

## Supporting factors for the implementation of congenital hypothyroid screening Programme in Neonatus at Sonraen Health Centre

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### Abstract

**Background:** The global prevalence of hypothyroidism is estimated to be around 1:3,000–4,000 in newborns. Hypothyroidism in Indonesia was 1:12,724 in 2022. The first congenital hypothyroid screening program was implemented in 2000. Congenital hypothyroid screening was rated in 2018 (4.60%) and 2022 (2.3%). Kupang district implemented it in 2023 (6.4%). This study aims to analyze and determine the implementation factors of the congenital hypothyroid screening program at Sonraen Health Centre, Kupang Regency.

**Methods:** quantitative research with a cross-sectional approach. The sample size was 62 respondents, with total sampling and a questionnaire as research instruments. Analysis techniques include bivariate with chi-square, Spearman Rho tests, and multivariate logistic regression.

**Results:** The successful implementation of the congenital hypothyroid screening program in 2023 at the Sonraen Health Centre was 28.7%. Based on bivariate analysis obtained for competence ( $p < 0.001$ ), training ( $p = 0.012$ ), health human resources ( $p = 0.019$ ), budget ( $p = 0.319$ ), logistics ( $p < 0.001$ ), SOP ( $p < 0.001$ ), recording and reporting ( $p = 1,000$ ). Based on multivariate analysis, competence had a risk of 25.429, and SOP had a risk of 10.801 times the implementation of congenital hypothyroid screening.

**Conclusion:** Program achievement is far from the target. It appears that competence, training, human resources, logistics availability, and SOP are support factors in the implementation of congenital hypothyroid screening. However, the most dominant factor is competence.

**Keywords:** Congenital Hypothyroidism; Congenital Hypothyroid Screening; Program Achievements; Support Factors

### 1. Introduction

Congenital hypothyroidism is a thyroid hormone deficiency at birth due to impaired development of the thyroid gland or impaired production of thyroid hormone (Kollati Y et al., 2020; Bowden and Goldis, 2024). In newborns, 95% of congenital hypothyroidism does not present with signs or symptoms during the early intervention period (Indonesian Paediatric Association (IDAI), 2017). The global prevalence of hypothyroidism is estimated to be around 1:3,000–4,000 in newborns and increases to 1:300-900 in iodine-deficient areas. In Asian countries, the prevalence of congenital hypothyroidism in Japan is 1:7,600, Singapore is 1:3,000–3,500, Malaysia is 1:3,026, the Philippines is 1:3,460, and Hong Kong is 1:2,404. Incidence rates are lower in Korea (1:4,300) and Vietnam (1:5,502). A preliminary project in India showed a higher incidence of 1:1,700 and in Bangladesh at 1:2,000 (Ministry of Health, 2014).

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The incidence rate in Indonesia in 2022 will be 1:12,724 with a congenital hypothyroid screening rate of 2.3%. The incidence rate could certainly be higher or closer to the global lift if hypothyroid screening coverage reached at least 90% across the target. The prevalence of mentally retarded children in Indonesia is estimated to be 1–3% of the total Indonesian population with mental retardation, or around 6.6 million people. This is a challenge for Indonesia to strengthen newborn screening services (Ministry of Health, 2023). Based on the Basic Health Research Report of the Indonesian Ministry of Health (2018), 4.60% of newborns in Indonesia were screened for congenital hypothyroidism. The low coverage of congenital hypothyroid screening is influenced by several factors: knowledge, logistics, and family support (Hiola et al., 2022).

The Kupang District Health Office has also implemented the CHS program for newborns. From 2017 until 2022, congenital hypothyroid screening was not implemented at all in Kupang District. The implementation only began in 2023, but only 6.4% of newborns were screened, and the result was negative for hypothyroidism. This is still far from the expected target of 100% of newborns at that time. (Kupang District Health Office, 2023).

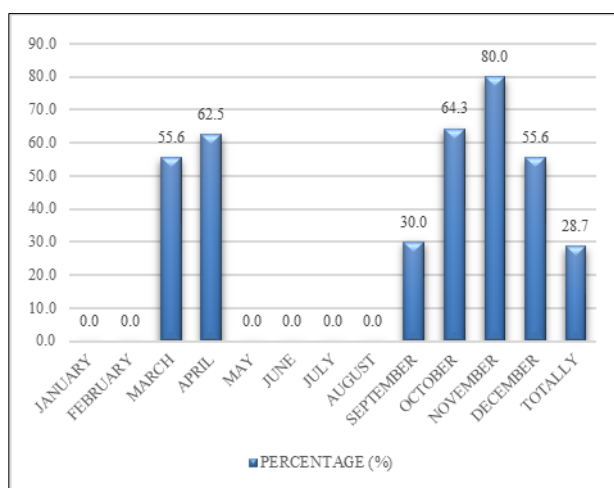
Based on the results of preliminary studies that have been carried out by distributing questionnaires to several health workers who perform congenital hypothyroid screening services in the Kupang district, there is still low coverage of congenital hypothyroid screening in newborns due to several factors, including less competent health workers because they have not attended training, the number of logistics that don't match the number of newborns at the health center, and inadequate or no health human resources. From the above background, the author is interested in analyzing and determining the implementation factors of the congenital hypothyroid screening program in newborns.

## 2. Methodology

This research is an observational analytic study using a cross-sectional design that is conducted at the same time. The population of this research is all employees of Sonraen Health Centre. Sampling is done using total sampling based on inclusion and exclusion criteria. So, the sample size in this study was 62 respondents.

## 3. Results and discussion

### 3.1. Univariate Analysis



**Figure 1** Outcome diagram of the implementation of congenital hypothyroid screening in newborns at Sonraen Health Centre in 2023

Based on the diagram above, the implementation of congenital hypothyroid screening in newborns at the Sonraen Health Centre only began to be implemented in March 2023. The highest implementation achievement was in November at 80.0%, and the lowest was in May–August 2023. The total achievement of congenital hypothyroid screening implementation in 2023 at Sonraen Health Centre was 28.7%. This means that the achievement is still far from the expected 100%.

**Table 1** Frequency distribution of competency variables: training, health, human resources, budget, logistics, SOPs, recording, and reporting

Variable	(f)	(%)
Competence		
Good	0	0
Fair	32	51.6
Lack	14	22.6
Poor	16	25.8
Training		
Very Good	3	4.9
Good	0	0
Lack	25	40.3
None	34	54.8
Health Human Resources		
Strongly agree	42	67.7
Agree	20	32.3
Disagree	0	0
Strongly disagree	0	0
Budget		
Strongly agree	43	69.4
Agree	19	30.6
Disagree	0	0
Strongly disagree	0	0
Logistics		
Stock available	16	25.8
Limited stock	34	54.8
Stock not available	12	19.4
SOP		
Available	26	41.9
Not available	36	58.1
Recording and Reporting		
Very routine	61	98.4
Routine	0	0
Rarely	0	0
Never	1	1.6

Based on the Table 1 above shows that 51.6% of respondents had sufficient competence. Respondents who did not attend CHS training were 54.8% more than those who attended training. Almost all respondents (67.7%) strongly agreed that the human resources included in the CHS team are the head of health center, doctors, midwives, nurses, and health analysts. Most respondents (69.4%) strongly agreed that a budget was needed to implement the CHS program. A total of 54.8% had limited CHS logistics stock at the health centers. In terms of SOPs, according to 51.8% of respondents not available. The frequency distribution table also shows that almost all 98.4% said that recording and reporting are very routine.

**Table 2** Distribution of respondents based on implementation of the CHS program at Sonraen Health Centre

Variable	(f)	(%)
CHS program implementation Support	32	51.6
Not supportive	30	48.4

Based on table 2, shows that most respondents, 51.6%, said there were factors involved that supported the implementation of the CHS program.

### 3.2. Bivariate Analysis

**Table 3** The relationship between competence and the implementation of CHS at Sonraen Health Centre

Competence	CHS implementation				Totally		<i>p-value</i>
	Support		Not supportive		f	%	
	F	%	F	%			
Good	0	0	0	0	0	0	<0,001
Fair	30	93.8	2	6.3	32	100	
Lack	1	7.1	13	92.9	14	100	
Poor	1	6.3	15	93.8	16	100	
Totally	32	51.6	30	48.4	62	100	

Based on Table 3, the competency variable of 62 respondents obtained 93.8% with sufficient competence or competence. Based on the statistical analysis test obtained, the *p-value* is <0.001, which means there is a relationship between competence and the implementation of CHS. The competence of a health human resource must be adequate and of high quality in organizing development and health services for the community. Competence is meant to show the knowledge, skills, and attitudes of a profession and is a characteristic of a professional's particular expertise (Imansyah et al., 2023). In Law Number 13/2003 concerning Labour, in Article 1 (10), "competence is the workability of each individual, which includes aspects of knowledge, skills, and attitudes according to established standards.

Based on research conducted by Fianasih and Triyono (2023), a program is significantly influenced by competence, meaning that with the competence possessed by health human resources, the role in carrying out congenital hypothyroid screening actions will run well and by service standards. PMK Number 78 of 2014, concerning congenital hypothyroid screening, states that those carrying out CHS actions must have a valid license and certificate of competence so that they deserve to be called competent personal.

**Table 4** Relationship between training and implementation of CHS at Sonraen Health Centre

Trainingg	CHS implementation				Totally		<i>p-value</i>
	Support		Not supportive		f	%	
	F	%	F	%			
Very Good	3	100	0	0	3	100	0.012
Good	0	0	0	0	0	0	
Lack	16	64.0	9	34.0	25	100	
None	13	38.2	21	61.8	34	100	
Totally	32	51.6	30	48.4	62	100	

Table 4 shows that 100% of respondents supported the implementation of CHS by attending training very well, while 61.8% of respondents did not attend training. The statistical test results got a p-value of 0.012 and a coefficient (r) of 0.318, which means there is a relationship between the training attended by respondents and the implementation of CHS, but the correlation is weak. The purpose of training is to be able to uniformize, as much as possible, the abilities and mindset of a person in an organization (Kasmir, 2016). In PMK No. 78 of 2014, one of the CHS operational strategies is to conduct CHS program training and orientation for health workers in health service facilities.

Based on research conducted by Muliawati (2016), which states that there is a relationship between training and the PSN program in Tanah Kalikedinding Village but has a low relationship strength, This research is also in line with the research of Masruri et al. (2023) at RSUD Dr. Soetomo Surabaya, which states that there is a significant influence between training and professional nurse competence. Research conducted in the Magelang district shows that the lack of quality of human resources implementing the screening program is partly due to the fact that NHI and CHS training at the health center level has never been held, so village midwives have not been exposed to training directly (Latifah et al., 2020).

**Table 5** Relationship between Health Human Resource and CHS Implementation at Sonraen Health Centre

Health Human Resource	CHS implementation				Totally		p-value
	Support		Not supportive		f	%	
	F	%	F	%			
Strongly agree	26	61.9	16	38.1	42	100	0,019
Agree	6	30.0	14	70.0	20	100	
Disagree	0	0	0	0	0	0	
Strongly disagree	0	0	0	0	0	0	
Totally	32	51.6	30	48.4	62	100	

Based on table 5 shows that most respondents (61.9%) strongly agree that health human resources included in the CHS implementation team, consisting of the head of the health center, doctors, midwives, nurses, and health analysts, support the implementation of CHS and the statistical test results obtained a p-value of 0.019, which means there is a relationship between health human resources and the implementation of congenital hypothyroid screening. According to PMK Number 78 of 2014, the target human resources in the congenital hypothyroid screening program are midwives and nurses, general practitioners of health care facilities, health analysts, pediatricians, clinical pathology specialists, and obstetricians and gynecologists.

Based on the results of research by Anggriani et al. (2019), which states that in the input variable, there are human resources, namely the personnel involved in the CHS program at Public health centre Karangrejo Metro City, totaling six people, namely the coordinator and implementing staff, all of whom are midwives. According to the results of research by Latifah et al. in 2020 on the hypothyroid screening program for neonatals in iodine deficiency-replete areas, it shows that the implementers of the CHS program in the field are village midwives. Village midwives conduct examinations during neonatal visits at the age of 0 days by looking for signs of congenital hypothyroidism (Latifah et al., 2020).

Table 6 above shows that 57.9% agree that the budget is not a factor that supports the implementation of CHS. The statistical test results obtained a p-value of 0.319, which means there is no relationship between the budget and the implementation of CHS. The implementation of a program certainly requires a budget to realize it. In the health sector, there is also a budget allocated from both the central and local governments to organize health services for the community.

The government supports the CHS program through PMK Number 78 of 2024, which states that the provision of CHS program needs in healthcare facilities (public health centre ) can use BOK funds, APBD, and other non-binding sources. Based on the Minister of Health Regulation No. 3 Year 2023 Article 15 (4,d), which states that sampling for congenital hypothyroid screening (CHS) is included in the delivery tariff package, it is expected that the implementation of the congenital hypothyroid screening program will not experience major obstacles. The use of BOK, APBD, and BPJS non-

capitation funds through maternity claims at Public Health Centre, although not significantly related, can have a positive impact on the implementation of the congenital hypothyroid screening program (CHS).

**Table 6** Relationship between budget and CHS implementation at Sonraen Health Centre

Budget	CHS implementation				Totally		<i>p-value</i>
	Support		Not supportive		f	%	
	F	%	F	%			
Strongly agree	24	55.8	19	44.2	43	100	0.319
Agree	8	42.1	11	57.9	19	100	
Disagree	0	0	0	0	0	0	
Strongly disagree	0	0	0	0	0	0	
Totally	32	51.6	30	48.4	62	100	

Based on research conducted by Anggraini et al. in 2019, the input variables regarding the source of funds used for the CHS program at the Karangrejo Health Centre came from the APBD (Regional Revenue and Expenditure Budget) and BOK (Health Operational Costs). The source of funds originating from the APBD is 40% of the health budget. The source of funds is then used by Karangrejo Health Centre for the operational costs of CHS program activities (Anggraini et al., 2019). The results of this study contradict research conducted by Latifah et al. in 2020, which states that there is a budgetary relationship with the implementation of the CHS program, which is marked by the availability of insufficient funds, causing not all babies born to be examined for CHS, so that the coverage of the implementation of the CHS program is still far from the target (Latifah et al., 2020). According to Octavius et al., a study in 2023 showed that to accelerate the CHS program in Indonesia, one of them was a benefit-cost analysis and the implementation of a single payment system for the CHS program (Octavius et al., 2023).

**Table 7** Relationship between CHS logistics and CHS implementation at Sonraen Health Centre

Logistics	CHS implementation				Totally		<i>p-value</i>
	Support		Not supportive		f	%	
	F	%	F	%			
Stock available	15	93.8	1	6.3	16	100	<0.001
Limited stock	14	41.2	20	58.8	34	100	
Stock not available	3	25.0	9	75.0	12	100	
Totally	32	51.6	30	48.4	62	100	

Based on Table 7 above, most respondents (93.8%) said CHS logistics used were in stock. From the statistical test results obtained, the *p-value* was <0.001, which means there is a relationship between CHS logistics and the implementation of CHS. The availability of medical device logistics must be complete and in good condition or suitable for use so that it will support the implementation of a program in health services. Sonraen Health Centre, in terms of availability of CHS logistics, has stock in usable condition. However, there are also times when stocks are limited or even empty due to the availability of logistics at the Kupang District Health Office. So the policy of the Kupang District Health Office to provide CHS logistics is only five packages per health center.

Research conducted by Hiola et al. (2022) on factors affecting the coverage of congenital hypothyroid screening implementation at Prof. Dr. H. Aloe Saboe Hospital, Gorontalo City, found that logistical factors have a close relationship with the coverage of CHS implementation. In line with research by Anggraini et al. (Anggraini et al., 2019) at Public health centre Karang Rejo Metro City, the third point input variable is facilities and infrastructure, with the facilities (logistics) used by the health center to support the implementation of CHS program activities, including filter paper, lancets, sterile gloves, 70% alcohol or alcohol swabs, gauze, and cotton.

**Table 8** Relationship between SOPs and Implementation of CHS at Sonraen Health Centre

SOPs	CHS implementation				Totally		<i>p-value</i>
	Support		Not supportive				
	F	%	F	F	%	%	
Available	24	92.3	2	7.7	26	100	<0.001
Not available	8	22.2	28	77.8	36	100	
Totally	32	51.6	30	48.8	62	100	

Based on Table 8, almost all respondents, 92.3%, support the implementation of CHS with the availability of SOPs for performing actions. The statistical test results obtained a *p-value* of <0.001, which means there is a relationship between the SOP and the implementation of CHS. Health workers with various professions must follow the Procedural Operational Standards (SOP) to ensure the quality of the examination results.

In line with research by Putri and Cholifah at Public health centre Taman Sidoarjo in 2024, which states that in running the CHS program at Public Health Centre Taman according to the Standard Operating Procedures (SOP) that have been made by the public health centre and having an organizational structure for implementing the program, the use of SOPs will be a guide for implementing policies in the implementation of the CHS program (Putri and Cholifah, 2024). PMK No. 78 of 2014 states that standard service procedures (SPO) must be made and documented to maintain consistency in the quality of examination results.

**Table 9** The relationship between recording and reporting with the implementation of CHS at Sonraen Health Centre

Recording and Reporting	CHS implementation				Totally		<i>p-value</i>
	Support		Not supportive				
	F	%	F	F	%	%	
Very routine	31	50.8	30	49.2	61	100	1,000
Routine	0	0	0	0	0	0	
Rarely	0	0	0	0	0	0	
Never	1	100	0	0	1	100	
Totally	32	51.6	30	48.8	62	100	

Table 9 shows that 50.8% of respondents do it regularly to support the implementation of CHS. The statistical test results have a *p-value* of 1.000, which means there is no significant relationship between recording and reporting with the implementation of the CHS program at Sonraen Health Centre.

One of the indicators of a program is based on recording and reporting. Without recording and reporting, any activity or program implemented will be invisible. The output of this recording and reporting is valuable data and information when using the appropriate and correct methods (Muharini, 2016).

Research conducted by Putri and Cholifah (2024) shows that in the implementation of the CHS program for recording and reporting, babies who have been carried out CHS do not report to the public health centre because they have done their reporting to the District Health Office or City, which means that recording and reporting at the public health centre has nothing to do with the implementation of the CHS program (Putri and Cholifah, 2024). Multivariate Analysis

Based on Table 10, the strength of the influence of the competence variable with the implementation of congenital hypothyroid screening is OR 25.429 (95% CI 4.192–154.263) and a *p-value* of <0.001 (<0.05), while the SOP variable with the implementation of congenital hypothyroid screening is OR 10.801 (95% CI 1.411–82.690) and a *p-value* of 0.022 (<0.05). Based on the OR value, the variable that has the most dominant influence on the implementation of congenital hypothyroid screening is competence.

**Table 10** Multivariate analysis results

	B	p-value	Exp (B) / Odd Ratio (OR)	95% C.I for EXP(B)	
				Lower	Upper
Competence	3.236	<0.001	25.429	4.192	154.263
SOPs	2.380	0.022	10.801	1.411	82.690

#### 4. Conclusions

The achievement of the congenital hypothyroid screening program at Sonraen Health Centre in 2023 of 28.7% is still far from the target. This study concluded that the factors supporting the implementation of congenital hypothyroid screening are competence, training, health, human resources, logistics, and SOPs. However, the most dominant and influential factor is competence.

#### Compliance with ethical standards

##### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

##### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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