Research Article

Prevalence of hearing loss in children presenting with speech and language delay at a Tertiary Hospital, Tanzania

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ABSTRACT

Introduction: Speech and language development is essential in childhood. Delay adversely affects psychosocial and educational outcomes, with hearing loss (HL) being a major contributing factor. In Tanzania, population-based data on childhood speech and language disorders are unavailable. This study provides baseline evidence to guide future research on the national burden of speech and language delay.

Method: A descriptive cross-sectional study was conducted at Muhimbili National Hospital from January 2023 to December 2025. Children presenting with speech and language delay or regression who met the eligibility criteria were recruited. Demographic and clinical information was collected, and participants underwent otoscopy, tympanometry, and development-appropriate audiological assessment. Associations between hearing status and selected clinical characteristics were assessed using appropriate statistical tests.

Results: Fifty-nine children were included; 43 (72.9%) had hearing loss (95% CI: 59.7–83.6%). The median age was 4.0 years (IQR3.25-5:00). Otoscopic and tympanometry findings suggestive of middle-ear pathology were not significantly associated with hearing status.

Conclusion: Hearing loss was common among children presenting with speech and language delay at this tertiary hospital. These findings support the importance of timely audiological assessment in this population. Further studies involving larger and more representative populations are needed to establish the broader burden of hearing loss among children with speech and language delay in Tanzania

Keywords: prevalence, children, hearing loss, speech and language delay, Tanzania

Introduction

The first years of life are crucial for speech and language development.[1] The process relies on an intact auditory system, adequate audiovisual stimulation, and sufficient exposure to spoken language. Children unable to perceive sound are therefore at risk of impaired language development.[2]

Speech refers to verbal language production, while language involves cognitive processing of communication.[3] Speech delay is suspected when spoken language is absent or less intelligible than expected for age. By two years, children should use about 50 words and combine them into meaningful two-word phrases.[4] Language delay occurs when children cannot effectively use acquired vocabulary. Key milestones include saying "mama" or "dada" by the end of the first year and making requests and following familiar one-step instructions by 18 months.[3]

Yoshinaga-Itano et al. found that hearing-impaired children identified by six months achieved better receptive and expressive language outcomes those diagnosed later.[5] Fulcher et al. similarly showed that children identified and treated by 12 months achieved better outcomes compared to normal-hearing peers by five years, whereas delayed intervention resulted in poorer outcomes.[6]

Speech and language delay may indicate hearing loss (HL).[7] Speech and language delay is among the most common developmental disorders affecting children aged 3–16 years, with an estimated prevalence of 3–10% worldwide.[8,9] However, prevalence remains uncertain due to under-recognition. HL severe enough to affect speech and language occurs in approximately 1–6 per 1,000 children in high-income countries.[10] Persistent speech delay beyond 3 years affects 4–5% of children in Germany, while prevalence ranges from 2–15% among those aged 4–6 years.[11] In the United States, prevalence ranges from 2.3% to 19% among children under 5 years.[12] Despite this burden, recognition remains inadequate, with low identification rates among parents, healthcare providers, and educators.[13,14]

Evidence from sub-Saharan Africa remains limited despite a significant burden of communication disorders.[13] Nwosu et al. reported communication impairments in 8–30% of Nigerians, while speech and language disorders affect approximately 6% of South African children.[15] Limited access to auditory and verbal rehabilitation may cause affected children to lag behind peers by up to 7.5 years by adolescence.[12] In Tanzania, population-based data on childhood speech and language disorders are unavailable. This study provides baseline evidence from Muhimbili National Hospital (MNH) to guide future research on the national burden of speech and language delay.

Method

This descriptive cross-sectional study was conducted at the ENT Department at MNH from January 2023 to December 2025. Participants were children aged 18 months to eight years presenting with speech and language delay or regression. Children with primary developmental delay disorders were excluded.

Ethical approval was obtained from the Muhimbili University of Health and Allied Sciences Ethics and Research Committee. Participants were recruited using convenience sampling. After informed assent and parental/guardian consent, history focusing on HL and physical examination, including otoscopy, were performed. Data were collected using a standardised form followed by audiological assessment.

Children below four years underwent tympanometry and click Auditory Brainstem Response (ABR) testing, while those aged ≥4 years underwent Conditioned Play Audiometry (CPA) or Pure Tone Audiometry (PTA) based on developmental age and cooperation. ABR was performed when cooperation was inadequate or results were inconsistent.

Tympanometry was performed using a 226 Hz probe and click ABR was performed accordingly, with hearing thresholds determined using waves I, III, and V and interpreted alongside tympanometry findings.

CPA assessed hearing thresholds at 0.5, 1, 2, and 4 kHz. PTA was performed using an Interacoustics AC33 clinical audiometer. Children diagnosed with HL were referred to the ENT clinic for further management. Freeman-Halton extension of Fisher's exact test was used for statistical significance and p-value of less than 0.05 was considered to be statistically significant.

Results

Demographic characteristics of participants

The median age was 4.0 years (interquartile range 3.25–5.00; range 18 months to 8 years). Females comprised 50.8% of participants (Table 1).

Prevalence of hearing loss

Overall prevalence of HL was 72.9% (43/59) with a 95% Confidence Interval (CI) of 60.9%–84.9% (Standard Error = 6.1%).

The median age of presentation of participants with HL was 4.00 years (IQR 3.25-5.00) and without HL was 4.30 (IQR 3.25-5.00).

Prevalence of HL by age and sex

Females comprised 50.8% of participants and 55.8% of the participants with HL. Among participants with normal hearing, 62.7% were males; however, this difference was not statistically significant (p-value 0.200) Table 2.

Hearing loss prevalence by age range and sex

Among the female participants, most of those with HL were in the age range of 2-3 and 3-4 years, followed by 4-5 years, while among male participants, most were in the age range of 4-5 years, followed by the age range of 3-4 years (Figure 1).

Table 1. Demographic characteristics of participants

Characteristic	Overall Participants N=59
Age in years (Median, IQR)	4.00 (3.25-5.00)
Sex:	
Female	30 (50.8%)
Male	29 (49.2%)

Table 2. Prevalence of hearing loss by age and sex

Characteristic	Normal hearing, N=16	HL, N= 43	p-value
Age in years (Median, IQR)	4.30 (3.38-5.00)	4.00 (3.25-5.00)	0.700
Sex			
Females	6 (37.5%)	24 (55.8%)	0.200
Males	10 (62.7%)	19 (44.2%)	

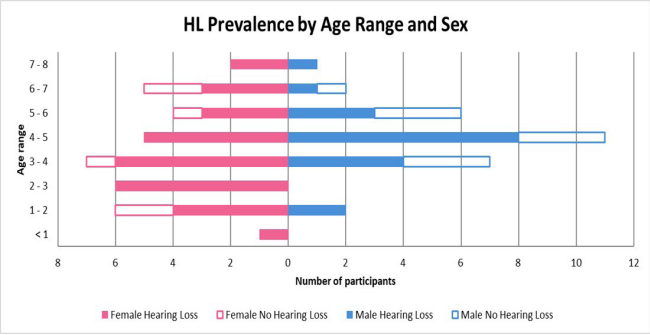

Figure 1. Prevalence of HL by age in years and sex

Hearing thresholds by sex

Among male participants with HL (n=19), the most common degree was

mild (42.1%), followed by severe (31.6%). In female participants with HL (n=24), moderate HL was most common (33.3%), followed by mild HL (25.0%). Mild HL was common among participants with HL overall (32.6%) (Table 3).

Types of HL

The most common middle ear finding was a bulging tympanic membrane, observed in 37.2% of participants with HL. Among participants with type B tympanograms, 48.8% had varying degrees of HL in the right ears and 44.2% in the left ears. The Freeman-Halton extension of Fisher's exact test showed no significant association between otoscopic and tympanometric features suggestive of Otitis Media with Effusion (OME) and HL in either the right or left ear - Table 4.

Discussion

Speech and language development depends on intact auditory, neurological, and psychological systems. This study described demographic characteristics and HL degree among children presenting with speech and language delay.

A total of 59 participants were recruited, with a median age of 4.0 years (interquartile range 3.25–5.0 years), consistent with previous studies.[11–15] Females comprised 30 (50.8%) and males 29 (49.2%). Although females represented a slightly higher proportion of participants with HL (55.8%), the difference was not statistically significant (P = 0.200). The prevalence of HL was 72.9%, higher than the 13.3% reported in other studies.[13,14] This may reflect the referral nature of MNH, where more severe cases are managed.

Most participants had mild HL (32.6%), followed by moderate HL which accounted for 25.6%. Severe HL was revealed in 23.3% of participants with HL. These findings are comparable with previous reports showing mild to moderate HL in 42.1% and severe HL in 11.0% of children with speech delay.[10]

Otoscopic findings suggestive of OME were common, affecting 25 right and 23 left ears, while tympanic membrane perforations and retractions were uncommon. Most OME cases had mild to moderate HL; however, OME was not significantly associated with HL.

Conclusion

The prevalence of HL among children aged 18 months to 8 years presenting with speech and language delay was 72.9%. Mild to moderate and severe HL were the most common degrees identified. OME was not significantly associated with HL. Hearing assessment is recommended for all children presenting with speech and language delay to enable early diagnosis and intervention.

Table 3. Hearing loss severity by sex

HL Level	Males N=19	Females N=24	Total with HL (N=43)	Proportion of total participants (N=59)
Mild	8 (42.1%)	6 (25.0%)	14 (32.6%)	23.7%
Moderate	3 (15.8%)	8 (33.3%)	11 (25.6%)	18.6%
Moderately Severe	2 (10.5%)	3 (12.5%)	5(11.6%)	8.5%
Severe	6 (31.6%)	4 (16.7%)	10(23.3%)	16.9%
Profound	0 (0.0%)	3 (12.5%)	3(7.0%)	5.1%
Total	19 (100%)	24 (100%)	43(100.0%)	72.9%

Table 4. Otoscopy and tympanometry findings

Characteristic	Overall, N= 59	Normal hearing, N=16	HL, N=43	p-value
Right TM appearance				
Normal	36 (61.0%)	12 (75.0%)	24 (55.8%)	
Bulging	20 (33.9%)	4 (25.0%)	16 (37.2%)	0.441
Inflamed	1 (1.7%)	0 (0%)	1 (2.3%)	
Perforated	2 (3.4%)	0 (0%)	2 (4.7%)	
Left TM appearance				
Normal	37 (62.7%)	12 (75.0%)	25 (58.1%)	
Bulging	20 (33.8%)	4 (25.0%)	16 (37.2%)	0.548
Perforated	1 (1.7%)	0 (0%)	1 (2.3%)	
Retracted	1 (1.7%)	0 (0%)	1 (2.3%)	
Right tympanogram				
A	34 (57.6%)	12 (75.0%)	22 (51.2%)	0.141
B	25 (42.4%)	4 (25.0%)	21 (48.8%)	
C	0 (0%)	0 (0%)	0 (0%)	
Left tympanogram				
A	36 (61.0%)	12 (75.0%)	24 (55.8%)	0.224
B	23 (39.0%)	4 (25.0%)	19 (44.2%)	
C	0 (0%)	0 (0%)	0 (0%)	

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Conflict of interests: None

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