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The Influence Of Maternal Knowledge Determinants According to The Theory of Reasoned Action on Adherence to Neonatal Congenital Hypothyroidism Screening

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ABSTRACT

Congenital hypothyroidism screening (CHS) is a crucial effort to detect thyroid disorders in newborns to prevent growth and developmental delays. This study aimed to analyze the influence of maternal knowledge determinants based on the Theory of Reasoned Action on adherence to congenital hypothyroidism screening among newborns in the working area of the Buleleng I Public Health Center, Buleleng Regency, in 2025. A cross-sectional design, involving 50 postpartum woman selected through purposive sampling. Data were collected using a questionnaire and was tested bivariately using Fisher exact test. The study was conducted from January to February 2025. Fisher's Exact test indicated that variables significantly associated with CHS adherence were parity ($p=0.048$; OR=5.17; 95% CI=1.19-22.39), maternal age ($p=0.012$; OR=7.07; 95% CI=1.57-31.85), maternal education ($p=0.002$; OR=0.1; 95% CI=0.16-0.63), maternal occupation ($p=0.009$; OR=9.33; 95% CI=1.72-50.61), source of CHS information ($p=0.018$; OR=7; 95% CI=1.48-33.1), and family support ($p=0.000$; OR=27.00; 95% CI=3.03-240.39). Additionally, components of the Theory of Reasoned Action, including attitude toward behavior ($p=0.007$; OR=8.50; 95% CI=1.83-39.42), subjective norm ($p=0.000$; OR=27.00; 95% CI=3.03-240.39), and behavioral intention ($p=0.004$; OR=9.33; 95% CI=1.96-44.36), also showed significant influence. Knowledge determinants and reasoned action theory can be used as measuring tools for maternal compliance in carrying out congenital hypothyroid screening in newborns.

Keywords: Congenital Hypothyroidism Screening, Reasoned Action, Adherence.

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INTRODUCTION

Congenital hypothyroidism (CH) is a condition when the thyroid gland decreases or even does not function acquired from birth. CH is caused as a result of structural abnormalities or metabolic dysfunction in the synthesis of the hormone thyroid, as well as iodine deficiency(Kemenkes RI, 2014). The prevalence of congenital hypothyroidism in the world is estimated to be close to 1 per 3000 births, but increases in iodine deficit endemic areas, which is 1:300-900(Kemenkes RI, 2014). The incidence of congenital hypothyroidism globally is 1:2000 to 1:3000(Jamali et al., 2024).Thyroid hormones play an important role in the growth and development process, especially during the neonatal period. Therefore, CHS that is not detected and treated from the beginning will cause impaired brain development, intellectual disability, metabolic disorders and developmental disorders.

Congenital hypothyroidism is one of the most preventable causes of mental retardation with proper early detection. Developed countries have carried out congenital hypothyroid screening programs since the 1970s, while the implementation of CHS in Indonesia was only implemented in 2014 through the Regulation of the Minister of Health of the Republic of Indonesia Number 78 of 2014 (Jacob, 2016; Jamali et al., 2024; Kemenkes RI, 2023; Minamitani, 2021; Pulungan et al., 2024). Although CHS has been recommended by WHO, its implementation in Indonesia still faces many challenges, both in terms of lack of awareness, inadequate access and health facilities, and low participation from mothers.

The 2023 Indonesian Health Survey shows that the proportion of congenital hypothyroidism screening examinations in newborns with CHS is only 28.3% and those who are not examined are 60.7% based on health office documents (Kemenkes RI, 2023). The lowest coverage of CHS implementation is in Bali Province at 18.2% with the highest number in Tabanan Regency, at 74.4%, and the lowest in Buleleng Regency at 0.3% (Dinkes Bali, 2022). Based on data from the Buleleng Regency Health Office, the Puskesmas that have the lowest CHS coverage is the Buleleng I Public Health Center located in Buleleng sub-district which is the sub-district with the highest population in Buleleng Regency which is 51.95%.

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Given that Buleleng Regency records the lowest CHS rate, this area represents a critical setting to explore barriers to maternal compliance.

The low CHS rate is influenced by many factors, one of which is knowledge. Several studies suggest that behavioral determinants, particularly maternal knowledge and perception play a pivotal role in the success of neonatal screening program (Cherella & Wassner, 2017; Pulungan et al., 2019). A preliminary survey conducted by the researchers in January 2025 at the Sawan I Public Health Center with similar demographic characteristics showed that only 5% of mothers could correctly describe the purpose of CHS, and several admitted that they had refused or postponed the test due to misinformation or fear of side effects. These findings indicate significant gaps in maternal knowledge and perception that may contribute to the persistently low screening coverage in the region.

Therefore, this study specifically aims to analyze the influence of maternal knowledge determinants based on the theory of Reasoned Action on adherence with congenital hypothyroid screening in newborns in the Working Area of the Regional Technical Implementation Unit of the Buleleng I Public Health Center in Buleleng Regency in 2025 with a focus on specific geographical areas in areas that have not yet optimal CHS coverage.

METHOD

This research is analytic quantitative, analysis with a correlational design with a cross-sectional approach conducted in the Work Area of the Regional Technical Implementation Unit of the Buleleng I Public Health Center, Buleleng Regency in March-April 2025. The study population was postpartum mothers who had newborns recorded in the working area of the Buleleng I Health Center as many as 50 people, with a sample of 41 respondents obtained using the Lemeshow formula and purposive sampling techniques based on inclusion and exclusion criteria. The inclusion criteria include mothers who have babies less than one month old who are required or have undergone SHK, domiciled in the work area of the Buleleng I Health Center, have never attended a pregnant woman's class, are able to communicate well, and are

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willing to be respondents by signing an informed consent. Exclusion criteria include mothers with infants who have severe congenital disorders or serious medical conditions, cannot be encountered during data collection, have cognitive impairments, refuse to participate, or have participated in similar studies.

Primary data were collected through direct interviews and filling out structured questionnaires that had previously been tested for validity and reliability in the work area of the Sawan I Health Center on 30 respondents with similar demographic characteristics. The validity test used the Pearson Product Moment with valid criteria when r calculated $> r$ table (0.361) at a significance level of 5%, while the reliability was tested with Cronbach's Alpha with a value of $\alpha > 0.6$. Data were analyzed using the SPSS program version 26, including univariate analysis to describe the characteristics of respondents and research variables, as well as bivariate analysis using Chi-square test to assess the relationship between free and bound variables. If the data has an expected frequency of <5 , the Fisher's Exact Test is used. A $p <$ value of 0.05 is considered statistically significant. This research has received ethical approval from the Health Research Ethics Commission of the Ministry of Health of the Ministry of Health Denpasar with letter number DP.04.02/F.XXXII.25/288/2025, as well as a research permit from the Bali Province Investment and One-Stop Integrated Services Office (DPMPTSP) with number 503/324/REK/DPMPTSP/2025.

RESULTS

Conditions of the Research Location

The Regional Technical Implementation Unit of the Buleleng I Public Health Center is one of the health service centers established by the government and is located on Jl. A. Yani No.43, Kaliuntu, Buleleng District, Buleleng Regency. Buleleng I Public Health Center houses 15 sub-districts and 1 village.

Based on data and field observations, the coverage of CHS in the work area of the Buleleng I Public Health Center is still relatively low, which only reaches 51.95%, far below

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the national target. This low coverage is caused by several factors, including limited access, non-implementation of screening at several partner facilities, and lack of knowledge about the importance of CHS.

Respondent Characteristics

Based on the results in table 1, it can be seen that most of the respondents, namely as many as 70% of women, already have more than one child (multipara). When viewed based on age variables, 74% of respondents are in the adult age category.

In the variable level of education, the highest number is the level of higher education, which is 38%. In terms of work, as many as 60% of respondents work. The CHS information source variable in the table shows that most respondents already know about congenital hypothyroid screening from health workers, print media and social media, which is 80%. For the family support variable, most of the respondents, namely 62%, were supported by their families in the implementation of CHS.

Table 1. Distribution of Respondent Frequencies Based on Knowledge Determinant to Woman in the Work Area of the Buleleng I Public Health Center in 2025.

Characteristics	Frequency (n)	Presentase (%)
Parity		
Multipara	35	70
Primipara	15	30
Amount	50	100
Mother's Age		
Healthy Reproduction (20-35 years)	37	74
Unhealthy Reproduction (<20,>35 Years)	13	26
Amount	50	100
Mother's Education		
Higher (Diploma/Bachelor)	19	38
Middle (Secondary)	18	36
Elementary (Elementary/Junior High)	13	26

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Characteristics	Frequency (n)	Presentase (%)
Amount	50	100
Mother's Work		
Work	30	60
Not Working	20	40
Amount	50	100
CHS Information Resources		
Once	40	80
Never	10	20
Amount	50	100
Family Support		
Support	31	62
Not Supported	19	38
Amount	50	100

In table 2, the frequency distribution of the respondents' psychosocial characteristics was obtained on the variable attitude towards behavior, 76% of respondents had a strong attitude in behavior. As many as 62% of respondents had good support that encouraged the implementation of CHS from the surrounding environment in subjective norm variables. In the behavioral intention variable, 70% of respondents had a strong intention to do CHS on their babies. Of the total respondents, 80% complied and did CHS on time as recommended to their babies.

Table 2. Psychosocial Characteristics of *Reasoned Action* Aspects and CHS Compliance in Mothers in the Buleleng I Public Health Center Working Area of Buleleng Regency in 2025.

Characteristics	Frequency (n)	Presentase (%)
Attitudes towards Behavior		
Strong	38	76
Weak	12	24
Amount	50	100
Subjective Norms		
Support	31	62
Not Supported	19	38
Amount	50	100
Behavioral Intent		

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Characteristics	Frequency (n)	Presentase (%)
Strong	35	70
Weak	15	30
Amount	50	100
Mother's Compliance with CHS		
Adherence	40	80
Non-adherence	10	20
Amount	50	100

CHS Compliance based on Maternal Parity, Maternal Age, Maternal Education, Maternal Work, CHS Resources, and Family Support

Mothers with multipara parity were more compliant (88.6%) compared to primipara (60%), with the results of the Fisher Exact statistical test showing a value of $p= 0.048$ and OR (odds ratio)= 5.17 (95% CI: 1.19-22.39). The results of this study showed a significant influence between maternal parity and compliance in screening for congenital hypothyroidism (CHS). This is in line with research in the context of immunization programs, research by Agustin et al. (2021) mentioning that mothers with previous childbirth experience (multipara) have higher awareness in carrying out complete basic immunizations in children. The experience is believed to strengthen the mother's perception of the importance of preventive measures and early detection, including congenital hypothyroid screening.

In addition, mothers of adult age were more compliant (89.2%) than adolescent mothers (53.8%), with $p= 0.012$ and OR (odds ratio)= 7.07 (95% CI: 1.57-31.85), indicating that CHS adherence was 7.07 times higher in mothers of adult age (healthy reproduction). This is in line with findings by Mehran et al. (2019) in India involving 369 newborns finding that the average age of mothers was 25.83 years. The study did not find a significant correlation between maternal age and infant TSH levels, but highlighted the importance of maternal factors in screening outcomes. The study by Kumari et al. (2023) also explains that adherence to the screening program and follow-up is influenced by maternal age factors and maternal experience.

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The results of the analysis also showed that there was a significant relationship between the level of maternal education and compliance in screening for congenital hypothyroidism (CHS) in newborns with a value of $p= 0.002$ ($p< 0.05$). The OR value= 0.1 (95% CI: 0.16-0.63) and OR (odds ratio)= 2, 95% CI: 0.17-24.19. A systematic review and meta-analysis by Gebreyesus and Tesfay (2024) In Ethiopia found that mothers with primary education were 1.87 times more likely to complete child immunization than mothers without education. Furthermore, mothers with secondary to upper education are 3.47 times more likely to complete child immunization compared to mothers without education.

Work also plays an important role, where working mothers have a level with $p= 0.009$ and OR (odds ratio)= 9.33 (95% CI: 1.72-50.61). These findings were corroborated by a study by Moradi-Yes et al. (2024) conducted in Iran examining factors that affect maternal adherence to neonatal hearing screening. The results showed that mothers who had formal jobs were more likely to adhere to screening schedules than housewives, as they had better access to health information and facilities through the workplace and insurance. This research indicates that work can expand access to information and encourage more informed decisions when it comes to newborn screening. And it was strengthened by a study Rahman et al. (2020) that evaluated maternal participation in an anemia screening program in infants. Working mothers are reported to be quicker to take their children to health care because they have a higher awareness of the risk of disease.

Likewise, the availability of information about CHS has a significant effect on compliance ($p= 0.018$; OR (odds ratio)= 7; CI 95%: 1.48-33.12), indicating that CHS adherence was 7 times higher in mothers who were adequately informed. These results are in line with research by Radhia et al. (2023) showing that health education from health workers can improve pregnant women's knowledge and attitudes towards congenital hypothyroid screening, with p-value of 0.000, indicating a significant influence. Other research by Wiratni et al. (2025) has confirmed that maternal knowledge obtained from valid sources of information, such as health workers and flip-flops can increase maternal understanding of the importance of CHS, which has an impact on the adherence to the implementation of the screening.

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The family support factor has the strongest influence on CHS compliance. Mothers who received support with the results of the Fisher Exact test showed a value of $p= 0.000$ and OR (odds ratio)= 27 (95% CI: 3.03-240.39). Research by Aprianti et al. (2022) stated that 82.1% of all respondents who did not receive family support for screening did not carry out congenital hypothyroid screening in their babies. This shows that family support has a very important role in the implementation of CHS. Families who support the implementation of this program will make mothers have a strong desire to do CHS.

Table 3. Influence between Parity, Maternal Age, Maternal Education Level, Maternal Occupation, CHS Information Resources and Maternal Family Support with Compliance Mother performs CHS in the Puskesmas Work Area Buleleng I in 2025

Characteristics	CHS Adherence				Total	P value	OR	CI (95%)				
	Adherence		Non-adherence									
	n	%	n	%								
Parity												
Multipara	31	88,6	4	11,4	35	100						
Primipara	9	60	6	40	15	100	0,048	5,17 (1,19-22,39)				
Amount	40	80	10	20	50	100						
Mother's Age												
Healthy												
Reproduction (20-35 years)	33	89,2	4	12,82	37	100						
Unhealthy												
Reproduction (<20 Years)	7	53,8	6	46,2	13	100	0,012	7,07 (1,57-31,85)				
Amount	40	80	10	20	50	100						
Mother's Education												
Higher (Diploma/Bachelor)	17	89,5	2	10,5	19	100						
Middle (Secondary)	17	94,4	1	5,6	18	100	2	(0,17-24,19)				
Elementary (Elementary/Junior High)	6	46,2	7	53,8	13	100	0,002					
Amount	40	80	10	20	50	100						

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Characteristics	CHS Adherence				Total	P value	OR	CI (95%)				
	Adherence		Non-adherence									
	n	%	n	%								
Mother's Work												
Work	28	93,33	2	6,67	30	100						
Not Working	12	60	8	40	20	100	0,009	9,33 (1,72-50,61)				
Amount	40	80	10	20	50	100						
CHS Information Resources												
Get	35	87,5	5	12,5	40	100						
Can't	5	50	5	50	10	100	0,018	7 (1,48-33,1)				
Amount	40	80	10	20	50	100						
Family Support												
Support	30	96,77	1	3,23	31	100						
Not Supported	10	52,63	9	47,37	19	100	0,000	27 (3,03-240,39)				
Amount	40	80	10	20	50	100						

CHS's Adherend in Reasoned Actioned Theory Aspects

Mothers with a positive or strong attitude towards the importance of CHS tended to be more compliant (89.47%) than mothers with a weak attitude (50%), with a value of $p= 0.007$ and $OR= 8.5$ (95% CI: 1.83-39.42). This shows that CHS adherence is 8.5 times higher in mothers with strong attitudes. This is supported by studies by Wilaiwongsathien et al. (2023) reporting that in Thailand, parents' positive attitudes towards newborn blood screening contribute to increased awareness and participation in screening programs. In addition, a study by Kadiroğlu et al. (2023) in Turkey also found that mothers with positive attitudes towards newborn screening were more likely to comply with the screening. The study emphasizes that mothers' attitudes are influenced by factors such as education level and number of children.

In the subjective norm aspect, the results of the statistical test showed a value of $p= 0.000$ and $OR= 27$ (CI 95%: 3.03-240.39), which indicates that compliance with implementing CHS was 27 times higher in mothers who received support related to subjective norms. There is a significant influence between social support and the mother's compliance with CHS in her baby. Mothers who felt socially supported (from family, partners, or health workers) showed higher levels of adherence compared to mothers who did not receive social support. A study

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by Ringtiyas et al. (2020) in Indonesia found that subjective norms have a significant influence on the mother's intention to provide basic immunizations to the baby. Despite the focus on immunization, the same principle can be applied to CHS, where social support from the surrounding environment increases the intention and adherence of the mother to the child's health program.

In addition, behavioral intentions also showed a significant influence, $p= 0.004$ and $OR= 9.33$ (95% CI: 1.96-44.36) showed that mothers with intentional mothers who were angry had a 9.33 times greater chance of complying with CHS. The mother's intention to implement CHS is the strongest indicator in bridging attitudes and real actions. Research by Fauziah et al. (2024) this one in support of this finding found that maternal behavior is influenced by maternal intentions. Mothers with higher knowledge had 3,619 times higher intentions of breastfeeding their babies compared to mothers with lower knowledge. Likewise with the support of the husband, mothers with the support of the husband have the intention to breastfeed their babies 9,754 times higher. This is also supported by research by Rahyani et al. (2025) which explains that the husband's support can trigger the mother's actions so as to increase her compliance in conducting the examination.

Table 4. The Influence of *Reasoned Action* Theory Aspects of Attitudes towards Behavior, Subjective Norms, and Behavioral Intentions with Mother's Compliance in CHS in Working

Area of

Buleleng I Public Health Center in 2025.

Characteristics	CHS Adherence						P value	OR	CI (95%)
	Adherence		Non-adherence		Total				
	n	%	n	%	n	%			
Attitudes towards Behavior									
Strong	34	89,47	4	10,53	38	100	0,007	8,5	(1,83-39,42)
Weak	6	50	6	50	12	100			
Amount	40	80	10	20	50	100			
Subjective Norms									
Support	30	96,77	1	3,23	31	100	0,000	27	(3,03-
Not Supported	10	52,63	9	47,37	19	100			240,39)

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Amount	40	80	10	20	50	100			
Behavioral Intent									
Strong	32	91,43	3	8,57	35	100	0,004	9,33	(1,96-44,36)
Weak	8	53,33	7	46,67	15	100			
Amount	40	80	10	20	50	100			

DISCUSSION

This study demonstrated that maternal knowledge determinants based on the Theory of Reasoned Action (TRA) significantly influence adherence to congenital hypothyroidism screening (CHS). Mothers with higher education, adequate information, and supportive environments showed greater compliance. These findings support the TRA concept, emphasizing that attitudes, subjective norms, and behavioral intentions shape health-related behaviors (Ringtiyas et al., 2020).

Consistent with previous research, maternal knowledge remains a fundamental factor in promoting preventive behavior. Studies by Kadiroğlu et al. (2023) and Wilaiwongsathien et al. (2023) reported that sufficient maternal understanding and positive attitudes increase participation in newborn screening. Conversely, limited knowledge contributes to misconceptions and delayed screening (Cherella & Wassner, 2017). Education therefore acts as a key determinant; mothers with higher education tend to access credible information and make informed health decisions (Gebreyesus & Tesfay, 2024; Jacob, 2016).

Family support and subjective norms were also strongly associated with adherence. Supportive family environments enhance mothers' confidence and willingness to perform CHS (Aprianti et al., 2022; Rahyani et al., 2025). This aligns with TRA, in which perceived social expectations influence behavioral intention and action. Behavioral intention in this study emerged as a mediator between knowledge and compliance, reinforcing evidence that intention predicts health behavior (Fauziah et al., 2024; Moradi-Joo et al., 2024).

These findings underscore the importance of integrating behavioral models into public health interventions. Health education should not only transfer knowledge but also strengthen motivation, attitudes, and social support systems. In line with Pulungan et al. (2024) and Minamitani (2021), incorporating TRA-based education strategies may improve maternal participation in CHS programs and enhance early detection outcomes in Indonesia.

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CONCLUSION(S)

This study aims to analyze the influence of determinants of maternal knowledge based on the Theory of Reasoned Action (TRA) on compliance in screening for congenital hypothyroidism (CHS) in newborns. The results of the study showed that determinant factors such as parity, age, education, employment, information sources, and family support had a significant effect on maternal compliance in implementing CHS. In addition, the main components of TRA, namely attitudes towards behavior, subjective norms, and behavioral intentions, have proven to be important mediators that strengthen the relationship between knowledge and obedience actions. Mothers with positive attitudes, strong social support, and high behavioral intentions are more likely to comply with the screening process. These findings confirm that increasing maternal adherence to CHS depends not only on providing information, but also on strengthening psychosocial factors and the social environment that influence behavioral intentions. Therefore, the application of behavioral theory-based educational approaches such as TRA is recommended to increase the effectiveness of congenital hypothyroid screening programs in Indonesia

Conflict of Interest

The author(s) declare that they have no conflict of interest.

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