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# Factors that influence congenital hypothyroidism screening among pregnant women

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***Abstract***:
Congenital Hypothyroidism Screening (CHS) is an essential neonatal health intervention aimed at early detection of thyroid hormone deficiency to prevent growth and developmental disorders. However, CHS coverage in several regions of Indonesia remains low, particularly in East Kalimantan, where limited maternal knowledge and inadequate family support may influence screening participation. This study aimed to identify factors associated with the implementation of congenital hypothyroidism screening in the working area of the Mendik Community Health Center, Paser Regency, East Kalimantan Province, Indonesia. A cross-sectional study was conducted between September and October 2025 involving 30 pregnant women selected using a total sampling technique. Data were collected using a validated and reliable questionnaire assessing respondent characteristics, maternal knowledge, family support, maternal attitudes, and implementation of congenital hypothyroidism screening. Data were analyzed using descriptive statistics, Chi-square tests, and logistic regression analysis with a significance level of $p < 0.05$. More than half of respondents had inadequate knowledge regarding CHS (57%) and low family support (60%). The implementation of CHS remained low, with 53% of respondents not undergoing screening. Bivariate analysis showed that maternal knowledge ($p = 0.009$) and family support ($p = 0.024$) were significantly associated with CHS implementation, whereas maternal attitude was not significantly associated ($p = 1.000$). Logistic regression analysis identified maternal knowledge as the dominant factor influencing CHS implementation (OR = 15.4; 95% CI = 1.74–136). Maternal knowledge and family support significantly influence the implementation of congenital hypothyroidism screening. Strengthening family-centered health education during antenatal care is essential to improve CHS coverage in primary healthcare settings.

***Keywords***:
congenital hypothyroidism; family support; health knowledge; pregnant women

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## INTRODUCTION

Congenital Hypothyroidism Screening (CHS) is recognized globally as one of the most important neonatal health interventions because it enables the early identification of thyroid hormone deficiency in newborns, thereby preventing irreversible intellectual disability, impaired neurological development, and long-term growth disorders when treatment is initiated promptly (Appelberg et al.,

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2023). The implementation of newborn screening programs has significantly improved child health outcomes and quality of life in many countries, making CHS an essential component of preventive pediatric healthcare systems worldwide (Tony et al., 2022). Early diagnosis through screening is particularly important because clinical manifestations of congenital hypothyroidism are often nonspecific during the neonatal period, causing many cases to remain undetected without systematic screening programs (Pulungan & Soesanti, 2020).

Despite the recognized benefits of CHS, many developing countries continue to experience substantial barriers in achieving optimal screening coverage. Limited public awareness, inadequate healthcare infrastructure, unequal access to screening facilities, insufficient logistical support, and poor family engagement remain major challenges in the successful implementation of neonatal screening programs (Setyaningsih & Wulandari, 2022). In Indonesia, these challenges remain evident, particularly in rural and underserved regions where access to healthcare and educational resources is limited. According to the 2023 Indonesian Health Survey, approximately 82.5% of newborns in East Kalimantan had not undergone congenital hypothyroidism screening, indicating that the coverage of CHS remains critically low. Furthermore, in the working area of the Mendik Community Health Center (UPTD) in Paser Regency, East Kalimantan Province, screening coverage in 2024 reached only around 35%, which remains far below the expected national target.

Previous studies have demonstrated that participation in congenital hypothyroidism screening is strongly influenced not only by healthcare service availability but also by parental and family-related factors. Maternal knowledge, educational background, attitudes toward newborn screening, perceived benefits and barriers, and family support play crucial roles in determining whether newborns receive CHS services (Kasem et al., 2022). Research conducted in Indonesia also reported that insufficient understanding of congenital hypothyroidism among postpartum mothers was associated with increased anxiety regarding newborn screening procedures (Faizi et al., 2022). Similarly, other studies found that family approval and support were among the most influential determinants of screening participation, with a large proportion of families refusing or delaying screening due to limited awareness and misconceptions regarding the importance of early detection (Retnosari et al., 2024).

Current evidence regarding CHS implementation in Indonesia has primarily focused on program evaluation, technical implementation, and general educational interventions, while limited attention has been given to the influence of psychosocial and familial factors on screening participation, particularly in primary healthcare settings with low screening coverage (Setyaningsih & Wulandari, 2022). Moreover, most previous studies were conducted in urban hospitals or tertiary healthcare facilities, which may not adequately represent the unique sociocultural and healthcare

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access conditions experienced in rural or semi-rural communities such as Paser Regency. Consequently, there remains a substantial research gap concerning how maternal knowledge, attitudes, and family support affect CHS participation within community-based primary healthcare services.

This study offers novelty by specifically examining the influence of social and behavioral factors, including maternal knowledge, family support, and attitudes, on the implementation of congenital hypothyroidism screening in the working area of the Mendik Community Health Center (UPTD), an area characterized by low screening coverage and limited evidence-based research. Understanding these determinants is essential because family-centered decision-making patterns strongly influence maternal health behavior in many Indonesian communities. By identifying the most influential factors associated with CHS participation, this study is expected to provide evidence-based recommendations for designing targeted health education, community engagement strategies, and family-centered interventions to improve congenital hypothyroidism screening coverage.

Therefore, this study aims to identify and analyze the factors influencing the implementation of congenital hypothyroidism screening in the working area of the Mendik Community Health Center (UPTD), Paser Regency, East Kalimantan Province. The findings are expected to strengthen neonatal screening programs, enhance family awareness of early detection of congenital disorders, and support national efforts to improve neonatal health outcomes and the quality of human resources in Indonesia.

## METHODS

This study employed an analytical observational design with a cross-sectional approach to identify factors associated with the implementation of congenital hypothyroidism screening among mothers in the working area of the Mendik Community Health Center, Paser Regency, East Kalimantan Province, Indonesia. The study was conducted between September and October 2025. Ethical approval for this study was obtained from the relevant Health Research Ethics Committee under approval number 021/09.KEPK/UBK/XII/2025. Prior to data collection, all participants received a detailed explanation of the study's objectives and procedures and subsequently provided written informed consent.

The study population consisted of pregnant women who attended maternal healthcare services at the Mendik Community Health Center during the study period. Participants were recruited using a total sampling technique, in which all eligible pregnant women who met the inclusion criteria and

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agreed to participate were included in the study. A total of 30 respondents participated in this research. Inclusion criteria included pregnant women who were willing to participate and able to communicate effectively during data collection.

Data were collected using a structured questionnaire developed based on the study's objectives and relevant literature on congenital hypothyroidism screening. The questionnaire underwent validity and reliability testing prior to implementation. The validity test demonstrated that all questionnaire items were valid, as indicated by corrected item-total correlation values exceeding the critical r-table value. Reliability testing showed that the instrument had satisfactory internal consistency, with a Cronbach's alpha coefficient exceeding the acceptable threshold of 0.70, indicating that the questionnaire was reliable for data collection.

The questionnaire consisted of several sections assessing respondent characteristics, maternal knowledge, family support, maternal attitudes, and the implementation of congenital hypothyroidism screening. Respondent characteristics included maternal age, educational level, occupation, and parity status. Maternal knowledge regarding congenital hypothyroidism screening was assessed through questions related to the purpose, benefits, timing, procedures, and potential risks associated with the absence of screening in newborns. Family support was evaluated on emotional, informational, motivational, and family-approval aspects related to screening participation. Maternal attitudes toward congenital hypothyroidism screening were assessed through perceptions and acceptance of newborn screening practices. All questionnaire items were measured using a 5-point Likert scale.

The dependent variable in this study was the implementation of congenital hypothyroidism screening, defined as the mother's action in bringing the newborn to a healthcare facility for congenital hypothyroidism screening according to the recommended schedule and procedure. Screening status was verified through observation, maternal and child health records (KIA book), and program reports from the community health center. Operationally, the implementation variable was categorized into "implemented" and "not implemented."

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS). Univariate analysis was conducted to describe the frequency distribution and percentage of respondent characteristics and study variables. Bivariate analysis using the Chi-square test was subsequently performed to examine the associations between maternal knowledge, family support, maternal attitudes, and the implementation of congenital hypothyroidism screening. Statistical significance was determined at a p-value of less than 0.05. Variables associated with the dependent variable were further analyzed using logistic regression to identify the dominant factors influencing the implementation of congenital hypothyroidism screening among respondents.

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## RESULTS

A total of 30 pregnant women participated in this study. Based on respondent characteristics, the majority of participants were aged 26–30 years (37%), followed by 21–25 years (30%), 31–35 years (20%), and 36–40 years (13%). Regarding educational background, most respondents had completed senior high school (47%), while 30% had completed junior high school, 17% had higher education, and only 7% had completed elementary school. In terms of occupation, the majority of respondents were housewives (70%), followed by civil servants (13%), farmers (10%), and the self-employed (7%). Based on parity status, primiparous and multiparous mothers accounted for 40% each, while 20% were grand multiparous.

Table 1. Distribution of Respondents According to Sociodemographic Characteristics, Knowledge, Family Support, and Maternal Attitudes Toward Congenital Hypothyroidism Screening (CHS)

| Variables | Categories | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Age (years) | 21–25 | 9 | 30 |
| | 26–30 | 11 | 37 |
| | 31–35 | 6 | 20 |
| | 36–40 | 4 | 13 |
| Educational Level | Higher education | 5 | 17 |
| | Senior high school | 14 | 47 |
| | Junior high school | 9 | 30 |
| | Elementary school | 2 | 7 |
| Occupation | Civil servant | 4 | 13 |
| | Self-employed | 2 | 7 |
| | Farmer | 3 | 10 |
| | Housewife | 21 | 70 |
| Parity | Primipara | 12 | 40 |
| | Multipara | 12 | 40 |
| | Grand multipara | 6 | 20 |
| Maternal Knowledge | Inadequate | 17 | 57 |
| | Adequate | 13 | 43 |
| Family Support | High | 12 | 40 |
| | Low | 18 | 60 |
| Maternal Attitude | Negative | 15 | 50 |
| | Positive | 15 | 50 |

Regarding the independent variables, more than half of the respondents (57%) demonstrated insufficient knowledge of congenital hypothyroidism screening, whereas 43% had good knowledge. Most respondents also reported low family support related to congenital hypothyroidism screening implementation (60%), while 40% experienced high family support. Maternal attitudes toward congenital hypothyroidism screening were equally distributed, with 50% demonstrating positive attitudes and 50% demonstrating negative attitudes.

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Table 2. Distribution of Congenital Hypothyroidism Screening Implementation Among Respondents

| Variable | Category | Frequency | Percentage |
|---|---|---|---|
| Implementation of Congenital Hypothyroidism Screening | Not implemented | 16 | 53 |
| | Implemented | 14 | 47 |

The findings showed that the implementation of congenital hypothyroidism screening among respondents remained relatively low. Of the total participants, 53% did not undergo congenital hypothyroidism screening for their newborns, whereas only 47% had implemented the screening according to the recommended procedures and schedule.

Table 3. Association Between Maternal Factors and the Implementation of Congenital Hypothyroidism Screening

| Dependent Variable | Independent Variables | $\chi^2$ Value | p-value | Interpretation |
|---|---|---|---|---|
| Implementation of Congenital Hypothyroidism Screening | Maternal knowledge | 6.07 | 0.009 | Significant association |
| | Family support | 5.60 | 0.024 | Significant association |
| | Maternal attitude | 7.00 | 1.000 | No significant association |

Bivariate analysis was conducted using the Chi-square test to examine the relationship between maternal knowledge, family support, maternal attitudes, and the implementation of congenital hypothyroidism screening. The results demonstrated that maternal knowledge was statistically significantly associated with the implementation of congenital hypothyroidism screening ($\chi^2 = 6.07$; $p = 0.009$). Similarly, family support was also significantly associated with congenital hypothyroidism screening implementation ($\chi^2 = 5.60$; $p = 0.024$). These findings indicate that mothers with better knowledge and stronger family support were more likely to implement congenital hypothyroidism screening for their newborns. In contrast, maternal attitude did not show a statistically significant relationship with the implementation of congenital hypothyroidism screening ($\chi^2 = 7.00$; $p = 1.000$). Therefore, the maternal attitude variable was excluded from the subsequent multivariate logistic regression analysis because it did not meet the statistical significance criteria.

Table 4. Multivariate Logistic Regression Analysis of Factors Associated with the Implementation of Congenital Hypothyroidism Screening

| Variables | Odds Ratio (OR) | 95% Confidence Interval (CI) | p-value | Nagelkerke $R^2$ |
|---|---|---|---|---|
| Inadequate maternal knowledge | 15.4 | 1.74–136.00 | 0.009 | 0.52 |
| Low family support | 0.10 | 0.01–0.83 | 0.024 | |

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Multivariate analysis using logistic regression was performed to identify the dominant factors influencing the implementation of congenital hypothyroidism screening. The analysis demonstrated that maternal knowledge was the most influential factor associated with the implementation of congenital hypothyroidism screening, with an odds ratio (OR) of 15.4 (95% CI: 1.74–136; p = 0.009). This finding indicates that mothers with inadequate knowledge were substantially more likely not to implement congenital hypothyroidism screening compared to mothers with adequate knowledge. Family support was also identified as a significant predictor of the implementation of congenital hypothyroidism screening (OR = 0.10; 95% CI: 0.01–0.83; p = 0.024). Respondents with low family support were less likely to implement congenital hypothyroidism screening compared to those receiving strong family support. Furthermore, the Nagelkerke R-square from the logistic regression analysis was 0.52, indicating that maternal knowledge and family support together explained approximately 52% of the variance in the implementation of congenital hypothyroidism screening. This result suggests that the model had moderate predictive power, while the remaining 48% may have been influenced by other factors not examined in the present study.

## DISCUSSION

The findings of this study indicate that the implementation of congenital hypothyroidism screening among respondents remained relatively low, with maternal knowledge and family support identified as significant factors associated with screening, whereas maternal attitudes did not demonstrate a statistically significant relationship. Logistic regression analysis further confirmed that maternal knowledge was the most influential factor in participation in congenital hypothyroidism screening, highlighting the critical roles of health literacy and family involvement in promoting neonatal screening uptake in primary healthcare settings.

The results of this study are consistent with previous studies demonstrating that maternal knowledge significantly influences participation in newborn screening programs. Kasem et al. (2022) reported that mothers with an adequate understanding of newborn screening procedures and benefits were more likely to participate in neonatal screening services. Similarly, Faizi et al. (2022) found that educational interventions significantly improved maternal knowledge of congenital hypothyroidism screening, thereby increasing mothers' willingness to undergo screening. The present findings also support the findings of Setyaningsih and Wulandari (2022), who identified insufficient public awareness and limited family engagement as major barriers to the implementation of congenital hypothyroidism screening in Indonesia.

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Maternal knowledge emerged as the strongest predictor of congenital hypothyroidism screening implementation in this study. Mothers with inadequate knowledge were substantially less likely to participate in screening than those with adequate knowledge. This finding may be explained by the limited understanding among mothers regarding the importance of early detection, the long-term consequences of untreated congenital hypothyroidism, and the benefits of timely intervention. Previous studies have emphasized that mothers with higher health literacy tend to demonstrate better preventive healthcare behaviors, including participation in neonatal screening programs (Kasem et al., 2022). In rural or underserved settings, limited exposure to health education and restricted access to information sources may further contribute to inadequate maternal understanding regarding congenital hypothyroidism screening.

Family support was also identified as a significant factor influencing congenital hypothyroidism screening implementation. Families play an important role in maternal healthcare decision-making, particularly in collectivist societies such as Indonesia, where health-related decisions are often influenced by spouses and extended family members. Emotional, informational, and practical support from family members may encourage mothers to access healthcare services and comply with recommended neonatal screening procedures. Chudleigh et al. (2022) emphasized that effective communication and family-centered approaches are essential to improve parental acceptance of newborn screening programs. The findings of the present study suggest that inadequate family support may reduce maternal confidence and motivation to participate in congenital hypothyroidism screening, particularly among mothers with limited autonomy or healthcare access.

Interestingly, maternal attitudes toward congenital hypothyroidism screening did not demonstrate a statistically significant relationship with screening implementation. This finding suggests that positive attitudes alone may not translate into actual health behavior when structural and informational barriers remain. Although mothers may express favorable perceptions of screening, practical limitations, such as a lack of family support, transportation barriers, limited healthcare access, or insufficient knowledge, may prevent them from implementing screening recommendations. Similar findings have been reported in studies examining preventive maternal and child health behaviors, where attitudes alone were insufficient predictors of healthcare utilization without adequate social and environmental support systems (Conway et al., 2022).

The relatively low implementation of congenital hypothyroidism screening observed in this study also reflects broader public health challenges in neonatal screening programs within developing countries. Limited healthcare infrastructure, inadequate dissemination of information, and insufficient integration of screening education into antenatal care services remain significant

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barriers to achieving optimal screening coverage. In many rural healthcare settings, maternal exposure to communication, information, and education (CIE) media remains limited, reducing opportunities for mothers and families to obtain accurate information regarding congenital hypothyroidism screening. Therefore, strengthening community-based health promotion through antenatal counseling, Posyandu activities, and family-centered educational interventions may improve public awareness and participation in screening.

The findings of this study have important implications for healthcare practice and policy. Healthcare providers, particularly nurses and midwives working in primary healthcare centers, should intensify educational interventions regarding congenital hypothyroidism screening during antenatal and postnatal care services. Family-centered education strategies should also be integrated into maternal healthcare programs to increase family involvement and support in neonatal health decision-making. In addition, policymakers should strengthen the availability of communication and educational resources regarding congenital hypothyroidism screening, especially in rural and underserved communities with low screening coverage.

Several limitations should be acknowledged in this study. First, the relatively small sample size may limit the generalizability of the findings to broader populations. Second, the cross-sectional design prevents establishing causal relationships among maternal knowledge, family support, attitudes, and screening implementation. Third, this study only examined selected psychosocial variables, while other potentially influential factors, such as socioeconomic status, healthcare accessibility, cultural beliefs, and healthcare provider support, were not analyzed. Future studies are recommended to involve larger sample sizes, multicenter settings, and longitudinal designs to provide more comprehensive evidence on factors influencing the implementation of congenital hypothyroidism screening.

## CONCLUSION

Maternal knowledge was a major factor influencing the implementation of congenital hypothyroidism screening. Limited access to communication, information, and education (IEC) media can also be a barrier to congenital hypothyroidism screening coverage in community health centers. Therefore, efforts are needed to improve information and education for the community at integrated health posts (*Posyandu*) and counseling regarding congenital hypothyroidism screening in pregnant women's classes. This is to ensure the effective implementation of congenital hypothyroidism screening in community health centers.

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The need for improved education and information, in the form of advertisements, pamphlets, and counseling, about screening for hypothyroidism congenita (CHF) in public during *posyandu* and pregnancy classes, so that the public has an open outlook and can support mothers, ensuring the effective implementation of screening for hypothyroidism congenital.

## CONFLICT OF INTEREST

This study is not perfect, so it is hoped that future researchers can expand the research sample and delve deeper to obtain more accurate results in evaluating the factors that may influence the implementation of future congenital hypothyroidism screening programs.

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