹⁸

In the Maopolskie Voivodeship of Poland, Weronika Swierniak and colleagues conducted research to evaluate Hearing Screening among First-Grade Children in Rural and Small Towns. Results of this research Twenty-five percent of the kids had favorable results and were forwarded for additional audiological evaluations. An estimated 11.6 percent of people had hearing loss, of whom 6.5 percent had four-frequency pure-tone hearing loss, 7.6 percent had high-frequency pure-tone hearing loss, and 8.2 percent had low-frequency pure-tone hearing loss (low-frequency pure-tone average). A study by Weronika Swierniak, et al. revealed that many kids in the district had hearing issues.¹⁹

Weronika Swierniak et al. observed that 88.7 percent of study participants had normal hearing, 9.2 percent had conductive hearing loss, and just 2.1 percent had sensorineural hearing

loss. Therefore, 11.2 percent of people have a hearing impairment. Among Polish school-age children from rural locations, Henryk Skarzynski et al. conducted research to determine the prevalence of hearing loss. The findings from this study are in agreement with our findings. 16.4% of hearing screening results were positive, a rate that was noticeably greater in younger children than in older children. More people had mild hearing loss than those with moderate or greater hearing loss. Bilateral hearing loss was less common in the kids than unilateral hearing loss. According to this study, hearing issues are prevalent in this population, particularly in younger children. It demonstrates the critical necessity for routinely checking on children's hearing health and raising awareness among parents and educators of the importance of hearing loss, even unilateral and mild hearing loss.²⁰

CONCLUSION

According to the study findings, school children in slum regions have hearing impairments. It also demonstrates the likelihood of hearing loss as a result of a lack of knowledge and inadequate medical resources. The participants in our study were also unaware that they had hearing loss. It was determined that those who had middle ear infections had hearing loss.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.

Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.

Competing interests: None

Funding: No funding source is involved.

Authors' contributions: All authors read and approved the final manuscript.

REFERENCES:

- 01- Clark JL. Hearing Screening for All in 2022. *The Hearing Journal*. 2022 Feb 1;75(2):6-7.
- 02- Intro-6- Nunes AD, Silva CR, Balen SA, Souza DL, Barbosa IR. Prevalence of hearing impairment and associated factors in school-aged children and adolescents: a systematic review. *Brazilian journal of otorhinolaryngology*. 2019 Apr 29; 85:244-53.
- 03- Brown TH. Childhood hearing impairment. *Paediatrics and Child health*. 2020 Jan 1;30(1):6-13.
- 04- Yun C, Wang Z, Gao J, He P, Guo C, Chen G, Zheng X. Prevalence and social risk factors for hearing impairment in Chinese children—A national survey. *International journal of environmental research and public health*. 2017 Jan;14(1):88.
- 05- Pilka E, Jedrzejczak WW, Kochanek K, Pastucha M, Skarzynski H. Assessment of the Hearing Status of School-Age Children from Rural and Urban Areas of Mid-Eastern Poland. *International Journal of Environmental Research and Public Health*. 2021 Jan;18(8):4299.
- 06- Graydon K, Waterworth C, Miller H, Gunasekera H. Global burden of hearing impairment and ear disease. *The Journal of Laryngology & Otology*. 2019 Jan;133(1):18-25.
- 07- Swierniak W, Skarzynski PH, Gos E, Czajka N, Matusiak M, Hartwich P, Skarzynska MB. Hearing Screening among First-Grade Children in Rural Areas and Small Towns in Małopolskie Voivodeship, Poland. *Audiology Research*. 2021 Jun;11(2):275-83.

- 08- Intro- Wändell P, Li X, Carlsson AC, Sundquist J, Sundquist K. Hearing impairment among children in Sweden with foreign born parents and natives: A national Swedish study. *Acta Paediatrica*. 2021 Oct;110(10):2817-24.
- 09- Skarżyński H, Gos E, Świerniak W, Skarżyński PH. Prevalence of hearing loss among polish school-age children from rural areas- Results of hearing screening program in the sample of 67 416 children. *International journal of pediatric otorhinolaryngology*. 2020 Jan 1; 128:109676.
- 10- Intro- Bussé AM, Hoeve HL, Nasserinejad K, Mackey AR, Simonsz HJ, Goedegebure A. Prevalence of permanent neonatal hearing impairment: Systematic review and Bayesian meta-analysis. *International Journal of Audiology*. 2020 Jun 2;59(6):475-85.
- 11- intro Lieu JE, Kenna M, Anne S, Davidson L. Hearing loss in children: a review. *Jama*. 2020 Dec 1;324(21):2195-205.
- 12- Kolavali S, Ahmed SM, Prasad AS, Shankar T, Prasad GS, Gupta M, Devi SI, Hameed GS. Surveillance of hearing impairment in school children of slum areas of Kurnool City; AP. *Journal of Evolution of Medical and Dental Sciences*. 2014 Oct 2;3(49):11677-87.
- 13- intro- Brown CS, Emmett SD, Robler SK, Tucci DL. Global hearing loss prevention. *Otolaryngologic Clinics of North America*. 2018 Jun 1;51(3):575-92.
- 14- Yong M, Liang J, Ballreich J, Lea J, Westerberg BD, Emmett SD. Cost-effectiveness of school hearing screening programs: A scoping review. *Otolaryngology-Head and Neck Surgery*. 2020 Jun;162(6):826-38.
- 15- Yong M, Panth N, McMahon CM, Thorne PR, Emmett SD. How the world's children hear: A narrative review of school hearing screening programs globally. *OTO open*. 2020 May;4(2):2473974X20923580.
- 16- Moeller MP. Early intervention and language development in children who are deaf and hard of hearing. *Pediatrics*. 2000 Sep 1;106(3):e43-.
- 17- Munir SB, Saeed I, Khan SG, Rehman SS, Ghayas R, Sikander M, Ehsan F. Frequency of hearing impairment in children between the age of 2 to 10 years with middle ear infection. *Journal of the Pakistan Medical Association*. 2021 Dec 29;71(6):1662-5.
- 18- Kolavali S, Ahmed SM, Prasad AS, Shankar T, Prasad GS, Gupta M, Devi SI, Hameed GS. Surveillance of hearing impairment in school children of slum areas of Kurnool City; AP. *Journal of Evolution of Medical and Dental Sciences*. 2014 Oct 2;3(49):11677-87.
- 19- Swierniak W, Skarzynski PH, Gos E, Czajka N, Matusiak M, Hartwich P, Skarzyska MB. Hearing Screening among First-Grade Children in Rural Areas and Small Towns in Małopolskie Voivodeship, Poland. *Audiology Research*. 2021 Jun;11(2):275-83.
- 20- Skarżyński H, Gos E, Świerniak W, Skarżyński PH. Prevalence of hearing loss among polish school-age children from rural areas- Results of hearing screening program in the sample of 67 416 children. *International Journal of Pediatric Otorhinolaryngology*. 2020 Jan 1; 128:109676.