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Research Paper

A Study of Maternal Satisfaction With Newborn Hearing Screening Programs and Its Correlation With Demographic Variables in Tehran, Iran

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ABSTRACT

Background and Objectives: The effectiveness of programs for screening newborns' hearing is associated with the parental perceptions of the quality of the screening process. This study aimed to assess maternal satisfaction with newborn hearing screening programs and explore the association between maternal satisfaction and demographic variables.

Methods: Mothers whose babies underwent hearing screening at Akbarabadi Hospital in Tehran, Iran, participated in this study. The demographic variables questionnaire and a Persian version of the Parent Satisfaction Questionnaire with Neonatal Hearing Screening Programs were employed to collect demographic variables (residence, housing, employment, education, age, income, number of pregnancies, nationality, and number of children). This questionnaire was divided into four subscales (information, personnel in charge of the hearing test, appointment activities, and overall satisfaction), comprising 22 closed-ended, Likert-type scale questions, ranging from "strongly disagree =1" to "strongly agree =5". The questionnaire assessed parental satisfaction with various aspects of the newborn hearing screening program.

Results: A total of 250 mothers participated in the study. The majority of participants reported overall satisfaction (87.8%), personnel in charge of the hearing test (83.05%), and appointment activities (78.34%). In the open-ended response items, 148 participants (59.2%) contributed to this section. The highest level of satisfaction among mothers was attributed to the friendly demeanor of the screening staff. In contrast, the lowest level of satisfaction was related to the short duration of the test.

Conclusion: The findings revealed a high level of maternal satisfaction with the hearing screening program. However, interventions related to providing information before the screening process could further enhance satisfaction. Overall, the questionnaire was proven to be a user-friendly and effective tool for measuring satisfaction and identifying areas for improvement.

Keywords: Infant, Neonatal, Satisfaction, Maternal, Parental, Hearing screening

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What is "already known" in this topic:

First of all satisfaction of hearing screening program and its relationship with demographic variables.

What this article adds:

This study examines which variables have a positive impact and which variables have a negative impact on the satisfaction process.

Introduction

Hearing loss is often insidious and one of the most prevalent congenital anomalies. It is estimated that the prevalence of permanent hearing loss ranges from 1 to 3 per 1000 live births [1]. Hearing plays a crucial role in the development of language and speech in children [2, 3], and the impact of hearing loss is magnified when it interferes with this development, leading to language, speech, and cognitive disorders [4–6]. Additionally, it has a detrimental impact on social, emotional, and educational development, imposing a significant burden on society [7, 8]. Normal hearing during the initial 6 months of life is critical for the growth of normal spoken language. Indeed, children with permanent congenital or early-onset hearing loss who are diagnosed before 6 months of age and receive appropriate and timely intervention demonstrate better speech and language outcomes than their peers [9]. Therefore, early detection and intervention for hearing loss in the infant population significantly improve the development of language and speech skills. Hearing provides early experiences in cognitive development, ensuring and enhancing learning opportunities for children [10–12]. In 2019, the Joint Committee on Infant Hearing in the United States established the goal of newborn hearing screening programs (NHSPs) to identify infants with hearing loss (detected before three months of age) and initiate early intervention before six months of age [13].

The effectiveness of NHSPs is closely linked to parental attitudes toward the quality of the screening process [14, 15]. Parents have a profound impact on their child's life, and their choices significantly influence the success or failure of their child's treatment program. Satisfied parents are more likely to cooperate, adapt to their child's behavior more quickly, and return for follow-up care [16, 17]. Numerous studies have been conducted to assess parental satisfaction with NHSPs. For instance, Mazlan et al. developed a questionnaire to evaluate parental satisfaction with NHSPs. Parents whose infants had undergone hearing screening reported high levels of satisfaction [17]. Similarly, Shojaee et al. [18], who translated the parent satisfaction questionnaire with neonatal hearing screening programs (PSQ-NHSPs) into Persian and assessed its validity and reliability, indicated that most parents were satisfied with this program.

In summary, parental satisfaction is a critical criterion for determining the success of universal NHSPs [18]. Furthermore, the use of a questionnaire specifically designed for this purpose, along with the collection of demographic variables and the analysis of its relationship with satisfaction, can more effectively address various aspects of these programs. Therefore, this study aims to measure maternal satisfaction with the hearing screening program immediately after receiving services at Akbarabadi Hospital in Tehran and to investigate the relationship between maternal satisfaction and demographic variables.

Materials and Methods

Study participants

The study population consisted of Iranian and Afghan mothers whose infants had undergone newborn hearing screening. All mothers were approached voluntarily, and a census survey was conducted with 250 participants who completed the Persian version of the (PSQ-NHSPs) after the initial hearing screening. All newborns underwent hearing screening before hospital discharge. The hospital's own audiologist conducted the screening. In this study, the research team and the main researcher only investigated the level of satisfaction with the provided screenings. The mean age of the infants at the initial screening test was one day.

Study methods

This quantitative, descriptive-analytic study was conducted between January and April of 2024. After obtaining ethical approval from the university and coordinating with the department's officials, the study was performed at the Maternity Ward of Akbarabadi Hospital, Iran University of Medical Sciences, Iran.

In this study, the demographic variables questionnaire and a Persian version of the PSQ-NHSPs were utilized to collect demographic variables (residence, employment, housing, age, education, income, nationality, number of pregnancies, and number of children). This questionnaire was categorized into 4 subscales: Information, appointment activities, personnel in charge of the hearing test, and overall satisfaction. It consisted of 22 closed-ended Likert-type scale questions ranging from "strongly disagree=1" to "strongly agree=5". The questionnaire assessed parental satisfaction with different aspects of the newborn hearing screening program. The information subscale, consisting of three items (3-5), evaluated parents' satisfaction with written materials provided before the screening. The subscale of personnel in charge of the hearing test, comprising eight items (9-16), assessed parents' satisfaction with the healthcare provider who conducted the screening.

The appointment activities subscale, containing 7 items (8, 17-22), examined parents' satisfaction with the appointment-making process. Finally, the overall satisfaction subscale, with three items, measured parents' general satisfaction with the entire screening program. Some items were reverse-coded to mitigate response bias. Additionally, three open-ended questions were included to allow parents to provide qualitative feedback and suggestions for improvement [18]. In a previous study by Shojaee et al., the Persian version of the PSQ-NHSPs demonstrated excellent internal consistency, with a Cronbach α of 0.897 for the overall questionnaire and values ranging from 0.70 to 0.84 for the subscales [18]. In this study, demographic information (e.g. nationality, age, employment status, level of education, residence status, number of children, number of pregnancies, and income) was collected from mothers using a questionnaire that assessed the demographic variables.

The data collected from Iranian and Afghan mothers were analyzed using SPSS software, version 17. Descriptive statistics were utilized to summarize the level of maternal satisfaction. The Spearman rank correlation coefficient was employed to examine the relationships between the subscales and the demographic variables.

Results

A total of 250 mothers participated in this study. Their demographic variables are presented in Tables 1 and 2. Family income was used as a measure of economic status. Participants reported learning about the newborn hearing screening program through various sources, including healthcare providers (72%), relatives (14.8%), friends (6.7%), and other sources, such as newspapers, television, and social media (6.5%). Based on maternal reports, 55.6% of infants passed the hearing screening, 13.6% failed, and 12.8% were unaware of the screening results. Given that no information, either verbal or written, was provided to mothers before the hearing screening, the questions in the information subscale of the questionnaire, which assessed understanding and adequacy of provided information, were left unanswered. For the personnel in charge of the hearing test subscale, the Mean±SD ranged from 3.61 to 4.31, with a mean of 3.84.

The highest level of satisfaction was attributed to the "behavior and attitude of the screening staff", while the lowest level of satisfaction was associated with "sufficient information regarding test results". In the subscale of the appointment process, the Mean±SD were 3.68 to 3.96 and 2.96. The highest level of satisfaction was related to "I had the opportunity to ask more questions about the newborn hearing screening program", and the highest level of dissatisfaction was attributed to "the duration of the testing session was insufficient". In the overall satisfaction subscale, the Mean±SD were 3.88 to 4.15 and 2.04, respectively.

In the open-ended response items, 148(59.2%) participants contributed to this section. The responses were manually analyzed, which involved organizing and grouping the responses based on similar words or phrases. The highest level of satisfaction among mothers was attributed to the friendly demeanor of the screening staff. In contrast, the lowest level of satisfaction was related to the short duration of the test (Tables 3 and 4). In the section on suggestions for improving newborn hearing screening provided by the participants, the suggestions were categorized into three groups: Increasing the duration of the screening staff's presence (n=13, 10.23%), providing information on infant hearing care (n=76, 59.84%), and explaining the process and how to conduct the hearing screening test before performing it (n=38, 29.92%).

Table 1. Demographic variables of participants (n=250)

Variables		No. (%)
Nationality	Iran	175(70)
	Afghanistan	75(30)
Residence	Urban	227(90.8)
	Rural	27(9.2)
Education level	Lower than a diploma	109(43.6)
	Diploma and higher	141(56.4)
Employment	Yes	21(8.4)
	No	229(91.6)
Housing	Owner	17(6.8)
	Tenant	233(93.2)
Number of pregnancies	1	66(26.4)
	2	161(64.4)
	3 and higher	23(9.2)
Number of children	1	71(28.4)
	2	158(63.2)
	3 and higher	21(8.4)

In addition, the relationship between demographic variables and mothers' satisfaction with the newborn hearing screening program was investigated using a paired Spearman correlation. The results demonstrated that only the nationality variable had a significant relationship with the level of mothers' satisfaction. Conversely, other demographic variables were not related to the level of mothers' satisfaction (Table 5).

Discussion

This study investigated the level of satisfaction with the newborn hearing screening program and examined its correlation with the demographic variables of the participants.

The results demonstrated that most participants (72%) heard about newborn hearing screening from healthcare providers. In the study conducted by Shojaee et al., which aimed to translate the PSQ-NHSPs questionnaire into the Persian language and evaluate 138 mothers in Tehran [18], and in the study by Mazlan et al., which sought to translate the PSQ-NHSPs questionnaire into Malay and investigated 119 families [17], 82.6% and 70.6% of the participants, respectively, reported learning about the newborn hearing screening program through hospital staff. Moreover, Goedert et al. concluded that midwives play a significant role in increasing the rate of hearing screening by ensuring that newborn hearing tests are performed [19]. Across all program components, the highest level of satisfaction was associated with the screening staff, while the lowest level of sat-

Table 2. Age and income variables of participants (n=250)

Variables	Mean±SD	Min	Max
Age (y)	25.43±4.490	15	37
Income (Rial/Month)	11.16±2.402	6	22

Table 3. Summary of responses to "one thing which you were more than satisfied about"

Satisfied With	No. (%)
Friendly demeanor of the screening staff	112(36.12)
Full explanation regarding the test result	96(30.97)
The possibility of screening in the hospital and not going anywhere else	102(32.91)

Table 4. Summary of responses to "one thing which you were less than satisfied about"

Dissatisfied With	No. (%)
Crowded environment	43(40.95)
The test time is short	62(59.05)

isfaction was related to the information subscale. This subscale obtained the lowest mean score, primarily due to the lack of information provided before the hearing test. Providing sufficient information about the program and its procedure can play a crucial role. According to previous research, parents who received no general knowledge about the program indicated a high level of anxiety. However, it was found that parents from higher socioeconomic classes had a higher probability of being aware of the screening program [20]. This finding may be because the screening program occurs shortly after birth, and there is insufficient time to educate mothers [21]. The findings of Shojaee et al. also revealed that mothers received no information before the newborn hearing screening test. Consequently, no responses were provided to the questions in the information provision subscale [18]. However, Mazlan et al. reported that a large number of parents (81%) had received information, and the majority of participants (95.6%) were satisfied with the information subscale. This research demonstrated a high level of satisfaction regarding the personnel subscale. It plays a crucial role in succeeding in the hearing screening program. In fact, a better correlation between personnel and parents, especially in "refer" cases, is highly important and can lead to increased positive family outcomes [17]. In the study by Shojaee et al., 60.1% of participants responded "strongly agree" or "agree" to the items included in the screening staff subscale [18]. In the study by Mazlan et al. 95% of participants strongly agreed or agreed with the items in this subscale of the questionnaire [17]. In the appointment activities subscale, 78.34% of participants strongly agreed or agreed with the questionnaire items. Based on the results of Shojaee et al, 58% of participants were satisfied with the

Table 5. The relationship between demographic variables and satisfaction level

Variables	Satisfaction Level (Spearman Correlation)
Age	0.596
Nationality	0.001*
Education level	0.754
Number of pregnancies	0.684
Number of children	0.569
Residence	0.831
Employment status	0.649
The amount of income	0.924
Housing	0.768

*The correlation is significant at the 0.05 level.

appointment scheduling items [18]. The findings of Mazlan et al. reveal that over 95% of participants strongly agree or agree with the related items [17]. Our findings confirm that the majority of participants (87.8%) are satisfied with the overall satisfaction items. In the study by Shojaee et al, 90.6% of the participants reported a high level of satisfaction with the overall satisfaction subscale [18]. Similarly, in the study by Mazlan et al., 78% of the participants are satisfied with the overall satisfaction subscale of the hearing screening questionnaire [17].

Based on the open-ended questions, mothers expressed high satisfaction with the behavior of the screening staff, which was also reflected in the closed-ended questions. Suggestions indicate that mothers desired to obtain more information about infant hearing care, which was also reflected in the information provision subscale, showing that mothers are eager to increase their knowledge about their child's hearing.

When examining the relationship between demographic variables and the newborn hearing screening questionnaire, no significant correlation was found between different satisfaction subscales (personnel in charge of hearing test, appointment activities, and overall satisfaction) and the variables of residence, housing, age, education, income, employment, number of pregnancies, and number of children, suggesting that these variables do not influence each other. Furthermore, a significant correlation was noted between the overall satisfaction and screening staff of hearing test subscales and the variable of nationality, indicating a mutual influence. However, this significant correlation was not observed between the appointment activities subscale and nationality, indicating that these variables do not affect each other. It is worth noting that Shojaee et al. investigated the relationship between satisfaction with the newborn hearing screening program and education level, age, and income [18].

Several factors may influence the positive outcomes in such studies. Mothers who were more satisfied or whose infants had passed the hearing test may have been more motivated to participate in the study. Additionally, mothers who completed the questionnaire may have been hesitant about their responses being disclosed and affecting the behavior of hospital staff. Given the possibility of false positive responses, institutions should adhere to specific principles to improve conditions for both parents and infants. Furthermore, to avoid wasting time, a system should be implemented to remind parents of their upcoming appointments, thereby preventing delays. These factors need to be considered in NHSPs in Iran.

Conclusion

Overall, mothers report being satisfied with the hearing screening program they participated in at the university hospital. However, concerns about the information dimension necessitate further intervention to enhance the program. Furthermore, the findings of this research demonstrate that the survey instrument is effective in identifying areas that need improvement in the hearing screening program. It is recommended that future studies focus on other stages of screening to gain a more comprehensive understanding of the hearing screening program in Iran.

Ethical Considerations

Compliance with ethical guidelines

The study was approved by the Ethics Committee of Iran University of Medical Sciences, Tehran, Iran (Code: IR.IUMS.REC.1402.641).

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Authors' contributions

Conceptualization and study design: Ali Aryamand, Mohammad Kamali, Malihah Mazaher Yazdi, and Reza Salehi; Data collection: Ali Aryamand and Majid Kalani; Statistical analysis: Mohammad Kamali; Data interpretation: Malihah Mazaher Yazdi; Writing the original article: Reza Salehi; Review and editing: Ali Aryamand, Malihah Mazaher Yazdi, and Mohammad Kamali; Supervision: Mohammad Kamali.

Conflict of interest

The authors declared no conflict of interest.

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