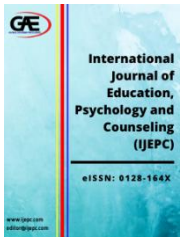
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KNOWLEDGE AND AWARENESS OF CHILDHOOD HEARING LOSS AMONG EDUCATORS: A SYSTEMATIC REVIEW

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Abstract:

Childhood hearing loss may affect communication, language development, classroom participation, and academic progress, making educators an important group for recognising possible hearing difficulties and facilitating appropriate support. However, evidence on educators' knowledge and awareness remains scattered across different educational settings and countries, with variation in the areas of hearing health assessed. This systematic literature review examined the level and domains of educators' knowledge and awareness of childhood hearing loss, including understanding of early identification, access to hearing care, and professional support needs. The review followed the PRISMA framework. Advanced searches were conducted in Scopus and Web of Science using search terms related to knowledge and awareness, childhood hearing loss, and educators. The searches identified 527 records, of which 10 primary empirical studies met the final eligibility criteria and were included in the synthesis. Three themes were identified: (1) foundational knowledge of childhood hearing loss, covering causes, risk factors, signs, effects, prevention, and hearing technology; (2) knowledge for early identification and access to hearing care, including recognition, assessment, intervention, and referral; and (3) knowledge translation and professional capacity-building, covering training, curriculum adaptation, classroom support, and institutional resources. Across the studies, general awareness and knowledge of the effects of hearing loss were often stronger than knowledge of identification, referral, and intervention. Educational programmes improved short-term knowledge, although evidence of long-term application was limited. Greater attention to practical referral knowledge, role-specific training, and links between education and hearing-health services is needed.

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Keyword:

Hearing Loss; Early Identification, Hearing Health, Teacher Training

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Introduction

Childhood hearing loss can affect speech and language development, literacy, academic performance, and social participation (Aggarwal et al., 2024; World Health Organization, 2021; Zussino et al., 2022). Some of these effects may become more apparent when children enter educational settings, where communication and listening demands increase. Difficulty accessing spoken information can interfere with following verbal instructions, participating in classroom activities, and communicating effectively with educators and peers (Borders et al., 2010; Xie et al., 2014). Early identification and appropriate intervention are therefore important in reducing the developmental and language consequences associated with childhood hearing loss (Ching et al., 2017; Kanji & Naude, 2026). Formal hearing screening can identify children who require further assessment, while audiological evaluation is needed to establish hearing status. Educational settings provide an additional opportunity for possible hearing difficulties to be noticed, particularly when these difficulties were not identified earlier or become more apparent with increasing listening demands. Educators, including teachers, early childhood practitioners, and school administrators, have regular contact with children across different learning and communication situations and may observe behaviours that raise concerns about hearing. School-based studies have shown that education personnel can contribute to recognising children at risk of hearing or communication difficulties and directing them towards further assessment when appropriate (Kumar & D'Mello, 2006; Shinn et al., 2021). Educators may also contribute to referral and access to hearing services, particularly when hearing difficulties have not previously been identified (Kaspar et al., 2023). Their role is therefore relevant not only for children with established hearing loss but also for those whose hearing difficulties become apparent during the preschool or school years.

The extent to which educators can contribute to recognition and support depends partly on their knowledge and awareness of childhood hearing loss. Relevant knowledge includes understanding possible causes and risk factors, recognising signs of hearing difficulty, knowing how hearing loss may affect communication and learning, have basic knowledge of hearing technologies, and understand when further assessment may be required. Educators may also need knowledge of communication strategies, classroom support, and appropriate referral procedures. Previous studies have reported considerable variation across these areas, including differences in awareness, understanding of hearing-loss severity, knowledge of technological devices, communication strategies, and educational support (Nilisha & Ranjan, 2021; Santos & Delgado-Pinheiro, 2018; Sendesen et al., 2026). Findings from professional-development research also suggest that hearing-related knowledge can improve following structured education, although evidence on long-term retention and application in practice remains limited. These differences indicate that general awareness alone may not adequately represent preparedness to recognise and respond to childhood hearing loss. Existing studies also involve different educator groups, educational settings, and assessment approaches, making the evidence difficult to interpret as a whole. A systematic synthesis is therefore needed to clarify what educators know about childhood hearing loss, identify areas where knowledge and awareness remain limited, and examine how this knowledge relates to recognition, referral, and educational support. The present review brings together current evidence across educator groups and settings to provide a clearer account of existing knowledge, persistent gaps, and priorities for future professional development and research.

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Literature Review

Knowledge and awareness of childhood hearing loss among educators involve more than recognising that hearing difficulties can affect learning. Relevant knowledge includes understanding common signs and causes of hearing loss, its possible severity, effects on speech and language development, the purpose of hearing technologies, communication needs, and the circumstances in which referral for further assessment is appropriate. Research has examined these areas among different educator groups and through different assessment approaches. Nilisha and Ranjan (2021), for example, developed and validated a questionnaire that assessed awareness, knowledge, and practice related to hearing impairment among school teachers. Santos and Delgado-Pinheiro (2018) examined teachers' knowledge of hearing-loss degree, technological devices, and communication strategies, whereas Sendesen et al. (2026) reported a moderate level of knowledge of hearing loss and hearing aids among classroom teachers. Tuli et al. (2018) identified gaps in knowledge concerning the causes, assessment, and treatment of paediatric hearing loss. Earlier work by Blair et al. (1999) also showed that teachers did not always have adequate information about the hearing loss of students in their classrooms. Evidence from preschool settings is less extensive Silva et al. (2010), for instance, found that many preschool teachers had limited or imprecise knowledge of hearing loss. Across these studies, the level of knowledge differed according to the area being assessed, suggesting that educator knowledge cannot be represented adequately by a single general measure.

Differences are particularly apparent in knowledge of hearing-loss severity, hearing technologies, and communication strategies. Santos and Delgado-Pinheiro (2018) found limited understanding of hearing-loss degree and of devices such as hearing aids, cochlear implants, and frequency modulation systems. Gaps were also reported in communication strategies for students with hearing impairment. Sendesen et al. (2026) similarly found only moderate knowledge of hearing loss and hearing aids among classroom teachers, while Tuli et al. (2018) reported limited knowledge of causes, assessment, and treatment. Blair and EuDaly (1999) further showed that teachers were not always sufficiently informed about the hearing needs of individual students. In preschool education, Silva et al. (2010) noted that much of the knowledge reported by teachers appeared to come from common understanding or personal experience rather than formal preparation. General awareness of hearing loss was therefore not consistently accompanied by detailed knowledge of severity, management options, hearing technology, or educational implications. This matters in educational settings because educators may work with children using hearing aids or cochlear implants, children with mild or fluctuating hearing loss, or children whose hearing difficulties have not yet been diagnosed. Appropriate support depends not only on recognising that a hearing problem may exist but also on understanding how hearing loss may affect communication, participation, and learning.

Training has been examined as one way of addressing these gaps. Sharma et al. (2024) reported improvement in school teachers' knowledge after an educational programme on hearing loss and cochlear implants, while Kapalamula et al. (2023) found a marked increase in hearing-health knowledge among teachers in Malawi following an educational outreach programme. Both studies suggest that structured education can improve knowledge in areas where prior understanding is limited. Practical training may be especially useful when the content relates directly to situations encountered in schools. Kumar and D'Mello (2006), for example, trained teachers to use a questionnaire to identify children at risk of speech and hearing disorders. Shinn et al. (2021) also reported that teacher prescreening contributed to identifying children who later failed hearing screening. These studies are different from surveys that measure

existing knowledge because educators were given specific guidance before being expected to act. Even so, the findings show that educators can contribute to hearing-related identification when suitable instructions and procedures are provided. Training should therefore not be limited to factual information about hearing loss. Content on observable signs, classroom communication, hearing technology, referral procedures, and available services may be more useful when the purpose is to improve educators' responses to children with possible or confirmed hearing difficulties. Whether improvements after short training programmes are retained and applied in routine educational practice, however, has received much less attention. Knowledge of identification and referral is another area that deserves separate consideration. Educators observe children repeatedly during activities involving listening, communication, learning, and social interaction, which creates opportunities to notice persistent difficulties. Kumar and D'Mello (2006) demonstrated that teachers could assist in identifying children at risk when provided with an appropriate questionnaire and clear instructions. Shinn et al. (2021) similarly found that teachers identified children considered at high risk who subsequently failed hearing screening. Kaspar et al. (2023), although involving school principals rather than classroom teachers, reported substantial knowledge of childhood hearing loss and hearing services and discussed the contribution that education personnel may make to access to care. Preschool evidence shows that knowledge of screening and referral cannot be assumed. Silva et al. (2010) reported that almost all preschool teachers in the study were unfamiliar with school hearing screening despite having some knowledge of characteristics associated with hearing impairment. Recognition of a possible hearing problem and knowledge of the next appropriate action are therefore not the same. An educator may notice poor listening, delayed responses, speech difficulties, or problems following spoken instructions but still be uncertain about where the child should be referred, what type of assessment is required, or which services are available. Referral knowledge is consequently an important part of preparedness, particularly where educators may be among the first adults outside the family to notice persistent communication or listening difficulties.

Existing studies do not examine the same aspects of knowledge or the same groups of educators. Some focus on general awareness and practice (Nilisha & Ranjan, 2021), while others examine hearing-loss degree, hearing technologies and communication strategies (Santos & Delgado-Pinheiro, 2018), hearing loss and hearing-aid knowledge (Sendesen et al., 2026), causes and management (Tuli et al., 2018), or knowledge of individual students' hearing needs (Blair et al., 1999). Participant groups also differ and include preschool teachers, primary and secondary school teachers, educators working with children with diagnosed hearing loss, and school principals (Silva et al., 2010; Santos & Delgado-Pinheiro, 2018; Kaspar et al., 2023). A recent systematic review of teachers' knowledge and attitudes towards the inclusion of children with hearing impairment identified only a small number of eligible studies and concentrated mainly on primary and secondary school teachers (Keerthan et al., 2025). Evidence involving early childhood educators and other education personnel remains less developed. Differences in study populations, questionnaires, scoring methods, and knowledge domains also limit direct comparison. Common strengths and weaknesses across educator groups are therefore not yet well established. Reviewing this literature systematically can help determine which aspects of childhood hearing loss are generally understood, where knowledge remains limited, and which areas require greater attention in professional education and future research.

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Research Question

Formulating research questions (RQs) is an important step in a Systematic Literature Review (SLR) because the questions define the scope and direction of the review. They guide the identification, selection, and analysis of relevant studies and help ensure that the review remains aligned with its objectives. Well-defined RQs also provide a basis for organising and synthesising the evidence, identifying recurring patterns, and determining areas where knowledge remains limited.

The specification of research questions is a key activity during the planning stage of an SLR because it influences the subsequent stages of searching, study selection, data extraction, and synthesis (Kitchenham & Charters, 2007). In this review, the Population–Interest–Context (PICo) framework proposed by Lockwood et al. (2015) was used to formulate the research questions. The Population (P) comprised educators, the Interest (I) concerned knowledge and awareness of childhood hearing loss, and the Context (Co) covered preschool, school, and other educational settings. A preliminary examination of the literature identified three recurring areas: foundational knowledge of childhood hearing loss, knowledge related to early identification and access to hearing care, and knowledge translation and professional capacity-building. Based on these identified themes and the PICo framework, three research questions were formulated as follows:

- **RQ1:** What is the level and nature of educators' foundational knowledge of childhood hearing loss, including its causes, risk factors, signs and symptoms, consequences, prevention, and management?
- **RQ2:** What knowledge do educators have regarding the early identification of childhood hearing loss, referral, intervention, and access to hearing-health services?
- **RQ3:** How is educators' knowledge of childhood hearing loss supported and applied through training, professional development, and institutional support?

Materials and Methods

This systematic literature review (SLR) was conducted according to the guidelines of Kitchenham and Charters (2007)**,** covering the planning, conduct, and reporting stages of the review. The Population–Interest–Context (PICo) framework was used to formulate the research questions and guide the development of the search strategy. Reporting followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (Page et al., 2021), particularly for documenting the identification, screening, eligibility assessment, and inclusion of studies.

The review process comprised four stages: identification, screening, eligibility assessment, and inclusion. Scopus and Web of Science were searched using predefined search terms and Boolean operators. Retrieved records were filtered according to the selection criteria, followed by duplicate removal and title and abstract screening. Articles considered potentially relevant were then assessed in full text against the review criteria. Data from the included studies were extracted and organised according to the research questions, and the findings were synthesised thematically. The study selection process was presented using a PRISMA flow diagram.

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Identification

The identification stage involved a structured search of Scopus and Web of Science (WoS) for publications relevant to *Knowledge and Awareness of Childhood Hearing Loss Among Educators*. The search was based on three main concepts: knowledge and awareness, childhood hearing loss, and educators. These concepts were informed by the Population–Interest–Context (PICo) framework and were used to develop the search terms and Boolean combinations for each database. The complete search strategies are presented in Table 1. The initial search retrieved 407 records from Scopus and 120 records from Web of Science, giving a total of 527 records for subsequent screening.

Scopus and Web of Science were selected because both provide broad coverage of literature in health sciences, social sciences, and education. This was relevant to the multidisciplinary nature of childhood hearing loss and educator knowledge. Using both databases also increased the range of potentially eligible studies identified during the search. The 527 records represented the total number retrieved before duplicate removal and application of the screening and eligibility criteria.

Table 1. Search Strategies Used in Scopus and Web of Science

Database	Search string
Scopus	TITLE-ABS-KEY ((knowledge OR awareness OR understanding OR "teacher knowledge" OR "teacher awareness") AND ("childhood hearing loss" OR "pediatric hearing loss" OR "hearing impairment" OR "hearing disability" OR "hearing deficit") AND (teacher* OR educator* OR "school staff" OR "educational professional*")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SRCTYPE, "j")) AND (LIMIT-TO (OA, "publisherfullgold")) AND (LIMIT-TO (SUBJAREA, "MEDI") OR LIMIT-TO (SUBJAREA, "SOCI") OR LIMIT-TO (SUBJAREA, "HEAL") OR LIMIT-TO (SUBJAREA, "ARTS") OR LIMIT-TO (SUBJAREA, "MULT") OR LIMIT-TO (SUBJAREA, "NURS")) AND (LIMIT-TO (DOCTYPE, "ar"))
Web of Science	(knowledge OR awareness OR understanding OR "teacher knowledge" OR "teacher awareness") AND ("childhood hearing loss" OR "pediatric hearing loss" OR "hearing impairment" OR "hearing disability" OR "hearing deficit") AND (teacher* OR educator* OR "school staff" OR "educational professional*") (Topic) AND Open Access AND Article (Document Types) AND English (Languages) AND (Education Educational Research OR Otorhinolaryngology OR Audiology Speech Language Pathology OR Social Sciences Other Topics OR Arts Humanities Other Topics OR Health Care Sciences Services) (Research Areas)

Screening

Following identification, 527 records were retrieved from Scopus (n = 407) and Web of Science (n = 120). The records were filtered using the predefined selection criteria. Publications were retained if they were written in English, classified as journal articles, including articles published in press, indexed within the specified subject areas of Medicine, Social Sciences, Health Professions, Arts and Humanities, Multidisciplinary Studies, and Nursing, and available

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as Open Access. Application of these criteria excluded 447 records, leaving 80 records for further assessment, comprising 52 from Scopus and 28 from Web of Science. The inclusion and exclusion criteria applied at this stage are presented in Table 2.

The remaining records were then checked for duplication across the two databases. Three duplicate records were removed, leaving 77 unique records for the next stage of screening.

Table 2. Inclusion and Exclusion Criteria for Study Selection

Criterion	Inclusion	Exclusion
Language	English	Non-English
Publication type	Journal articles	Conference papers, books, and review articles
Subject area	Medicine, Social Sciences, Health Professions, Arts and Humanities, Multidisciplinary, and Nursing	Subject areas outside the predefined categories
Open Access status	Open Access	Non-open Access

Eligibility

Following title and abstract screening, 14 articles were assessed in full text. Eligibility was determined according to the predefined criteria, including whether the study involved the relevant educator population and examined knowledge or awareness of childhood hearing loss. Four articles were excluded because the population and/or outcomes did not meet the review criteria. This included studies that addressed general knowledge of inclusive education without specifically examining knowledge or awareness of childhood hearing loss. Ten primary empirical studies remained and were included in the review and thematic analysis. The study selection process is shown in Figure 1.

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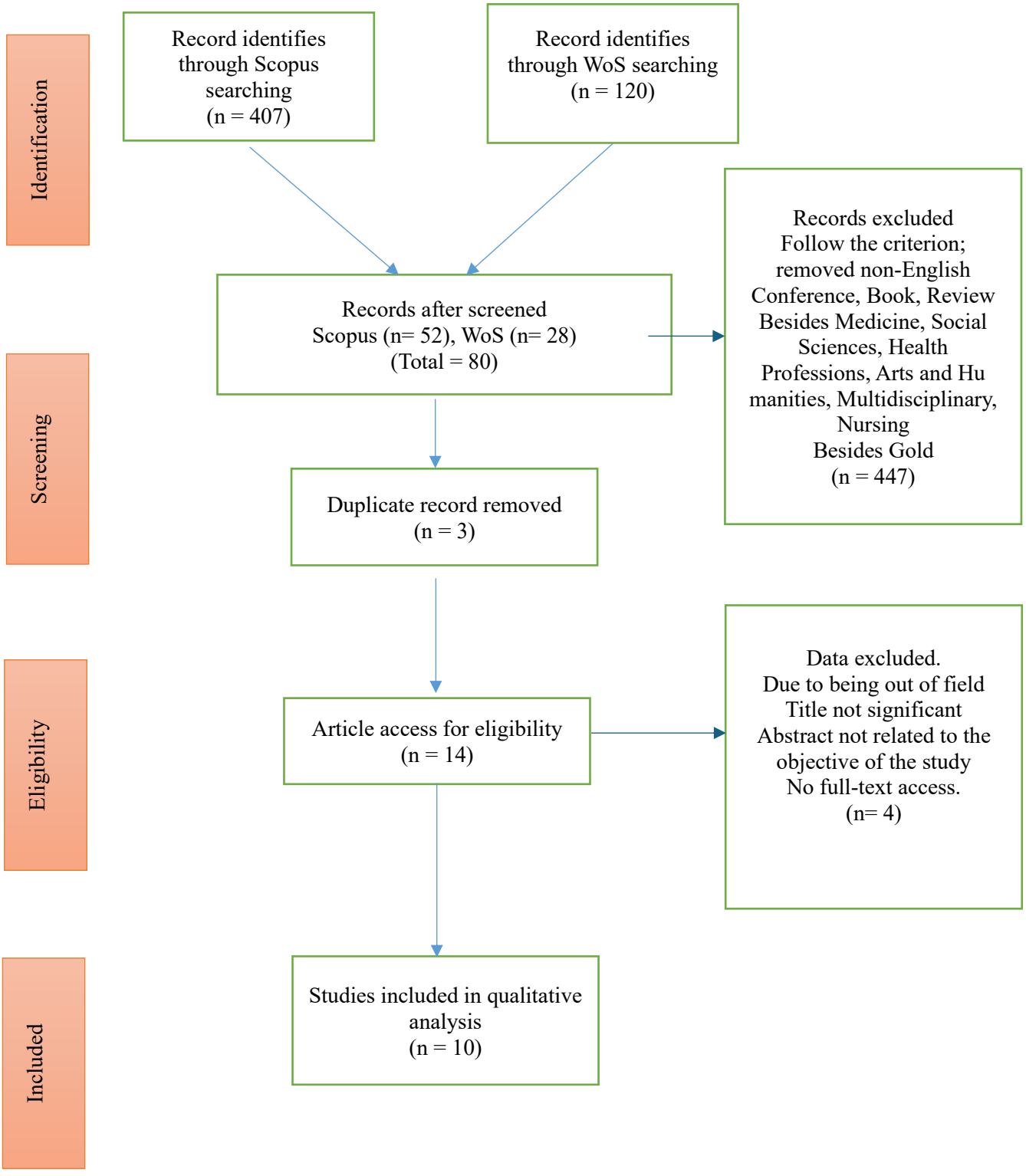


Figure 1. PRISMA 2020 Flow Diagram Of The Study Identification, Screening, Eligibility Assessment, And Inclusion Process (Page Et Al., 2021).

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Data Abstraction and Analysis

Data were extracted from the 10 included studies according to the three research questions. Information recorded from each study included the study objective, country and educational setting, participant characteristics, study design, method used to assess knowledge or awareness, main findings, and reported limitations. For studies that included professional development or training, details of the intervention and any reported changes in knowledge or awareness were also recorded. The bibliographic characteristics of the included studies are presented in Table 3.

The findings were compared using an integrative thematic approach. The analysis focused on educators' knowledge of childhood hearing loss, including causes and risk factors, signs and symptoms, early identification, referral, intervention, and educational support. Differences in assessment instruments, participant groups, and educational settings were taken into account during comparison. Findings based on measured knowledge were considered separately from self-reported awareness, attitudes, perceived preparedness, and reported practice.

The findings were organised into three themes that reflected the research questions: (1) Foundational Knowledge of Childhood Hearing Loss; (2) Knowledge for Early Identification and Access to Hearing Care**;** and (3) Knowledge Translation and Professional Capacity-Building**.** The thematic grouping was reviewed by the research team, and any differences in classification were discussed before the final grouping was agreed.

Table 3. Bibliographic Characteristics of the Primary Studies Included in the Review

No.	Authors	Title	Year	Journal	Scopus	Web of Science
1	Hussein et al. (2018)	Knowledge and attitudes of early childhood development practitioners towards hearing health in poor communities	2018	International Journal of Pediatric Otorhinolaryngology	/	/
2	Tuli et al. (2018)	Knowledge, Attitude of Sikkim Primary School Teachers About Paediatric Hearing Loss	2018	Indian Journal of Otolaryngology and Head & Neck Surgery	/	/
3	AlOtaibi et al. (2020)	Knowledge and attitudes of school teachers toward hearing problems with students in general elementary schools in Makkah, 2019	2020	Medical Sciences	/	
4	Kapalamula et al. (2023)	Hearing Health Awareness and the Need for Educational Outreach Amongst Teachers in Malawi	2023	Audiology Research	/	/
5	Kaspar et al. (2023)	Knowledge and attitudes of school principals towards childhood hearing loss and	2023	SAGE Open Medicine	/	/

No.	Authors	Title	Year	Journal	Scopus	Web of Science
		hearing services: A cross-sectional survey to support the implementation of inclusive education in Samoa				
6	Dsouza and Ranjan (2024)	Awareness, knowledge, and practice among regular primary school teachers about hearing impairment	2024	Hearing, Balance and Communication	/	/
7	Sharma et al. (2024)	Change in Knowledge and Attitudes about Hearing Loss and Cochlear Implants among the School Teachers	2024	Otorhinolaryngology Clinics: An International Journal	/	
8	Abraham and Masunga (2026)	Primary school teachers knowledge attitudes and teaching challenges regarding hearing loss among pupils in central Tanzania	2026	Discover Public Health	/	/
9	Goh et al. (2026)	Knowledge and attitudes towards childhood hearing loss among Malaysian early childhood development practitioners: relevance to early identification and inclusive education	2026	International Journal of Inclusive Education	/	/
10	Khalid et al. (2026)	Primary teachers' perceived knowledge of hearing impairment and curriculum adaptations: the mediating role of institutional support for the inclusion of students with hearing impairments	2026	International Journal of Inclusive Education	/	/

Quality Appraisal

The quality of the included studies was assessed using the approach described by Kitchenham and Charters (2007). Six quality assessment criteria adapted from Abouzahra et al. (2020) were applied to examine the clarity, relevance, and methodological reporting of each study.

The assessment considered whether each study: (QA1) clearly stated its purpose; (QA2) demonstrated the relevance and usefulness of the research; (QA3) described the methodology adequately; (QA4) clearly defined the main concepts underlying the study; (QA5) compared or discussed its findings in relation to previous research; and (QA6) explicitly reported its limitations.

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Each criterion was scored as Yes (Y = 1), Partly (P = 0.5), or No (N = 0). Three reviewers assessed each study independently using the six criteria. The ratings were then compared, and any differences were discussed until agreement was reached. The scores for the six criteria were added to obtain an overall quality score, with a maximum possible score of 6 for each study. A score greater than 3 was established as the minimum quality threshold for inclusion in the synthesis. Studies achieving an aggregated score above 3.0 were retained for the subsequent stage of the review.

Results and Discussion

Quality Assessment Analysis

The 10 included studies received scores between 5.0 and 6.0 out of a maximum of 6, with a mean score of 5.65 (94.2%). Six studies achieved 6.0 (100%), one scored 5.5 (91.7%), and three scored 5.0 (83.3%). All studies clearly stated their objectives (QA1), established the relevance and usefulness of the research (QA2), and defined the main concepts examined (QA4). Methodological reporting was adequate in most studies. One study was rated Partly for QA3 because the description of questionnaire scoring was inconsistent. All studies discussed their findings in relation to previous research (QA5). Three studies did not explicitly report study-specific limitations and therefore received no score for QA6. The quality appraisal scores for the 10 included studies are presented in Table 4.

The scores should be interpreted within the scope of the six criteria adapted from Abouzahra et al. (2020). These criteria assess selected aspects of study reporting and methodological quality but do not provide a complete assessment of risk of bias. A high total score should therefore not be taken to mean that a study is free from limitations related to sampling, measurement, study design, or generalizability.

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Table 4: Quality Appraisal of the Included Primary Studies

Author	Title and year	QA1	QA2	QA3	QA4	QA5	QA6	Total	Percentage (%)
Hussein et al. (2018)	Knowledge and attitudes of early childhood development practitioners towards hearing health in poor communities	Y	Y	Y	Y	Y	N	5.0/6	83.3
Tuli et al. (2018)	Knowledge, Attitude of Sikkim Primary School Teachers About Paediatric Hearing Loss	Y	Y	Y	Y	Y	N	5.0/6	83.3
AlOtaibi et al. (2020)	Knowledge and attitudes of school teachers toward hearing problems with students in general elementary schools in Makkah, 2019	Y	Y	Y	Y	Y	Y	6.0/6	100.0
Kapalamula et al.(2023)	Hearing Health Awareness and the Need for Educational Outreach Amongst Teachers in Malawi	Y	Y	Y	Y	Y	Y	6.0/6	100.0
Kaspar et al. (2023)	Knowledge and attitudes of school principals towards childhood hearing loss and hearing services: A cross-sectional survey to support the implementation of inclusive education in Samoa	Y	Y	Y	Y	Y	Y	6.0/6	100.0
Dsouza & Rajan (2024)	Awareness, knowledge, and practice among regular primary school teachers about hearing impairment	Y	Y	Y	Y	Y	N	5.0/6	83.3
Sharma et al. (2024)	Change in Knowledge and Attitudes about Hearing Loss and Cochlear Implants among the School Teachers	Y	Y	P	Y	Y	Y	5.5/6	91.7
Abraham & Masunga(2026)	Primary school teachers knowledge attitudes and teaching challenges regarding hearing loss among pupils in central Tanzania	Y	Y	Y	Y	Y	Y	6.0/6	100.0
Goh et al. (2026)	Knowledge and attitudes towards childhood hearing loss among Malaysian early childhood development practitioners: relevance to early identification and inclusive education	Y	Y	Y	Y	Y	Y	6.0/6	100.0
Khalid et al. (2026)	Primary teachers' perceived knowledge of hearing impairment and curriculum adaptations: the mediating role of institutional support for the inclusion of students with hearing impairments	Y	Y	Y	Y	Y	Y	6.0/6	100.0

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Thematic Analysis

Analysis of the 10 included studies resulted in three themes, presented in Table 5. The grouping was based on the study objectives, knowledge areas examined, main findings, and research gaps reported in each article. The first theme covers educators' foundational knowledge of childhood hearing loss, including causes and risk factors, signs and symptoms, developmental and educational effects, prevention, and hearing technology. The second theme covers knowledge of early identification and access to hearing care, including recognition of possible hearing difficulties, screening, intervention, and referral to appropriate services. The third theme covers professional development and the use of hearing-related knowledge in educational settings, including training, educational interventions, curriculum adaptation, classroom support, and institutional resources. Each study was placed under the theme that best matched its main objective and findings.

Table 5. Summary of Themes Identified Across the Included Studies

Theme	Focus Area	No. of Articles	Main Research Direction
Theme 1: Foundational knowledge of childhood hearing loss	Knowledge of causes and risk factors, signs and symptoms, developmental and educational effects, prevention, hearing technology, and general hearing-health concepts	4	Establishing what educators know about childhood hearing loss and identifying specific areas of adequate, incomplete, or inaccurate knowledge
Theme 2: Knowledge for early identification and access to hearing care	Recognition of suspected hearing difficulties, identification and screening, intervention, hearing services, and referral	3	Examining whether educators possess the actionable knowledge required to recognise concerns and facilitate access to hearing assessment and intervention
Theme 3: Knowledge translation and professional capacity-building	Educational interventions, professional training, communication and classroom strategies, curriculum adaptation, assistive technology, and institutional support	3	Examining how hearing-related knowledge can be improved and translated into practical educational support

Foundational knowledge of childhood hearing loss

Across the four studies grouped under foundational knowledge, educators generally recognised childhood hearing loss as an important issue, although the depth of factual knowledge differed considerably. Hussein et al. (2018), who studied 82 early childhood development practitioners in a low-resource South African community, found relatively good recognition of common causes such as genetic factors and ear infection, but weaker knowledge of identification in young children and the effects of hearing loss in the classroom. A less favourable pattern was reported by AlOtaibi et al. (2020) among 390 elementary school teachers in Makkah, where only 4.9% were classified as having good knowledge and most participants fell within the poor

or intermediate categories. Tuli et al. (2018) also reported weak knowledge among primary school teachers in Sikkim, particularly in relation to causes, investigation, and treatment, despite generally favourable attitudes towards pupils with hearing impairment. Dsouza and Ranjan (2024) found fair overall knowledge among 270 regular primary school teachers, together with good awareness and reported practice, although knowledge of causes and amplification devices remained limited. Direct comparison of overall scores is difficult because the studies used different questionnaires, scoring systems, participant groups, and educational settings. Even so, a similar pattern was apparent: general awareness of hearing loss was more common than detailed knowledge of its causes, identification, assessment, and management (Hussein et al., 2018; AlOtaibi et al., 2020; Tuli et al., 2018; Dsouza & Ranjan, 2024).

Knowledge of causes and risk factors was particularly variable. Hussein et al. (2018) reported that more than 80% of early childhood development practitioners recognised genetic factors and ear infections as possible causes of hearing loss. Dsouza and Ranjan (2024) also found relatively good knowledge of otitis media, whereas understanding of other congenital and acquired causes was less consistent. In contrast, Tuli et al. (2018) reported generally poor knowledge of causes among primary school teachers. AlOtaibi et al. (2020) likewise found that overall knowledge remained mainly within the poor and intermediate categories despite correct responses to some items relating to hearing problems. The pattern across the studies suggests that familiar or commonly encountered conditions, particularly ear infection, were better recognised than hereditary, prenatal, perinatal, or less obvious risk factors. This distinction is relevant because knowledge centred mainly on visible or familiar ear conditions may not help educators recognise children with congenital, progressive, or otherwise less apparent hearing loss. It also shows the limitation of relying only on an overall knowledge score. A teacher may perform well in one area and have substantial gaps in another. Foundational knowledge therefore covers several related areas, including causes, risk factors, signs, developmental effects, prevention, and basic hearing-health concepts, rather than a single uniform body of knowledge (Hussein et al., 2018; AlOtaibi et al., 2020; Tuli et al., 2018; Dsouza & Ranjan, 2024).

Knowledge of identification, hearing technology, and management was also limited in several studies. Hussein et al. (2018) found uncertainty about whether hearing loss could be accurately identified in children aged three to six years, although most participants considered hearing health important and supported hearing testing. Tuli et al. (2018) reported poor knowledge of investigation and treatment, suggesting that awareness of hearing loss did not necessarily extend to an understanding of how hearing difficulties are assessed or managed. Similar gaps were reported by Dsouza and Ranjan (2024), particularly for amplification devices, hearing-loss identification, and audiological management. AlOtaibi et al. (2020) also described mainly poor-to-intermediate knowledge, including uncertainty in areas related to management and rehabilitation. Knowledge of the educational effects of hearing loss therefore appears to be different from knowledge of diagnosis, amplification, and intervention. Basic familiarity with hearing assessment, hearing aids, other hearing technologies, and hearing-health services is important if educators are expected to respond appropriately to suspected or confirmed hearing difficulties. Positive attitudes alone do not fill these knowledge gaps. Hussein et al. (2018) reported strong support for hearing testing and considerable interest in receiving more information, while Tuli et al. (2018) found that 88.2% of participants supported special training before a child with hearing impairment entered the classroom. Such responses show willingness to receive further preparation, but do not establish knowledge of identification or

management (Hussein et al., 2018; AlOtaibi et al., 2020; Tuli et al., 2018; Dsouza & Ranjan, 2024).

Professional preparation and previous exposure were associated with knowledge in some studies, although the same factors were not examined consistently. Hussein et al. (2018) found an association between experience and overall knowledge and attitudes, while formal early childhood development training was related to selected knowledge items rather than the total score. AlOtaibi et al. (2020) reported better knowledge among several groups, including teachers with higher qualifications, special-education backgrounds, and previous experience with pupils who had hearing problems or used hearing aids. Dsouza and Ranjan (2024) found that previous hearing-related training was associated with better awareness and knowledge. Tuli et al. (2018) did not examine the same predictors, but 40.8% of participants identified inadequate teacher training as the main obstacle to inclusion. No single demographic or professional factor explains the differences across all four studies. What is more consistent is that several weaknesses concern areas that can be addressed through professional education, particularly causes and risk factors, identification, hearing technology, investigation, and management. Differences in sampling, educational settings, participant groups, and assessment instruments limit direct comparison between studies, but the overall picture is one of partial rather than absent knowledge. Educators commonly showed some understanding of childhood hearing loss, while more specialised hearing-health knowledge remained uneven (Hussein et al., 2018; AlOtaibi et al., 2020; Tuli et al., 2018; Dsouza & Ranjan, 2024).

Knowledge For Early Identification And Access To Hearing Care

Knowledge related to early identification differed across the three studies and was generally less developed than knowledge of the broader effects of hearing loss. Kaspar et al. (2023) reported that 71.6% of Samoan school principals knew that hearing loss could be identified at any age, while 73.4% recognised that children aged three to six years could be accurately diagnosed. A similar result was reported by Goh et al. (2026) among 849 Malaysian early childhood development practitioners: 75.1% agreed that hearing loss could be identified at any age, but only 60.2% recognised that accurate diagnosis was possible between three and six years. Identification and intervention were also the weakest knowledge domain in the Malaysian sample, with 52.8% classified as having high knowledge, compared with 83.5% for signs and symptoms and 86.7% for developmental effects. Abraham and Masunga (2026) reported lower overall knowledge among 405 Tanzanian primary school teachers, with 70.9% classified as having poor knowledge and only 8.1% reaching the good-knowledge category. Recognition of possible symptoms was also inconsistent. Although 95.1% associated failure to follow directions with hearing loss, 43% recognised frequent requests for repetition and 7.9% identified altered speech. The results suggest that observable classroom difficulties may be more familiar to educators than the age at which hearing loss can be identified, the range of possible signs, or the diagnostic process. Observation may alert an educator to a possible problem, but appropriate identification also requires knowledge of which behaviours warrant further hearing assessment.

Support for hearing assessment was high, although knowledge of the steps following recognition of a possible hearing problem was less clear. Kaspar et al. (2023) reported that 97.2% of school principals wanted pupils to receive hearing tests and 94.5% wanted further information about childhood hearing loss. In the same study, 73.4% agreed that hearing loss could be treated, although the meaning of “treatment” was not clearly defined and could have

referred to medical treatment, hearing devices, or other forms of management. Goh et al. (2026) also found strong support for hearing assessment, with 92.6% agreeing or strongly agreeing that children should receive a hearing test. At the same time, only 30.3% felt equipped to manage children with hearing loss, and identification and intervention remained the weakest knowledge domain. Abraham and Masunga (2026) found that 79.3% of teachers were aware of hearing aids, while only 5.4% reported currently teaching pupils who used them. Awareness of hearing technology therefore does not necessarily show that educators understand the full sequence from recognition and referral to assessment, intervention, and follow-up. Support for hearing testing was common, but practical knowledge of where to refer a child, what information should be communicated, and how families should be directed to hearing services was less evident. None of the three studies examined actual referral behaviour or confirmed whether educator concerns resulted in completed audiological assessment (Kaspar et al., 2023; Abraham & Masunga, 2026; Goh et al., 2026).

Professional preparation and the educational environment were also related to differences in knowledge. Kaspar et al. (2023) reported relatively strong knowledge and willingness among school principals, although gaps remained in training and available resources. Only 55% recognised hearing loss as common among young children despite high awareness of its possible effects on classroom listening, speech and language, reading, behaviour, and interaction with peers. Goh et al. (2026) found a similar difference between knowledge based on everyday observation and knowledge of identification and intervention. Practitioners with a degree had higher odds of being classified in a higher knowledge category than those without formal qualifications (OR 2.067, 95% CI 1.110–3.853), while full-time practitioners also had higher odds of greater knowledge (OR 2.942, 95% CI 1.174–7.379). Abraham and Masunga (2026) reported significant associations between knowledge and both teaching experience and specialisation, whereas class size and previous exposure to pupils with hearing loss were not associated with overall knowledge. Contact with children alone may therefore be insufficient to develop knowledge of early identification and referral. The Tanzanian study also reported several barriers within the educational setting: 93.1% identified lack of special-needs skills, 80.5% inadequate teaching technology and methods, 70.6% large class sizes, and only 20% considered the teaching environment supportive. The findings indicate that educator knowledge operates within a wider service and educational context. Training, referral information, specialist input, and institutional resources may all affect whether a suspected hearing difficulty is followed by appropriate action (Kaspar et al., 2023; Abraham & Masunga, 2026; Goh et al., 2026).

Interpretation of knowledge about referral and access to hearing care is limited by the methods used in the three studies. Kaspar et al. (2023) used a convenience sample of 109 school principals attending an education conference, had missing demographic information, and used a questionnaire that had not been validated or pilot-tested for the Samoan population. The study also noted possible differences in how participants understood terms such as “hearing loss” and “treatment,” which may have affected responses concerning identification and intervention. Abraham and Masunga (2026) used a larger sample and multistage cluster sampling, although some reported classroom challenges came from teachers without direct experience of pupils with hearing loss. Goh et al. (2026) included 849 practitioners from public and private early childhood centres, but the cross-sectional online survey measured reported knowledge and attitudes rather than actual referral decisions. The study did not assess detailed knowledge of local referral procedures, differences in referral guidance between centres, or whether concerns led to completed hearing assessment. The three studies therefore provide useful information

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about what educators report knowing, but much less information about what happens when a possible hearing problem is encountered in practice. Future studies could examine decision-making using case scenarios, referral records, or observed practice. Training could also include referral procedures, communication with families, and clear boundaries between the roles of educators and hearing-health professionals, with follow-up measures used to determine whether improved knowledge is reflected in referral and access to hearing care.

Knowledge translation and professional capacity-building

Knowledge translation and professional capacity-building were examined in three different ways: a hearing-health training programme in Malawi, a school-based awareness programme in India, and an investigation of institutional support and curriculum adaptation in inclusive schools in Pakistan. Kapalamula et al. (2023) reported immediate improvement after training among 387 primary-school teachers, with the mean knowledge score increasing from 71% before training to 97% after a one-hour session ($p < .001$). The programme covered ear anatomy, causes and degrees of hearing loss, effects on speech and language, classroom signs, management, communication strategies, and referral to audiology services. Greater changes occurred in areas where baseline knowledge was low. Correct responses concerning hearing-aid use in infants increased from 24% to 86%, knowledge of hereditary hearing loss from 57% to 97%, and recognition of the relationship between respiratory illness and ear infection from 56% to 95%. Sharma et al. (2024) reported improvement among 50 higher-secondary teachers in India after a one-hour audiovisual and oral programme. Mean knowledge scores increased from 33.68 to 59.32, while attitude scores increased from 10.78 to 12.14. Improvement was reported in knowledge of hearing-loss type, management, cochlear implants, implant components, and rehabilitation. Khalid et al. (2026) examined a different aspect of professional capacity. Among 200 teachers in inclusive primary schools in Punjab, mean scores for knowledge, institutional support, and curriculum adaptation generally fell between “to some extent” and “neutral.” The findings from these studies indicate that knowledge can improve after focused training, while its use in educational practice also depends on the conditions in which teachers work (Kapalamula et al., 2023; Sharma et al., 2024; Khalid et al., 2026).

The need for professional preparation extended beyond general awareness. Kapalamula et al. (2023) found that teachers already reported relatively high confidence in identifying a pupil with hearing difficulty (88%) and understanding the educational effects of hearing loss (87%) before training. Confidence was lower for management (53%) and prevention (44%). After training, the corresponding proportions increased to 97% for identification, 97% for understanding educational effects, 88% for management, and 97% for prevention. The greatest changes were therefore seen in areas where teachers had less confidence before the programme. Sharma et al. (2024) also found that incorrect or uncertain responses before training were replaced by more correct responses after the programme, although some uncertainty remained. This suggests that a single session may improve knowledge without resolving every misconception. Khalid et al. (2026) reported modest scores for instructional strategies ($M = 2.69$), curriculum content adaptation ($M = 2.55$), and assessment adaptation ($M = 2.62$) on a five-point scale. Knowledge related to cognitive development was also limited ($M = 2.58$), with somewhat higher scores for social ($M = 2.94$) and emotional development ($M = 2.81$). These results extend the issue beyond factual knowledge. Supporting children with hearing loss may also require teachers to modify teaching materials, use appropriate communication approaches, adjust assessment, and respond to social and emotional needs. Professional

preparation therefore needs to address both hearing-health knowledge and its use in classroom situations (Kapalamula et al., 2023; Sharma et al., 2024; Khalid et al., 2026).

Khalid et al. (2026) provided further evidence on the role of the school environment. Knowledge of hearing-impairment manifestations was positively associated with curriculum adaptation ($\beta = 0.61$, $t = 10.42$, $p < .001$), while the interaction between general knowledge of hearing impairment and knowledge of its manifestations showed a smaller association ($\beta = 0.13$, $t = 2.814$, $p < .001$). Institutional support also mediated the relationship between knowledge of manifestations and curriculum adaptation ($\beta = 0.06$, $t = 2.19$, $p = .02$). Teachers reported limited access to training, assistive technology, specialist support, and other resources. Kapalamula et al. (2023) examined a related issue from the perspective of hearing-service knowledge. After training, 95% of teachers reported knowing the role of audiologists, 88% considered local audiology services accessible, and 99% regarded the training as helpful and expressed interest in further hearing-health education. Location was the only tested characteristic associated with performance, whereas age, gender, and teaching experience were not significant. Sharma et al. (2024) also reported requests from school staff for repeated programmes and extension of the programme to other grades. These findings suggest that training is more useful when teachers also know where hearing services are available and have access to administrative support, specialist advice, and appropriate educational resources (Kapalamula et al., 2023; Sharma et al., 2024; Khalid et al., 2026).

The evidence, however, is limited in several respects. Both intervention studies measured outcomes immediately after training, so higher post-training scores cannot be taken as evidence of long-term retention or sustained changes in identification, referral, communication, or classroom practice. Kapalamula et al. (2023) used a locally adapted knowledge survey together with a WHO-derived instrument, but individual scores on the two measures showed only a low correlation, indicating that estimates of knowledge differed according to questionnaire content. The study did not include an untrained comparison group, and longer follow-up was recommended to examine retention of knowledge. Sharma et al. (2024) included only 50 teachers from five consenting higher-secondary schools, with recruitment affected by pandemic-related school closures. An inconsistency in the description of questionnaire scoring also makes interpretation of the absolute scores less straightforward, although the direction of the pre–post change is clear. Khalid et al. (2026) relied on self-reported knowledge and practice among teachers from government-designated inclusive schools in Punjab, which limits conclusions about observed teaching behaviour and other educational settings. The three studies provide evidence that training, institutional support, and access to services are related to professional capacity, but longer-term evidence is still limited. Further work should examine whether improvements in knowledge are retained and whether they are reflected in classroom adaptation, referral behaviour, use of hearing technology, and educational support for children with hearing loss.

Conclusion

This systematic literature review examined knowledge and awareness of childhood hearing loss among educators. The review covered empirical studies published between 2018 and 2026 involving teachers, school principals, and early childhood development practitioners from different educational settings. Scopus and Web of Science were searched for English-language journal articles, including in-press publications, that met the predefined subject-area and Open Access criteria. From 527 records initially identified, 10 studies met the eligibility requirements

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and were included in the review. The research questions examined the areas and level of educators' knowledge, their understanding of early identification and access to hearing care, and the role of professional development and institutional support.

Knowledge varied considerably across the areas examined. Educators generally recognised that childhood hearing loss can affect communication, learning, classroom participation, and social development, but understanding of specific causes, risk factors, identification, intervention, and hearing services was less consistent. Commonly encountered conditions such as ear infection were more readily recognised than congenital, progressive, or less obvious causes of hearing loss. Knowledge of observable classroom signs was also stronger in several studies than knowledge of diagnosis, referral, and intervention. Favourable attitudes towards hearing testing and further training were frequently reported, but positive attitudes did not necessarily mean that educators felt prepared to respond to a child with suspected or confirmed hearing loss. General awareness and practical hearing-health knowledge should therefore be considered separately.

The 10 studies were organised into three themes. Foundational knowledge of childhood hearing loss covered causes and risk factors, signs and symptoms, developmental and educational effects, prevention, and hearing technology. Knowledge for early identification and access to hearing care addressed recognition of possible hearing difficulties, hearing assessment, intervention, and referral. Knowledge translation and professional capacity-building covered training, curriculum adaptation, classroom support, assistive technology, and institutional resources. The three areas show that knowing that hearing loss affects learning is different from knowing how to recognise a possible problem, what action should follow, and how a child can be supported within an educational setting.

Studies involving professional development reported clear improvement in knowledge immediately after training. Better understanding was found in areas such as hearing-loss management, hearing aids, cochlear implants, prevention, and identification. Most of these studies, however, measured outcomes shortly after training. Whether the improvement was retained or resulted in changes in referral, classroom practice, communication with families, or use of hearing services was not established. Findings related to curriculum adaptation and institutional support also showed that knowledge alone may not be enough. Educators may require referral information, suitable teaching resources, access to assistive technology, specialist input, and support from the educational institution. Training should therefore include practical information that can be used when hearing difficulties are suspected or when a child with hearing loss is already in the classroom.

The review also clarifies an important issue in the existing literature. Educator knowledge has often been measured using an overall score, although the studies show considerable differences between individual knowledge areas. An educator may understand the educational effects of hearing loss but have limited knowledge of risk factors, hearing technology, or referral procedures. Examining these areas separately gives a more accurate account of professional knowledge than relying only on a total score. It also helps identify where further preparation is needed and which topics should receive greater attention in hearing-health education for educators.

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The review has several limitations. Only Scopus and Web of Science were searched, and the search was restricted to English-language journal articles, selected subject areas, and Open Access publications. Relevant studies available through other databases, languages, or publication formats may therefore have been missed. The included studies also differed in country, educator group, educational setting, sample size, questionnaire content, scoring method, and study design. Direct comparison of reported knowledge levels is therefore limited. Most studies used cross-sectional questionnaires and self-reported responses, while only a small number examined training programmes. Actual referral behaviour, classroom practice, communication with families, and longer-term use of acquired knowledge were rarely measured.

Further research should distinguish clearly between factual knowledge, awareness, attitudes, confidence, and reported practice. Greater attention is also needed to late-onset and progressive hearing loss, referral procedures, hearing technology, and the responsibilities of educators after a possible hearing problem is recognised. Longitudinal studies could determine whether knowledge gained through training is retained, while applied studies could examine whether greater knowledge results in appropriate referral, communication with families, classroom adaptation, and access to hearing services. Research across early childhood, primary, and secondary settings would also help determine whether different educator groups require different forms of preparation.

Educators commonly understand that childhood hearing loss is important, but knowledge needed for identification, referral, intervention, and educational support remains uneven. Improving this knowledge requires more than general awareness activities. Education that is relevant to the educator's role, clear referral pathways, access to hearing-health professionals, and support within educational settings are also needed. Systematic review of this literature helps define where knowledge is already established, where important gaps remain, and which areas require closer attention in future research and professional education.

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