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Hearing Health Literacy In Maternal Populations: A Comprehensive Review Of Knowledge And Attitudes Toward Newborn Rehabilitation

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Abstract: Hearing loss is one of the most common congenital disabilities globally, affecting 2-3 per 1,000 live births in healthy neonates and up to 3-4 per 100 in high-risk infants. Early detection and intervention are critical to ensuring normal speech, language, and cognitive development. However, the success of newborn hearing screening and rehabilitation programs largely depends on the awareness and attitudes of mothers and pregnant women. This review aims to assess and synthesize current evidence regarding the knowledge and attitudes of pregnant women and mothers of newborns toward hearing loss, its risk factors, early screening, and rehabilitation strategies. A structured narrative review was conducted using databases including PubMed, Google Scholar, Scopus, and Web of Science. Studies published in English between January 2010 and June 2025 focusing on maternal knowledge and attitudes towards infant hearing loss were included. Only original research and review articles involving pregnant women or mothers with infants under one year were analyzed. Findings indicate that while the overall attitude towards newborn hearing screening is positive, substantial knowledge gaps exist, particularly regarding risk factors, the importance of early intervention, and understanding of congenital versus acquired hearing loss. High maternal education, urban residence, and regular antenatal care are associated with greater awareness and compliance. Conversely, socio-cultural beliefs, low socioeconomic status, and rural residence are linked to reduced awareness and follow-up. Mothers show strong willingness to participate in screening but may face barriers such as stigma, misinformation, and financial constraints. There is an urgent need for targeted educational interventions during antenatal and postnatal care to bridge existing knowledge gaps and support informed decision-making. Enhancing maternal awareness and addressing socioeconomic and cultural barriers are very much essential for the success of early hearing detection and rehabilitation programs.

Keywords: Hearing loss, Newborn hearing screening, Maternal knowledge, Pregnant women, Mothers of newborns

1. Introduction

Hearing loss is recognized as the most common sensory deficit and one of the most prevalent congenital abnormalities worldwide, affecting approximately 1 to 3 per 1,000 live births in healthy term neonates and up to 2-4 per 100 in high-risk infants, such as those admitted to neonatal intensive care units. The condition can be either congenital or acquired, with genetic factors accounting for up to 80% of cases, and a range of prenatal, perinatal, and postnatal factors contributing to acquired forms[1] [2][3].

Early hearing is crucial for the development of speech, language, cognition, and learning. If undetected and untreated, hearing loss can lead to significant delays in these areas, as well as psychological and social challenges that may persist throughout life[4][5][6]. To address this, universal newborn hearing screening (UNHS) programs have been widely adopted in many countries, enabling the identification of hearing impairment within the first days after birth and facilitating early intervention, which is associated with markedly improved developmental outcomes[7][8].

Overview of Hearing Loss in Newborns

Hearing loss is one of the most common congenital disorders, affecting approximately 1 to 3 per 1,000 live births in healthy term infants and up to 2-4 per 100 in high-risk newborns, such as those admitted to neonatal intensive care units. The condition can be either congenital often due to genetic factors, which account for up to 80% of cases or acquired through prenatal, perinatal, or postnatal factors. Common causes include genetic mutations, intrauterine infections (such as rubella or cytomegalovirus), birth asphyxia, prematurity, low birth weight, and neonatal jaundice.

Hearing loss in newborns can be classified by severity (mild to profound) and type (sensorineural, conductive, or mixed). If undetected, even mild hearing loss can significantly affect a child's ability to develop speech, language, cognitive skills, and social-emotional well-being.

Importance of Early Detection and Rehabilitation

- Critical Window for Development: The first few years of life are very crucial for auditory, speech, and language development. Early identification of hearing loss allows for timely intervention, which is strongly associated with improved language, academic, and social outcomes.
- Universal Newborn Hearing Screening (UNHS): Many countries have implemented UNHS programs, which aim to screen all newborns before hospital discharge. These programs have dramatically increased the rates of early detection, enabling intervention within the first six months of life a period linked to the best developmental outcomes.
- Rehabilitation Options: Early rehabilitation may include the use of hearing aids, cochlear implants, and speech-language therapy. Prompt intervention maximizes the potential for normal language acquisition and minimizes the long-term impact of hearing loss on education and social integration.
- Reduction of Adverse Outcomes: Without early detection and intervention, children with hearing loss are at risk for delayed speech and language development, poor academic achievement, and social isolation.

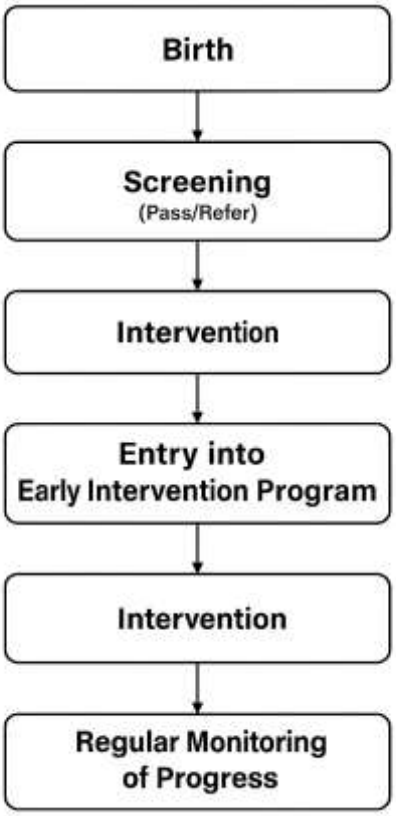

Figure 1: Universal Newborn process

Role of Mothers and Pregnant Women

- Awareness and Knowledge: The knowledge and attitudes of mothers and pregnant women are pivotal in the success of hearing screening and rehabilitation programs. Their understanding of risk factors, willingness to participate in screening, and acceptance of rehabilitation options directly influence outcomes for affected children.
- Participation in Screening**:** Mothers are often the primary decision-makers regarding their child's health. Their consent and cooperation are essential for the timely completion of newborn hearing screening and follow-up diagnostic assessments.
- Support for Rehabilitation: Mothers' acceptance of interventions such as hearing aids or cochlear implants is crucial for the child's successful rehabilitation. Positive attitudes and proactive engagement can help overcome barriers related to stigma, cultural beliefs, or misconceptions about hearing loss.
- Advocacy and Education: Pregnant women and mothers who are well-informed can advocate for their children's needs, seek appropriate services, and educate others in their communities, thereby enhancing overall awareness and support for early hearing health initiatives.
- Hospital and Community Role: Hospitals should provide targeted education and counseling to pregnant women and mothers of newborns, addressing knowledge gaps and cultural concerns. Engaging mothers in educational programs during antenatal and postnatal visits can significantly improve early detection and intervention rates.

Methodology

This review aimed to create existing evidence related to the knowledge and attitude of pregnant women and mothers of newborns towards hearing loss and its rehabilitation. A structured narrative review approach was adopted to identify and analyze relevant studies.

Search Strategy (Databases and Keywords Used)

A comprehensive literature search was conducted across several electronic databases, including PubMed, Google Scholar, Scopus, ScienceDirect, and Web of Science. To ensure a thorough review, the search was further supplemented by manually reviewing references from selected articles and reports from reputable organizations such as the World Health Organization (WHO). Keywords and MeSH terms were used in various combinations with Boolean operators (AND, OR) to capture relevant studies. These search terms included "pregnant women,"

"mothers of newborns," "maternal knowledge," "hearing loss," "newborn hearing screening," "hearing rehabilitation," "hearing aids," and "attitude towards hearing loss." This multi-faceted search strategy was designed to retrieve studies related to maternal knowledge and attitudes towards hearing loss, screening, and rehabilitation in newborns, ensuring a comprehensive assessment of the existing evidence.

Inclusion and Exclusion Criteria

Inclusion Criteria:

The inclusion criteria for this review were as follows: only articles published in English were considered, ensuring accessibility to a broad audience. Studies conducted between January 2015 and June 2025 was included to capture the most recent developments and trends in maternal knowledge and attitudes regarding hearing loss. The review focused on studies that specifically addressed pregnant women or mothers with children under the age of one year. These studies needed to explore knowledge and/or attitudes related to hearing loss, newborn hearing screening, or rehabilitation methods such as hearing aids or cochlear implants. Furthermore, only original research (including cross-sectional, descriptive, and qualitative studies) and review articles were included, ensuring a diverse range of study designs that provided a comprehensive understanding of the topic.

Exclusion Criteria:

The exclusion criteria for this review were clearly defined to ensure that only studies relevant to the knowledge and attitudes of pregnant women and mothers of newborns were included. Studies that involved only healthcare professionals or the general population were excluded, as they did not specifically address the target group of interest pregnant women or mothers with infants. Additionally, articles that focused solely on clinical treatment without exploring the knowledge or attitudes of mothers or pregnant women towards hearing loss and its rehabilitation were not included. This was to ensure that the review focused on the perceptions, awareness, and understanding of hearing loss in the maternal population, rather than on clinical practices or medical procedures alone. Furthermore, editorials, opinion pieces, and case reports were excluded, as they typically do not present original research findings and may lack the empirical evidence needed to draw generalizable conclusions on maternal knowledge and attitudes regarding hearing loss. By applying these exclusion criteria, the review aimed to provide a focused and evidence-based synthesis of studies directly related to the awareness and perspectives of the target population.

Time Frame of Included Studies

Studies published between January 2010 and June 2025 were considered eligible for inclusion. This 15-year window was selected to ensure a balance between recent developments and historical context in maternal awareness and newborn hearing health.

Study Selection Process

The initial search yielded a large number of studies. After removing duplicates, all titles and abstracts were screened for relevance. Full texts of potentially eligible articles were reviewed based on the inclusion and exclusion criteria. Any discrepancies in study selection were resolved through discussion among reviewers.

Knowledge of Pregnant Women and Mothers Towards Hearing Loss

Awareness of Causes and Risk Factors

Prenatal Risk Factors: Many pregnant women and mothers are aware that genetic factors, family history, consanguineous marriage, and maternal infections during pregnancy (such as rubella or cytomegalovirus) are significant causes of hearing loss in newborns. However, awareness is often incomplete, especially regarding less obvious risks[9].

Perinatal and Postnatal Risk Factors: Knowledge is generally lower for perinatal and postnatal causes. These include premature birth, low birth weight, neonatal jaundice, asphyxia, birth defects, prolonged mechanical ventilation, and the use of ototoxic drugs. Studies show that up to 77% of mothers were unaware that conditions like low birth weight, prematurity, or jaundice could cause hearing loss in infants. Awareness of ototoxic medications and middle ear infections is higher, with some studies reporting over 78% of mothers recognizing these as risks.

Pregnancy-Related Conditions: Some mothers are aware that high blood pressure, anemia, and hormonal changes during pregnancy can affect hearing, but this knowledge is not universal[10].

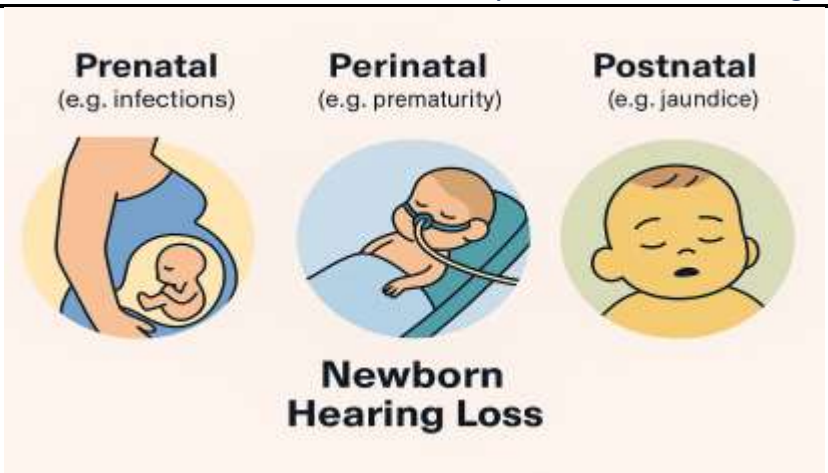

Figure 2: Risk Factors for Newborn Hearing Loss

Understanding of Congenital vs Acquired Hearing Loss

Congenital Hearing Loss: There is moderate awareness among mothers and pregnant women that hearing loss can be present at birth due to genetic or prenatal factors, including maternal infections and family history[11].
Acquired Hearing Loss: Understanding is more limited regarding hearing loss acquired after birth, which can result from infections (measles, mumps), trauma, or exposure to ototoxic medications[12][13]. Many mothers are less familiar with the risk of hearing loss developing in the neonatal period or early infancy due to environmental or medical factors.

Knowledge about Screening Availability

Screening Programs: Awareness of newborn hearing screening programs varies. While some mothers know about the availability of screening in hospitals, a significant proportion remain unaware of its existence or importance[14]. This gap can delay early detection and intervention.
Importance of Early Screening: Even among those aware of screening, not all understand the critical importance of early identification and intervention for optimal language and cognitive outcomes[15]. Education about the benefits of universal newborn hearing screening and the need for prompt follow-up in case of abnormal results is still needed in many settings.

Attitudes Towards Newborn Hearing Screening

Willingness to Participate in Screening

- High Participation Rates: The overwhelming majority of parents including mothers of newborns demonstrate a strong willingness to participate in newborn hearing screening programs. Data from multiple regions show participation rates consistently above 98%, with parental refusal rates remaining below 1% over many years. For example, in North-Rhine, Germany, only 0.4% of parents declined participation in a ten-year period[16] , and similar high compliance is reported in the Netherlands and other countries.
- Compliance with Initial Screening: Initial screening compliance is very high (98.8% in some regions), reflecting a generally positive attitude among mothers and families towards the process.

Beliefs About Early Detection

- Recognition of Importance: Most parents recognize that early detection of hearing loss is critical for a child's speech, communication, and cognitive development. There is broad acceptance of the value of universal newborn hearing screening, especially when programs are well-publicized and supported by healthcare providers[17][18].
- Support for Early Intervention: Parents who understand the potential impact of undetected hearing loss are more likely to support and follow through with screening and necessary follow-up, including diagnostic assessments and early rehabilitation.

Barriers to Acceptance (Stigma, Fear, Superstition)

- Low Refusal Rates, but Barriers Exist: While outright refusal is rare, barriers to acceptance do exist for a minority of families. These may include:
- Stigma: Some parents may fear social stigma associated with a diagnosis of hearing loss, leading to reluctance to participate in screening or follow-up.
- Fear and Anxiety: Concerns about the implications of a positive screening result, the need for further tests, or the potential for lifelong disability can cause anxiety and hesitancy [19].
- Superstition and Misconceptions: In some communities, superstitions or misconceptions about the causes of hearing loss (e.g., attributing it to fate or supernatural forces) may reduce acceptance of screening and intervention.
- Lack of Information: Non-compliance with follow-up or rescreening is sometimes linked to a lack of valid information or underestimation of the importance of early detection, particularly among parents who are less socially adaptive or have limited access to healthcare information."
- Need for Education: Studies emphasize that targeted education and counseling for mothers and families can help overcome these barriers, improve understanding, and increase acceptance and follow-through with newborn hearing screening and rehabilitation.[20][21]

Perceptions of Hearing Loss Rehabilitation

Awareness of Treatment Options (e.g., Hearing Aids, Cochlear Implants)

General Awareness: Most mothers and pregnant women are aware that hearing aids and cochlear implants are available treatment options for children with hearing loss. These devices are widely recognized as primary interventions, and their use is often discussed during hospital counseling and newborn screening follow-ups.
Other Rehabilitation Methods: Awareness is lower regarding additional rehabilitation methods such as speech and language therapy, communication techniques, and the importance of ongoing auditory rehabilitation programs.

Attitudes Towards Use in Children

Positive Attitudes: There is generally a positive attitude among mothers towards the use of hearing aids and cochlear implants in children. Many express willingness to pursue these interventions if recommended, especially when they understand the benefits for speech, language, and social development.
Rehabilitation Benefits: Evidence shows that hearing rehabilitation including the use of devices and therapy programs improves communication, quality of life, and social integration for children with hearing loss.[22][23]
Concerns: Some parents may initially have concerns about device appearance, social stigma, or the surgical nature of cochlear implants, but these concerns often decrease with proper counseling and support.

Concerns Around Cost, Accessibility, and Social Impact

Cost and Accessibility: Cost remains a significant concern for many families, especially in regions where hearing aids, cochlear implants, and rehabilitation services are not fully covered by insurance or public health programs. Accessibility to specialized services and follow-up care can also be a barrier, particularly in rural or underserved areas.
Social Impact: Social stigma and fear of discrimination can influence parental decisions. Some mothers worry about their child being labeled or treated differently due to visible hearing devices. These concerns may delay acceptance or consistent use of rehabilitation options.
Need for Education and Support: Addressing these concerns through targeted education, counseling, and peer support can improve acceptance and adherence to rehabilitation programs, ultimately leading to better outcomes for children with hearing loss.[24]

Socio cultural and Demographic Influences

Impact of Education and Socioeconomic Status

- Education: Low maternal education is strongly associated with decreased awareness of hearing loss, reduced health literacy, and higher rates of missed follow-up after newborn hearing screening. Mothers with higher education levels are more likely to understand the importance of early detection and to comply with recommended screening and interventions.[25]

- Socioeconomic Status: Lower socioeconomic status is linked to lower acceptance and participation in newborn hearing screening, as well as increased loss to follow-up. Financial hardship, lack of insurance, and uncertainty about the costs of screening, follow-up, and treatment can prevent families from accessing or completing early hearing detection and intervention programs.[7][26]

Urban vs Rural Differences

- Rural Residence: Families living in rural areas face greater barriers, including longer travel distances to hospitals, fewer specialized providers, and limited access to public transportation. These factors contribute to higher rates of missed follow-up and lower participation in screening and rehabilitation programs.
- Urban Residence: Urban families generally have better access to healthcare facilities and resources, resulting in higher screening rates and improved follow-up.[27]

Cultural and Religious Beliefs

- Cultural Beliefs: Cultural perceptions and traditional practices can influence maternal attitudes toward hearing loss and its management. In some communities, hearing loss may be attributed to fate, supernatural causes, or family shame, leading to reluctance to seek screening or rehabilitation.
- Religious Beliefs: Religious or spiritual beliefs may also shape acceptance of medical interventions, with some families preferring traditional remedies or delaying medical care due to faith-based convictions.

Influence of Healthcare Access (ANC Visits, Counseling)

- Antenatal Care (ANC) Visits: Regular ANC visits are a key source of information about newborn hearing screening. Mothers who attend more ANC visits are more likely to be informed about hearing loss, screening availability, and the importance of early intervention.[25]
- Counseling: Effective counseling during ANC and postnatal visits increases maternal knowledge, addresses misconceptions, and improves acceptance of screening and rehabilitation. Lack of counseling or poor communication from healthcare providers can perpetuate gaps in knowledge and negative attitudes.[28]

Table 1: Comparison of Maternal Knowledge and Attitude Towards Hearing Loss by Region and Education Level

Demographic Factor	High Knowledge/Positive Attitude	Low Knowledge/Negative Attitude
Region	**Urban Areas** ✓ Greater awareness of screening programs ✓ Higher compliance with follow-up ✓ Better access to hospitals and counseling	**Rural Areas** ✗ Limited awareness of screening and risk factors ✗ Poor access to specialized care ✗ Higher loss to follow-up
Education Level	**High Education** ✓ Better understanding of congenital/acquired causes ✓ Strong support for early intervention ✓ More proactive in decision-making	**Low Education** ✗ Poor understanding of risk factors and rehabilitation ✗ Greater influence of myths/stigma ✗ Less likely to complete screening pathway

Regional and International Perspectives

Global studies consistently reveal that mothers' knowledge and attitudes toward newborn hearing loss and screening vary widely by region, but certain trends are evident. For example, research from Hong Kong found that while mothers generally supported **Universal Newborn Hearing Screening (UNHS)** and were highly willing to bring their babies for follow-up if needed, their knowledge about infant hearing development and ongoing risks was limited. Many mothers incorrectly believed that a baby could not develop hearing loss after passing the initial

screening, and a significant number felt they did not receive enough information about the screening process or results. Despite these gaps, over 95% of mothers supported UNHS, reflecting strong acceptance of early detection programs and a desire for more comprehensive education and communication from healthcare providers.[29] Similar patterns were observed in Egypt, where about half of mothers had only fair knowledge of hearing loss causes and effects, yet two-thirds recognized the value of early detection and had positive attitudes toward early intervention and preferred screening methods. Notably, mothers' knowledge did not always correlate with their attitudes, suggesting that even those with limited information may still support screening and intervention if they perceive it as beneficial for their child's health.[30]

In other international contexts, such as Nigeria, studies have shown that awareness of newborn hearing screening and risk factors for infant hearing loss is generally poor among mothers, with many lacking understanding of causes and the importance of early intervention. However, willingness to accept newborn hearing screening remains high, especially among those with higher socioeconomic status and education, underscoring the influence of these factors on attitudes and participation.[25] Across regions, the need for public awareness campaigns and improved parental education is a common recommendation to enhance both knowledge and engagement with hearing health services.

Within India, research highlights similar challenges and opportunities. A study from Karnataka found that mothers of newborns often had moderate awareness of infant hearing loss and its risk factors, but knowledge gaps persisted regarding the importance of early screening and available rehabilitation options. Mothers generally expressed positive attitudes toward newborn hearing screening, mirroring international findings, but their understanding of the full spectrum of causes especially acquired hearing loss was limited. In Kerala and other Indian states, studies have also reported that while mothers are receptive to hospital-based screening programs, there is a need for more targeted education to address misconceptions and ensure sustained follow-up.

When comparing pregnant women and mothers of newborns, evidence suggests that mothers with newborns tend to have slightly higher awareness and more positive attitudes, likely due to direct exposure to hospital-based screening programs and counseling during the postnatal period. Pregnant women, on the other hand, may have less specific knowledge and may benefit from enhanced counseling during antenatal visits to prepare them for the importance of newborn hearing screening and early intervention.[31]

Discussion:

The discussion of maternal knowledge and attitudes toward newborn hearing loss and screening reveals a complex interplay of awareness, sociodemographic factors, and cultural influences. Studies from regions such as Karnataka, India, show that while a majority of mothers are aware that hearing loss can be present at birth and recognize its impact on speech, language, and social development, there remain substantial gaps in knowledge about specific risk factors and the availability or importance of newborn hearing screening programs [33] **(Vijayalakshmi et al., 2007).** For example, while mothers commonly identify congenital abnormalities, medication use during pregnancy, preterm birth, and substance use as potential causes, awareness of other significant risk factors such as infections (rubella, cytomegalovirus), neonatal jaundice, low birth weight, and prolonged NICU admission is often limited to a minority [32] **(Olusanya et al., 2006).**

This pattern is echoed in international studies, where mothers may recognize the consequences of hearing loss but lack detailed understanding of causative factors or the logistics of screening availability [36] **(Govender & Khan, 2017).** Sociodemographic variables, including maternal education, socioeconomic status, and rural versus urban residence, significantly influence both knowledge and follow-up compliance. Low maternal education, poverty, young maternal age, unmarried status, and rural residence are all associated with higher rates of missed follow-up after newborn hearing screening [34] **(Swanepoel et al., 2006).** These factors not only affect initial awareness but also the likelihood that families will complete recommended diagnostic testing and intervention if a hearing loss is suspected.

Cultural beliefs and perceptions of disability further complicate this landscape; in some communities, hearing loss may not be viewed as a condition requiring intervention, or there may be stigma associated with its diagnosis and treatment **(Olusanya et al., 2006).** Despite these challenges, willingness to participate in newborn hearing screening is generally high. Studies consistently report that over 85% of mothers express willingness to have their newborns screened, and acceptance of interventions such as hearing aids is also strong **(Govender & Khan, 2017).** However, a small proportion of mothers remain hesitant, often due to socioeconomic factors, concerns about social stigma, or cosmetic concerns regarding amplification devices.

Importantly, educational interventions have shown promising results. For instance, a study demonstrated that even brief exposure to an educational video significantly improved maternal knowledge about newborn hearing screening, highlighting the value of structured awareness initiatives [35] **(Krishnan & Van Hyfte, 2016).** The persistence of knowledge gaps even in settings where screening is mandatory and facilities are available underscores the need for ongoing education and culturally sensitive counseling within both antenatal and postnatal care settings.

In summary, while universal newborn hearing screening programs have made significant strides in early detection, their success is closely tied to maternal knowledge, attitudes, and sociodemographic context. Addressing disparities in awareness, improving access to information, and providing targeted support for high-risk and underprivileged groups are essential for maximizing the benefits of early hearing detection and intervention. Integrating comprehensive parental education and follow-up support into hospital-based programs can help bridge existing gaps and ensure that all children at risk for hearing loss receive timely and effective care.

Conclusion:

The knowledge and attitudes of pregnant women and mothers of newborns toward hearing loss and its rehabilitation are pivotal to the success of early detection and intervention programs. While most mothers and expectant women demonstrate a positive attitude and willingness to participate in newborn hearing screening, significant gaps in awareness persist particularly regarding specific risk factors, the ongoing risk of acquired hearing loss, and the importance of timely follow-up and rehabilitation. Sociodemographic factors such as education, socioeconomic status, and rural or urban residence, along with cultural and religious beliefs, strongly influence both knowledge levels and acceptance of screening and intervention. International and Indian studies consistently show that, although attitudes toward screening and rehabilitation are generally favorable, there is an urgent need for more comprehensive, culturally sensitive education and counseling. Hospitals and healthcare providers play a crucial role in bridging these knowledge gaps by integrating targeted information and support into antenatal and postnatal care. Addressing barriers related to cost, accessibility, and social stigma is equally important for ensuring that all families can benefit from early hearing detection and rehabilitation services. empowering mothers and pregnant women with accurate information, supportive counseling, and accessible services is essential for reducing the burden of childhood hearing loss. Strengthening maternal education and engagement within hospital and community settings will enhance early detection, promote timely intervention, and ultimately improve developmental outcomes for children with hearing impairment.

Conflicts of Interest: The authors declare no conflict of interest related to the development of this review or its findings. No financial or commercial relationships influenced the content or outcomes of this study.

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