

Parental Knowledge and Attitudes towards Hearing Loss and Audiology Services in Saudi Arabia: A Cross-Sectional Study

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ABSTRACT

Background: Paediatric hearing loss is a significant health concern worldwide, emphasizing the importance of parental knowledge and attitudes towards hearing health. Despite efforts to raise awareness, gaps in understanding persist, particularly in regions like Saudi Arabia. The aim of this cross-sectional study was to assess parental knowledge and attitudes towards childhood hearing loss and audiology services in Saudi Arabia.

Methodology: We surveyed 1191 parents in Saudi Arabia between September 2021 and January 2022 using the convenience sampling technique. We used a validated and adapted questionnaire from previous research to assess parental knowledge and attitudes through 31 items. Multilinear regression analysis was used to identify predictive factors of knowledge and attitude towards hearing loss and hearing services.

Results: A total of 1191 participants were involved in this study. Among the participants, 42.2% reported attending a hearing clinic, with 65.4% indicating a positive experience. 43.6% of parents demonstrated good knowledge, while 56.4% demonstrated poor knowledge. 79.9% of parents showed positive attitudes, while 20.1% displayed negative ones. Multilinear regression revealed clinic attendance, experience, education level, and income as significant predictors of knowledge and attitudes ($p < 0.05$).

Conclusion: The study highlights gaps in parental knowledge despite overall positive attitudes towards paediatric hearing health in Saudi Arabia. Targeted interventions, improved access to audiology services, and enhanced provider-patient communication are crucial to address these gaps and promote better outcomes for children with hearing impairment.

Keywords: Pediatric hearing loss, parental knowledge, attitudes, audiology services, Saudi Arabia.

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BACKGROUND

Hearing loss is one of the most common medical conditions that progresses in incidence and severity with age^{1,2}. There are three main types of hearing loss: conductive (CHL), sensorineural (SNHL), and mixed. Conductive hearing loss is typically secondary to damage to the external or middle ear, which impairs sound transmission to the inner ear. SNHL results from a disruption in the auditory pathway at any point, starting from the cochlea of the inner ear to the brainstem; although uncommon in children, it is the leading cause of permanent hearing loss³. Mixed hearing loss involves both conductive and sensorineural components⁴.

Pediatric hearing loss can be congenital or acquired⁵. Hearing loss occurs in approximately 1-3 newborns per 1000 births⁶, with 1-2 per 1,000 progressing to permanent childhood hearing impairment⁷. Higher prevalence of permanent childhood hearing loss (PCHL) observed in developing countries, and children from low socioeconomic status^{8,9}. Infant hearing loss affects both individuals and society¹⁰. Early detection and management are critical for identifying potentially reversible causes or other underlying conditions. Early recognition will aid in developing children's language, psychosocial functioning skills, and an average level of education. Subsequently, several countries have implemented a program called Universal Newborn Hearing Screening (UNHS), which enables the diagnosis and management of hearing impairment in early childhood to minimize the detrimental negative impact of hearing loss on children's development and education¹¹. Studies have demonstrated that these programs significantly reduce or eliminate the impact of SNHL on speech and language learning¹².

The hearing program's success is contingent upon community support and the willingness of parents to use provided healthcare audiology services⁸. Early intervention for hearing impairment correlates with parental awareness and support for hearing programs and services^{13,14}. Therefore, parental knowledge and attitudes about childhood hearing loss and hearing services are crucial for developing relevant and contextually appropriate audiology programs for children. A cross-sectional study conducted in Qassim, Saudi Arabia, assessed the parent's awareness and knowledge regarding pediatric hearing loss and hearing services, revealing that most parents included lacked a basic understanding of childhood hearing loss; however, the study was carried out in one city with a relatively small sample size. Therefore, it may be difficult to generalize their findings to the entire Saudi Arabian population¹¹. The aim of this study is to assess parental knowledge and attitudes towards childhood hearing loss and audiology services in Saudi Arabia.

Study Objectives:

1. To evaluate the level of parental knowledge regarding the causes, risk factors, and treatment options for pediatric hearing loss.
2. To assess parental attitudes towards seeking audiology services for their children, including early detection and intervention.
3. To investigate demographic factors associated with parental knowledge and attitudes, such as parental age, educational level, and income.
4. To identify potential gaps in parental understanding and perceptions regarding childhood hearing loss, aiming to inform targeted interventions and improve access to audiological care in Saudi Arabia.

METHODOLOGY

Study design and study population

This was a cross-sectional survey study that was conducted between

September 2021 and January 2022 to assess the parental knowledge and attitudes toward childhood hearing loss and hearing services in Saudi Arabia.

We targeted all parents regardless of whether they have a child with hearing loss or not to assess their knowledge. We included parents who reside in Saudi Arabia and have children aged 12 or younger. Parents who are not currently living in Saudi Arabia or have children older than 12 were excluded from this study.

Sample size

The sample size was calculated by Raosoft software, considering the confidence interval as 95%, a probability of prevalence of 50%, a margin of error of 5%, and stating that the required sample size for the study population was 385 individuals¹⁵.

Sampling Strategy

Eligible study participants meeting inclusion criteria were recruited using convenience sampling technique. They were invited to complete the questionnaire via survey links through social media platforms such as WhatsApp, Twitter, and Telegram.

Study Tool

An online self-administrated questionnaire survey designed by Google Platform questionnaire templet with the latest update version. We validated and adapted the questionnaire from previously published research in English, translated it into Arabic, verified it using the forward-backward method, and had three experts in the field review it.

Three sectors categorize the questionnaire; the first section assesses parents who have taken their child to an otology clinic and includes a question to gauge the response rate. The second section of the study questionnaire is about demographic data of the parents, including information about their (age, the region, level of education, and monthly income) without recording any identifying data for confidentiality. The third section of the questionnaire, comprising 31 items with options like "Yes," "No," and "I Don't Know," focuses on evaluating parental knowledge and attitudes towards childhood hearing loss and hearing services. We used 25 questions to gauge knowledge (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25), and another 6 questions to gauge attitudes (26, 27, 28, 29, 30, 31).

Each option was assigned a point value, "yes" answers were allocated 1 point, "no" and "don't know" answers were allocated 0 points. As a result, it provides a score spectrum of 0-25 points for knowledge and 0-6 points for attitude. Respectively. Knowledge score between 0-12 points was regarded as "poor knowledge" whereas a score of 13-25 was regarded as "excellent knowledge". Parents with a score of 0-3 points were regarded as having an "unfavourable attitude" whereas scores of 4-6 points were regarded "favourable attitude".

Statistical analysis

The Statistical Package for Social Science Software (SPSS) version 29 was used to analyse the data for this study. Categorical variables were presented as frequencies and percentages. Continuous variables were presented as mean and standard deviation (SD). The Chi-squared test was used to assess the statistically significant difference in attitude and knowledge levels across different demographic groups. Multilinear regression analysis was used to identify predictive factors of knowledge and attitude towards hearing loss and hearing services. The significance level was assigned as p-value less than 0.05.

RESULTS

Out of 1213, 1191 filled out the questionnaire (response rate 98.2%). Table 1 presents the demographic data of the study participants. A total of 1191 participants were included, with a distribution of 503 (42.2%) indicating they did not attend a hearing clinic, while 688 (57.8%) reported attending one. Table 1 shows that the majority reported a good experience with the clinic (450, 65.4%), while a smaller proportion reported a bad experience (17, 2.5%), and a significant number indicated a neutral experience (221, 32.1%).

Table 1. Demographic data

| Variable | |
|--------------------------|-------------|
| Attending hearing clinic | |
| No | 503 (42.2%) |
| Yes | 688 (57.8%) |
| Experience with clinic | |
| Good experience | 450 (65.4%) |
| Bad experience | 17 (2.5%) |
| Neutral | 221 (32.1%) |
| Parents | |
| Father | 504 (42.3%) |
| Mother | 687 (57.7%) |
| Region | |
| South | 157 (13.2%) |
| East | 98 (8.2%) |
| North | 98 (8.2%) |
| West | 615 (51.6%) |
| Central | 223 (18.7%) |
| Age | |
| 61 years and older | 38 (3.2%) |
| Younger than 31 years | 495 (41.6%) |
| Younger than 41 years | 302 (25.4%) |
| Younger than 51 years | 227 (19.1%) |
| Younger than 61 years | 129 (10.8%) |
| Educational level | |
| Elementary | 37 (3.1%) |
| High school | 225 (18.9%) |
| University | 841 (70.6%) |
| Illiterate | 14 (1.2%) |
| Intermediate | 74 (6.2%) |
| Monthly income | |
| 10000-20000 SRY | 379 (31.8%) |
| 5000-10000 SRY | 310 (26%) |
| Less than 5000 SRY | 356 (29.9%) |
| More than 20000 SRY | 146 (12.3%) |

SRY: Saudi riyal

In terms of parental representation, slightly more mothers participated in the study, with 687 (57.7%) compared to 504 (42.3%) fathers. Geographically, the largest representation came from the western region, with 615 participants (51.6%), followed by the central region with 223 (18.7%), while the south, east, and north regions had 157 (13.2%), 98 (8.2%), and 98 (8.2%) participants, respectively. Age distribution among participants varied, with the majority falling below the age of 41 years. Specifically, 495 participants (41.6%) were younger than 31 years, followed by 302 (25.4%) younger than 41 years, 227 (19.1%) younger than 51 years, 129 (10.8%) younger than 61 years, and 38 (3.2%) aged 61 years and older. Regarding educational background, the majority of participants had a university education (841, 70.6%), followed by high school education (225, 18.9%), and intermediate

education (74, 6.2%). A smaller proportion had elementary education (37, 3.1%), while an even smaller number were illiterate (14, 1.2%). Finally, the distribution of monthly income varied among participants, with 379 (31.8%) reporting an income between 10000-20000 SRY, 310 (26%) between 5000-10000 SRY, 356 (29.9%) less than 5000 SRY, and 146 (12.3%) reporting an income greater than 20000 SRY (Table 1).

Table 2 displays the participants' awareness levels of pediatric hearing loss. The majority of respondents demonstrated a high level of awareness regarding various factors related to hearing loss in children. For instance, 84% acknowledged that babies can be born with hearing loss, while a substantial number recognized that central nervous system infections (48.4%) and newborn infections (47.6%) can also cause hearing impairment. Additionally, awareness was notable regarding the impact of maternal infections during pregnancy, medication use, exposure to radiotherapy and chemotherapy, family history, inbreeding, and low birth weight on hearing loss, with percentages ranging from 31.9% to 53%. Importantly, a significant proportion (73.7%) recognized that children with hearing loss can attend school, indicating a positive perception of inclusion and accessibility. However, there were areas where awareness was comparatively lower, such as recognizing envy or magic as causes of hearing loss, with 44.2% and 53%, respectively. Overall, the findings suggest a commendable level of awareness among the participants regarding various factors associated with pediatric hearing loss, though there are areas that warrant further education and awareness campaigns to enhance understanding.

Table 3 delves into the attitudes of participants towards pediatric hearing loss. The findings indicate a generally positive attitude toward seeking early detection and intervention for hearing issues in children. The majority of respondents expressed willingness to have a hearing test for their baby soon after birth (76.5%), suggesting a proactive approach towards early detection. Similarly, a high percentage (83.1%) indicated a positive attitude towards having a hearing test for their child at school, which highlights a recognition of the importance of regular screening. Furthermore, a significant proportion (77.6%) expressed readiness to opt for ear surgery if necessary, demonstrating a willingness to pursue appropriate interventions. The acceptance of an initial examination of a child's hearing (81.4%) and the willingness to use hearing aids if required (78.3%) further underscore the positive attitudes towards addressing hearing impairments in children. Additionally, the majority of respondents expressed a desire for more information about hearing loss in children, causes, and treatment (83.8%), indicating an openness to learning and understanding.

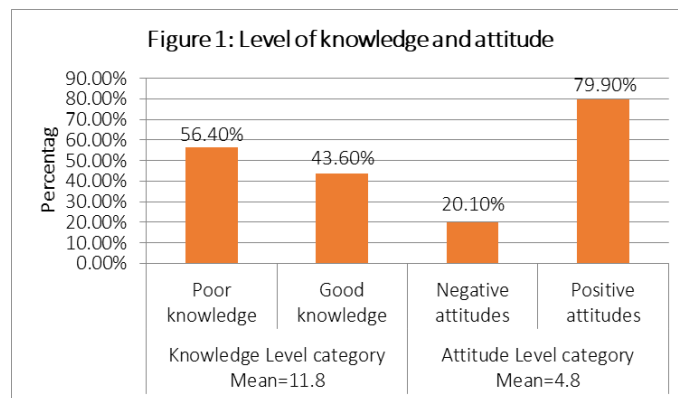


Table 4 provides an overview of the level of knowledge and attitude among the participants regarding pediatric hearing loss and audiology services. The mean knowledge score was found to be 11.8 ± 5.3,

Table 2. Awareness level of pediatric hearing loss

| Item | No | I don't know | Yes |
|--|-------------|--------------|-------------|
| Babies can be born with hearing loss. | 57 (4.8%) | 133 (11.2%) | 1001 (84%) |
| Central nervous system infection can cause hearing loss. | 79 (6.6%) | 535 (44.9%) | 577 (48.4%) |
| Newborn infection can cause hearing loss. | 179 (15%) | 567 (47.6%) | 445 (37.4%) |
| Infection of the mother during pregnancy can cause hearing loss for the fetus. | 217 (18.2%) | 594 (49.9%) | 380 (31.9%) |
| A child's use of medication can cause hearing loss. | 279 (23.4%) | 522 (43.8%) | 390 (32.7%) |
| Exposure of a child to radiotherapy can cause hearing loss. | 178 (14.9%) | 559 (46.9%) | 454 (38.1%) |
| Exposing a child to chemotherapy can cause hearing loss. | 211 (17.7%) | 576 (48.4%) | 404 (33.9%) |
| Jaundice (baby yolk) can cause hearing loss. | 399 (33.5%) | 578 (48.5%) | 214 (18%) |
| Delayed crying at birth can cause hearing loss. | 345 (29%) | 547 (45.9%) | 299 (25.1%) |
| Family history can cause hearing loss. | 165 (13.9%) | 268 (22.5%) | 758 (63.6%) |
| Inbreeding can cause hearing loss. | 283 (23.8%) | 318 (26.7%) | 590 (49.5%) |
| Low birth weight (less than 1500 grams) can cause hearing loss. | 363 (30.5%) | 631 (53%) | 197 (16.5%) |
| Children with hearing loss can go to school. | 140 (11.8%) | 173 (14.5%) | 878 (73.7%) |
| Risks related to conductive hearing loss and sensorineural hearing | 111 (9.3%) | 535 (44.9%) | 545 (45.8%) |
| Deformities of the head and face can cause hearing loss. | 206 (17.3%) | 390 (32.7%) | 595 (50%) |
| Head injury can cause hearing loss. | 114 (9.6%) | 245 (20.6%) | 832 (69.9%) |
| Envy can cause hearing loss. | 401 (33.7%) | 263 (22.1%) | 527 (44.2%) |
| Magic can cause hearing loss. | 273 (22.9%) | 287 (24.1%) | 631 (53%) |
| Ear discharge and otitis media can cause hearing loss. | 150 (12.6%) | 286 (24%) | 755 (63.4%) |
| Frequent upper respiratory infections can cause otitis media. | 195 (16.4%) | 410 (34.4%) | 586 (49.2%) |
| Breastfeeding for the first six months reduces or prevents otitis media. | 155 (13%) | 402 (33.8%) | 634 (53.2%) |
| Smoking by parents or children can lead to otitis media. | 301 (25.3%) | 495 (41.6%) | 395 (33.2%) |
| Routine childhood vaccinations can reduce otitis media. | 174 (14.6%) | 385 (32.3%) | 632 (53.1%) |
| Hearing loss can be recognized soon after birth. | 325 (27.3%) | 284 (23.8%) | 582 (48.9%) |
| Hearing loss can be treated. | 142 (11.9%) | 273 (22.9%) | 776 (65.2%) |

Table 3. Attitude towards pediatric hearing loss

| Item | No | I don't know | Yes |
|---|-------------|--------------|-------------|
| I would like to have a hearing test for my baby soon after birth. | 139 (11.7%) | 141 (11.8%) | 911 (76.5%) |
| I would like to have a hearing test for my child at school. | 87 (7.3%) | 114 (9.6%) | 990 (83.1%) |
| I would like to have ear surgery on my child if required. | 147 (12.3%) | 120 (10.1%) | 924 (77.6%) |
| I accept the initial examination of my child's hearing. | 82 (6.9%) | 139 (11.7%) | 970 (81.4%) |
| I would like to use hearing aids for my child if required. | 105 (8.8%) | 154 (12.9%) | 932 (78.3%) |
| I would like to have more information about hearing loss in children, causes and treatment. | 90 (7.6%) | 103 (8.6%) | 998 (83.8%) |

Table 4. Level of knowledge and attitude

| Variable | Mean ± SD | Range (min-max) |
|---------------------------------|------------|-----------------|
| Knowledge score | 11.8 ± 5.3 | (0-25) |
| Attitude score | 4.8 ± 1.8 | (0-6) |
| Variable | N | % |
| Knowledge Level category | | |
| Poor knowledge | 672 | 56.4 |
| Good knowledge | 519 | 43.6 |
| Attitude Level category | | |
| Negative attitudes | 239 | 20.1 |
| Positive attitudes | 952 | 79.9 |

with a range from 0 to 25, indicating a moderate level of knowledge among the respondents. In terms of knowledge level categories, 672 participants (56.4%) demonstrated poor knowledge, while 519 (43.6%) exhibited good knowledge about pediatric hearing loss.

The mean attitude score was 4.8 ± 1.8, with a range from 0 to 6. We found that the majority of participants (952, 79.9%) had positive attitudes towards pediatric hearing loss, while 239 (20.1%) exhibited negative attitudes, Figure 1.

Table 5 investigates the knowledge, and attitude towards hearing loss and hearing services stratified by demographic data. Attending a hearing clinic showed significant difference for both knowledge level ($P < 0.0001$) and attitude level ($P < 0.0001$). Specifically, participants who attended a hearing clinic demonstrated higher knowledge and more positive attitudes compared to those who did not. The clinic experience also showed a significant difference with knowledge level ($P = 0.038$) and attitude level ($P = 0.044$), with participants reporting a good experience exhibiting higher knowledge and more positive attitudes.

Table 5. Demographic data and knowledge and attitude toward hearing loss and hearing services

| Variable | Knowledge level | | Attitude level | | P value | |
|--------------------------|-----------------------|--------------|----------------|--------------|--------------|-----------------|
| | Poor | High | Negative | Positive | | |
| Attending hearing clinic | No | 315 46.9% | 188 36.2% | 149 62.3% | 354 37.2% | <0.0001** |
| | Yes | 357 53.1% | 331 63.8% | 90 37.7% | 598 62.8% | |
| Experience with clinic | Good experience | 220 61.6% | 230 69.5% | 51 56.7% | 399 66.7% | P-value=0.044* |
| | Bad experience | 10 2.8% | 7 2.1% | 5 5.5% | 12 2.0% | |
| | Neutral | 127 35.6% | 94 28.4% | 34 37.8% | 187 31.3% | |
| Parents | Father | 284 42.3% | 220 42.4% | 115 48.1% | 389 40.9% | P=0.025* |
| | Mother | 388 57.7% | 299 57.6% | 124 51.9% | 563 59.1% | |
| Region | South | 92 13.7% | 65 12.5% | 30 12.6% | 127 13.3% | P-value=0.498 |
| | East | 64 9.5% | 34 6.6% | 17 7.1% | 81 8.5% | |
| | North | 56 8.3% | 42 8.1% | 31 13.0% | 67 7.0% | |
| | West | 326 48.5% | 289 55.7% | 103 43.1% | 512 53.8% | |
| | Central | 134 19.9% | 89 17.1% | 58 24.3% | 165 17.3% | |
| Age | 61 years and older | 19 2.8% | 19 3.7% | 8 3.3% | 30 3.2% | P-value=0.580 |
| | Younger than 31 years | 278 41.4% | 217 41.8% | 101 42.3% | 394 41.4% | |
| | Younger than 41 years | 167 24.9% | 135 26.0% | 55 23.0% | 247 25.9% | |
| | Younger than 51 years | 134 19.9% | 93 17.9% | 42 17.6% | 185 19.4% | |
| | Younger than 61 years | 74 11.0% | 55 10.6% | 33 13.8% | 96 10.1% | |
| Educational level | Elementary | 27 4.0% | 10 1.9% | 15 6.3% | 22 2.3% | P-value= 0.001* |
| | High school | 133 19.8% | 92 17.7% | 56 23.4% | 169 17.8% | |
| | University | 449 66.8% | 392 75.5% | 130 54.4% | 711 74.7% | |
| | Illiterate | 9 1.3% | 5 1.0% | 3 1.3% | 11 1.2% | |
| | Intermediate | 54 8.0% | 20 3.9% | 35 14.6% | 39 4.1% | |
| Monthly income | 10000-20000 SRY | 209 31.1% | 170 32.8% | 80 33.5% | 299 31.4% | P-value=0.527 |
| | 5000-10000 SRY | 194 28.9% | 116 22.4% | 67 28.0% | 243 25.5% | |
| | Less than 5000 SRY | 197 29.3% | 159 30.6% | 59 24.7% | 297 31.2% | |
| | More than 20000 SRY | 72 10.7% | 74 14.3% | 33 13.8% | 113 11.9% | |

Table 6. Multilinear regression for potentially predictive factors of knowledge and attitude toward hearing loss and hearing services

| Level of Knowledge | Unstandardized Coefficients | Standardized Coefficients | P-value | 95% C.I. for Odds Ratio | |
|------------------------|-----------------------------|---------------------------|---------|-------------------------|--------|
| | B | Beta | | Lower | Upper |
| (Constant) | 6.782 | | .000 | 3.366 | 10.197 |
| clinic | 2.489 | .234 | .000 | 1.568 | 3.410 |
| experience | -.512 | -.106 | .016 | -.930 | -.095 |
| parent | -.168 | -.016 | .582 | -.766 | .430 |
| area | .091 | .022 | .449 | -.145 | .327 |
| age | -.202 | -.041 | .154 | -.480 | .076 |
| education | -.110 | -.016 | .585 | -.504 | .284 |
| income | .269 | .053 | .069 | -.021 | .559 |
| R Square= 0.032 | | Adjusted R Square= 0.026 | | | |
| Attitude level | Unstandardized Coefficients | Standardized Coefficients | P-value | 95% C.I. for Odds Ratio | |
| | B | Beta | | Lower | Upper |
| (Constant) | 2.683 | | .000 | 1.513 | 3.853 |
| clinic | .976 | .265 | .000 | .661 | 1.292 |
| experience | -.105 | -.063 | .148 | -.248 | .037 |
| parent | .169 | .046 | .107 | -.036 | .373 |
| area | -.026 | -.018 | .530 | -.107 | .055 |
| age | -.063 | -.037 | .198 | -.158 | .033 |
| education | -.071 | -.029 | .303 | -.206 | .064 |
| income | .006 | .003 | .907 | -.093 | .105 |
| R Square= 0.053 | | Adjusted R Square= 0.047 | | | |

Additionally, we found a significant difference (P = 0.025) between parental status and attitude level, where mothers showed slightly more positive attitudes than fathers. Educational level was significantly difference with both knowledge level (P = 0.001) and attitude level (P = 0.001), with participants who had a university education exhibiting higher knowledge and more positive attitudes. However, we found no significant difference in knowledge or attitude levels and region or monthly income.

Table 6 presents the results of multilinear regression analysis aimed at identifying potentially predictive factors of knowledge and attitude towards hearing loss and hearing services among the study participants. The constant value for the level of knowledge was 6.782, which represents the expected knowledge score when all other variables remain constant. Among the predictor variables, attending a hearing clinic showed a significant positive association with knowledge level (B = 2.489, p < 0.000), indicating that participants who attended a clinic tended to have higher knowledge scores. Conversely, experience with the clinic exhibited a negative association with knowledge level (B = -0.512, p = 0.016), suggesting that participants who reported a negative experience with the clinic tended to have lower knowledge scores. Other demographic variables, including parental status, region, age, education, and income, did not show significant associations with knowledge level.

When all other variables remain constant, the constant value for attitude level is 2.683, which represents the expected attitude score. Similar to knowledge level, attending a hearing clinic demonstrated a significant positive association with attitude level (B = 0.976, p < 0.000), indicating that participants who attended a clinic tended to have more positive attitudes towards hearing loss and hearing services. Experience with the clinic showed a negative but nonsignificant association with attitude level (B = -0.105, p = 0.148). Other demographic variables, including parental status, region, age, education, and income, also did not exhibit significant associations with attitude level.

DISCUSSION

Hearing loss can be a considerable impediment to education and social integration. Early identification and intervention can be significantly beneficial because hearing is essential to understanding social interactions and educational and behavioral participation. Our current study sought to explore the knowledge and attitudes of parents towards childhood hearing loss and audiology services. The results from the study revealed that both fathers and mothers reported relatively poor understanding of childhood hearing loss and its risk factors.

Around 84% of parents showed a high grade of knowledge regarding that babies could be born with hearing loss; a similar finding was found regarding that head trauma can cause hearing loss (69.9%); the majority of parents answered correctly when asked if children with hearing loss can attend school (73%); as well as when asked about “family history can cause hearing loss”. Similar findings were observed in a study done in Qassim¹¹, but it differs from studies done in India and solemn islands^{14,16}.

The current study also revealed poor parental knowledge regarding the risk factors of hearing loss, including “low birth weight can cause hearing loss”, “baby yolk (Jaundice) can cause hearing loss”. Parents showed limited knowledge regarding whether medications or drugs can cause hearing loss, these findings are similar to studies done in Qassim, Saudi Arabia, and India; this may be explained by the lack of educational programs in audiology clinics^{11,14}.

When asked about otitis media and its risk factors, 63% of parents answered correctly regarding whether “otitis media and ear discharges can cause hearing loss”, and 53% were aware that “vaccinations can prevent OM”. This agrees with a study done in the United Arab Emirates (UAE), where they found that the majority of parents were aware that “ear discharge and OM cause hearing loss”¹⁷.

Regarding non-biomedical beliefs, half of the parents thought that magic might cause hearing impairment (53%); the same results were observed with “Envy can cause HL”. Similar results were found in studies done in the Solemn Islands and UAE, where they found that most parents believed curses might cause HL. Additionally, 25% of their participants believed that evil spirits could potentially trigger HL^{16,17}.

Regarding attitude towards audiology services in Saudi Arabia, most parents expressed positive attitudes about the statement “I accept the initial examination of my child’s hearing “followed by “I would like to have more information about hearing loss in children, causes, and treatment.” which may be encouraging to implement more educational and promoting programs on infant hearing loss. These findings agree with a study done in Karnataka, India, in 2016, which found that 85% of the parents welcomed more information and contraindicated with the results of a previous survey of Solomon Islands but confirmed the positive attitudes of parents toward childhood audiology services^{16,17}. In addition, 77% of our participants would accept ear surgery for their child. In contrast, a study by Kaspar et al. demonstrated that surgical treatment was the least favored service (63.7%)¹⁶. Education and personal beliefs may play a role in these findings. Our study also showed a positive attitude toward children using hearing aids (78.3%) which is higher than another study done at King Khalid University Hospital's (KKUH) pediatric clinics (74%)¹⁸. Other studies have shown higher acceptance for hearing aids, such as a study done in Qassim, Saudi Arabia (84%) and Taif, Saudi Arabia (84.4%)^{11,19}.

The current study also examined parents' overall knowledge and attitudes toward childhood HL, revealing that 519 parents (43.6%) possessed good knowledge, while 672 parents (56.4%) possessed poor knowledge. However, 952 parents (79.9%) expressed positive attitudes toward childhood audiology services, and 239 parents (20.1%) expressed negative attitudes. This is the first study to determine Saudi Arabia's overall knowledge and attitudes toward childhood HL. Overall, our findings revealed that most participants possessed poor knowledge regarding childhood HL, although most parents expressed positive attitudes and practices regarding the hearing tests and audiology services. Our results are reflected in studies done in Qassim, Taif, and the UAE^{11,17,19}.

Moreover, those who attended the clinic, those with previous experience, and those with higher education had higher knowledge levels ($p < 0.0001$, $p = 0.038$, and $p = 0.001$). We observed similar findings regarding attitudes towards audiology services. Higher educational levels revealed similar associations in Qassim, Taif, and the UAE. Still, they did not report a significant association between going to hearing clinics and having a positive experience there. They observed no significant association between age and monthly income. This also disagrees with the findings in studies mentioned before in Qassim, Taif, and UAE.^{11,17,19}. To our knowledge, this is the first study to report this association.

Recommendations for change based on the findings focus on the improvement of parental knowledge and positive attitude toward hearing care. These considerations give significance to increasing accessibility to hearing clinics, especially among those in the lower income and educational strata, since clinic attendance, positive experiences, education level, and income were found to be significant predictors of knowledge and attitudes. Such clinic visits should include education programs for parents who have shown poor knowledge about hearing health, at 56.4%. Equally important will be the need for the clinics to continue their current good practice in ensuring positive

patient experiences given that this significantly influences knowledge and attitude. Outreach tailored to address the 20.1% of parents who showed negative attitudes should be supportive and reassuring.

This study has limitations. The cross-sectional survey study design restricted the generalisability of our findings and restricted the ability to examine causality. This study design is prone to social desirability and reporting bias. This is an online study which is not representative of all targeted study population and limited to users of social media websites. This online survey study did not estimate the number of individuals who received invitation to participate in this research, therefore, this could lead to non-response bias. Therefore, our study findings should be interpreted carefully.

Enhancing knowledge and attitude towards hearing loss and audiology services acceptability can be achieved through multiple approach including launching awareness campaign that targets parents and schools. Besides, paediatricians should enhance parental awareness regarding hearing loss and educate parents concerning early detection and prevention of further complications.

CONCLUSION

In conclusion, our study provides valuable insights into parental knowledge and attitudes towards childhood hearing loss and audiology services in Saudi Arabia. The findings underscore the importance of targeted interventions to address knowledge gaps and promote positive attitudes among parents. Strategies to improve access to audiology services, enhance provider-patient communication, and tailor educational interventions to parents with varying education levels may help improve outcomes for children with hearing impairment. Further research is warranted to explore the impact of these interventions on parental knowledge, attitudes, and healthcare-seeking behaviors in the context of pediatric hearing health.

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REFERENCES

1. Cruickshanks KJ, Tweed TS, Wiley TL, et al. The 5-year incidence and progression of hearing loss: the epidemiology of hearing loss study. *Arch Otolaryngol Head Neck Surg* 2003;129(10):1041-6.
2. Isaacson B. Hearing loss. *Med Clin North Am* 2010;94(5):973-88.
3. Weber PC, Klein AJ. Hearing loss. *Med Clin North Am* 1999;83(1):125-137.
4. Dimitrov L, Gossman W. Pediatric Hearing Loss [Internet]. 2021 [accessed 2024 September 14]. Available from: <https://pubmed.ncbi.nlm.nih.gov/30855869/>
5. Klein AJ, Weber PC. Hearing aids. *Med Clin North Am* 1999;83(1):139-51.
6. Mehl AL, Thomson V. The Colorado newborn hearing screening project, 1992-1999: on the threshold of effective population-based universal newborn hearing screening. *Pediatrics* 2002;109(1):1-7.

7. Fortnum HM, Summerfield AQ, Marshall DH, et al. Prevalence of permanent childhood hearing impairment in the United Kingdom and implications for universal neonatal hearing screening: questionnaire based ascertainment study. *BMJ* 2001;323(7312):536-40.
8. Govender SM, Khan NB. Knowledge and Cultural Beliefs of Mothers Regarding the Risk Factors of Infant Hearing Loss and Awareness of Audiology Services. *J Public Health Afr* 2017;8(1):557-62.
9. Kuschke S, Swanepoel W, le Roux T, et al. Profile of childhood hearing loss in the Western Cape, South Africa. *Int J Pediatr Otorhinolaryngol* 2020;137(1): 1-11.
10. Wang X, Wu D, Zhao Y, et al. Knowledge and attitude of mothers regarding infant hearing loss in Changsha, Hunan province, China. *Int J Audiol* 2017;56(12):997-1002.
11. Alsudays AM, Alharbi AA, Althunayyan FS, et al. Parental knowledge and attitudes to childhood hearing loss and hearing services in Qassim, Saudi Arabia. *BMC Pedia* 2020; 1(1): 1-12.
12. Moeller MP. Early intervention and language development in children who are deaf and hard of hearing. *Pediatrics* 2000;106(3):43-8.
13. Olusanya BO, Luxon LM, Wirz SL. Maternal views on infant hearing loss in a developing country. *Int J Pediatr Otorhinolaryngol* 2006;70(4):619-623.
14. Ravi R, Yerraguntla K, Gunjawate DR, et al. Knowledge and attitude (KA) survey regarding infant hearing loss in Karnataka, India. *Int J Pediatr Otorhinolaryngo* 2016;85(1):1-4.
15. Raosoft. Raosoft Sample Size Calculator [Internet]. 2004 [accessed 2024 September 14]. Available from: <http://www.raosoft.com/samplesize.html>.
16. Kaspar A, Newton O, Kei J, et al. Parental knowledge and attitudes to childhood hearing loss and hearing services in the Solomon Islands. *Int J Pediatr Otorhinolaryngol* 2017;103(1):87-92.
17. Ayas M, Yaseen H. Knowledge and Attitudes of Parents towards Childhood Hearing Loss and Pediatric Hearing Services in Sharjah, United Arab Emirates. *Inter jo enviro res pub health* 2021;18(12): 1-17.
18. Aljabri S, Alkaff H, Alsaleh A, et al. Parental Knowledge and Attitudes towards Childhood Hearing Loss and Hearing Services in King Khalid University Hospital's (KKUH). *Pedia Clinic* 2019; 1(1): 1-18.
19. Aljuaid SM, Alotaibi GH, Alsharif M, et al. Parental awareness of risks and causes of hearing loss and the acceptance of the intervention in Taif City, Saudi Arabia. *Saudi Jour Otorhinolaryngology Head Neck Sur* 2021;23(1):148 - 54.