

A Study on the Impact of Growth and Development Screening Education on Posyandu Cadres' Knowledge

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ABSTRACT

Background: Early detection of child growth and developmental problems is essential to ensure optimal child outcomes and improve human resource quality. Posyandu cadres play a crucial role in community-based screening; however, limited knowledge and technical skills may hinder effective implementation.

Purpose: Educational interventions are therefore needed to strengthen cadres' capacity in growth and developmental screening.

Methods: This study employed a pre-experimental one-group pretest-posttest design conducted in the Ciwaruga Health Center working area. A total of 33 Posyandu cadres were selected using total sampling based on predetermined inclusion criteria. The intervention consisted of structured education delivered through lectures, interactive discussions, and hands-on demonstrations covering anthropometric measurements, growth monitoring charts/ KMS (Kartu Menuju Sehat), developmental screening using the KPSP (Kuesioner Pra Skrining Perkembangan), and referral procedures. Cadres' knowledge was measured before and after the intervention using a validated and reliable questionnaire. Data were analyzed using descriptive statistics and the Wilcoxon signed-rank test.

Results: Before the intervention, most cadres demonstrated low to moderate knowledge levels. Following the educational program, a substantial improvement was observed, with the majority of respondents achieving a high level of knowledge. Statistical analysis revealed a significant difference between pretest and posttest knowledge scores ($p < 0.001$), indicating the effectiveness of the educational intervention.

Conclusions: Growth and developmental screening education significantly improves the knowledge of Posyandu cadres. Structured, practice-oriented educational approaches are effective strategies for enhancing cadre capacity and supporting the quality of community-based child health services.

Keywords: Growth and Development, Knowledge, Posyandu Cadres, Screening

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BACKGROUND

Improving the quality of human resources is a global priority that must begin in early childhood, particularly during the first five years of life, often referred to as the golden period. This phase is characterized by rapid physical growth, neurological maturation, and the development of cognitive, language, and socio-emotional abilities (Soetjningsih, 2014). Disruptions during this critical period may lead to long-term consequences, including reduced learning capacity, lower productivity, and diminished quality of life in adulthood (UNICEF, 2019). Without systematic monitoring, growth and developmental problems may go undetected, resulting in delayed intervention and suboptimal outcomes (Wong, 2008).

Growth and development are interrelated yet distinct processes. Growth refers to quantitative increases in body size and cellular mass, whereas development involves qualitative changes reflected in improved functional abilities, organ maturation, and integration among body systems (Whaley & Wong, 2004). These processes are influenced by nutritional intake, environmental stimulation, caregiving practices, health status, and socioeconomic conditions (Soetjningsih, 2014). Given their sequential and predictable nature, continuous monitoring is essential to ensure that children achieve their optimal developmental potential.

From a community nursing perspective, *Posyandu* cadres play a pivotal role as strategic partners of community nurses and function as Community Health Workers (CHWs) who connect families with primary health care (PHC) services. Their contribution extends beyond assisting routine community health activities, as they actively facilitate health promotion, disease prevention, early identification of child health problems, and referrals within the primary health care system. Consequently, strengthening cadres' competencies through education on child growth and developmental screening should be viewed not merely as an educational intervention to improve individual knowledge but as a community capacity-building strategy that enhances the effectiveness of PHC services. The World Health Organization (WHO) recognizes competent CHWs as a cornerstone of resilient primary health care systems and a key contributor to achieving Universal Health Coverage (UHC) through improved access, continuity, and equity of health services (WHO, 2025).

Growth and developmental monitoring is a fundamental component of pediatric health care because the first five years of life represent a critical window for neurological, motor, language, cognitive, and socio-emotional development. Developmental delays that remain undetected during this period may lead to long-term consequences, including poor school readiness, reduced academic performance, impaired social functioning, and decreased quality of life. Therefore, early identification through systematic developmental surveillance and screening is considered an evidence-based strategy for optimizing child development and minimizing lifelong disability. The American Academy of Pediatrics (AAP) Bright Futures Guidelines (2024) recommend developmental surveillance at every well-child visit and standardized developmental screening at 9, 18, and 30 months of age, or whenever developmental concerns or risk factors are identified. Likewise, WHO and UNICEF advocate integrating developmental monitoring into child- and family-centered PHC, emphasizing that early detection should be accompanied by responsive caregiving, effective communication with families, and timely community-based intervention to improve child health outcomes (AAP, 2024).

In Indonesia, developmental screening within primary health care is primarily conducted using the Pre-Screening Developmental Questionnaire (Kuesioner Pra Skrining Perkembangan; KPSP), a nationally standardized instrument designed to identify developmental deviations in gross motor, fine motor, language, and personal-social domains. The KPSP has considerable clinical significance because it is practical, inexpensive, and can

be administered reliably by trained healthcare professionals and *Posyandu* cadres, enabling early identification of children requiring further assessment or intervention. In parallel, the Child Growth Monitoring Card (Kartu Menuju Sehat; KMS) serves as a standardized tool for monitoring children's physical growth through serial weight-for-age measurements while functioning as a communication medium that facilitates interactions among healthcare providers, cadres, and parents regarding children's nutritional and health status. The combined implementation of KPSP and KMS provides a comprehensive approach to monitoring both physical growth and developmental milestones, thereby improving the quality of early detection, referral, and continuity of child health services.

Within the framework of community nursing, educating *Posyandu* cadres in the use of KPSP and KMS has implications that extend beyond technical competence. It strengthens their capacity to function as health promoters, family educators, and community empowerment agents who facilitate parental awareness, improve health literacy, encourage regular participation in child health services, and promote timely referral for children at developmental risk. Consequently, cadre education should be regarded as a sustainable capacity-building intervention that reinforces community participation, strengthens primary health care delivery, and supports the development of resilient community-based child health systems. This perspective shifts the focus from individual knowledge acquisition toward broader improvements in community empowerment and primary health care performance, highlighting the essential contribution of community nursing to achieving equitable child health outcomes.

At the global level, (UNICEF, 2019) reports that approximately 27.5% of children experience growth and developmental disturbances, with the highest burden occurring in low- and middle-income countries. In line with this, (UNESCO, 2023) estimates that nearly 200 million children under five years of age are at risk of not reaching optimal development due to inadequate stimulation and delayed early detection. In Indonesia, early detection of growth and development has been mandated through Ministry of Health Regulation No. 25 of 2014 as part of essential child health services; however, its implementation remains inconsistent. In West Java, coverage of growth and developmental monitoring has reached 79.1%, which is still below the national service target (Dinas Kesehatan Jawa Barat, 2023).

At the community level, *Posyandu* serves as a key platform for growth and developmental screening, as cadres act as the first point of contact for families. Despite this strategic role, several studies indicate that *Posyandu* activities often do not fully adhere to established standards. (Abidah & Novianti, 2020) reported that only 30% of *Posyandu* operated according to standard procedures, while errors in weighing and recording were still common among cadres. Similarly, (Sri Mulyanti, et al., 2023) found that accurate weighing practices occurred in only 3% of observed cases, increasing the risk of misinterpretation of children's nutritional status. These findings highlight the need to strengthen cadres' knowledge and technical competence in growth and developmental screening.

Preliminary observations in the Ciwaruga Health Center working area revealed that only 3 out of 12 *Posyandu* consistently conducted growth and developmental screening activities. In addition, an initial assessment indicated that only a small proportion of cadres possessed adequate knowledge and technical skills, particularly in anthropometric measurement techniques, documentation accuracy, interpretation of growth monitoring charts, and implementation of developmental screening procedures. These findings indicate a gap between recommended child growth and developmental screening standards and their actual implementation at the community level, highlighting the need for targeted educational interventions in this area.

Growth monitoring activities at *Posyandu* are commonly conducted using the *Kartu Menuju Sehat (KMS)*, a child growth monitoring chart used to track weight-for-age and identify

early signs of growth faltering. Meanwhile, developmental screening is performed using the *Kuesioner Pra Skrining Perkembangan (KPSP)*, an Indonesian developmental pre-screening questionnaire designed to assess age-appropriate developmental milestones in children. Although these tools are widely available and recommended, preliminary findings suggest that their utilization by cadres remains inconsistent and often suboptimal due to limited understanding and technical proficiency.

Cadre training needs to be carried out continuously because acquired knowledge and skills can decline over time (Wulandari, 2023). A study in Kupang found that the improvement in cadre skills was not maintained at the second post-test ($p=0.934$), indicating the need for regular mentoring (Nur, 2025). Empowering cadres through a combination of module training, hands-on practice, and digital media has proven most effective in improving knowledge and skills in toddler growth and development screening (Jamilah, 2023).

Although previous studies have demonstrated that structured education and training can improve cadres' competencies in early detection of child growth and development (Noprida et al., 2022; Jauhar et al., 2024), evidence regarding the effectiveness of growth and developmental screening education on cadre knowledge in the Ciwaruga Health Center working area remains limited. Therefore, this study aimed to analyze the effect of a structured growth and developmental screening education program on the knowledge level of Posyandu cadres in the Ciwaruga Health Center working area. The educational intervention covered anthropometric measurements, the use of growth monitoring charts (KMS), the application of the KPSP, and referral procedures as part of efforts to enhance cadres' capacity in early detection of child growth and development.

OBJECTIVE

The aim of this study was to determine the influence of health education on knowledge of toddler growth and development screening at the Ciwaruga Community Health Center.

METHODS

Research Design

This study used a pre-experimental approach with a one-group pretest–posttest design to assess the effectiveness of growth and developmental screening education in improving the knowledge of Posyandu cadres (Nursalam, 2016). This design enables the measurement of changes in participants' knowledge by comparing scores before and after the intervention within the same group, without involving a control group. According to (Sugiyono, 2019), this design is appropriate for educational research conducted in community settings, particularly when the objective is to evaluate intervention effects while maintaining the natural conditions and maximizing participant involvement.

This study employed a quasi-experimental one-group pretest–posttest design to evaluate the effect of growth and developmental screening education on the knowledge of *Posyandu* cadres. This design was selected because of ethical and practical considerations within community health services. All cadres are expected to provide child growth and developmental monitoring; therefore, withholding educational training from a control group could create inequitable access to essential competencies. Furthermore, the limited number of active cadres and the operational characteristics of *Posyandu* services made random allocation impractical without disrupting routine community health activities.

The authors acknowledge that the one-group pretest–posttest design is susceptible to several threats to internal validity, including testing effects, maturation, history, and regression to the mean. To minimize these threats, the pretest and posttest were administered within a short interval following the intervention, a standardized and validated questionnaire was used,

and all participants received identical educational materials, instructors, teaching methods, and duration of training. Although these procedures reduced potential sources of bias, causal inference remains more limited than in randomized controlled trials.

Variables

Two variables were examined in this study. The independent variable was growth and developmental screening education, delivered through lectures, demonstrations, and interactive discussions covering anthropometric measurements, the use of growth monitoring charts KMS (Kartu Menuju Sehat), developmental screening using the KPSP (Kuesioner Pra Skrining Perkembangan) an Indonesian child developmental pre-screening questionnaire, and referral mechanisms. The dependent variable was the level of knowledge of Posyandu cadres, measured before and after the educational intervention (Sugiyono, 2019; Notoatmodjo, 2018).

Participants

The study population comprised 43 Posyandu cadres from RW 01, RW 03, and RW 08 within the Ciwaruga Public Health Center working area. A total sampling technique was employed to include all cadres, considering the relatively small and homogeneous population (Notoatmodjo, 2018). Based on the inclusion criteria (1) being an active cadre for a minimum of six months, (2) residing in the Ciwaruga Health Center working area, and (3) willingness to participate a total of 33 cadres were deemed eligible. Exclusion criteria included absence during any research stage (pretest, educational session, or posttest) and refusal to provide informed consent (Nursalam, 2016). These criteria were applied to ensure consistent exposure to the intervention and to maintain internal validity.

Instrument

Data were collected using a knowledge questionnaire on growth and developmental screening adapted from (Abu Rizal Dinhas, 2017). The questionnaire consisted of 18 true false statements addressing five domains: (1) concepts of growth and development, (2) anthropometric indicators, (3) KMS (Kartu Menuju Sehat), guidelines, (4) application of the KPSP (Kuesioner Pra Skrining Perkembangan), and (5) early detection and referral procedures. Total scores ranged from 0 to 18, with higher scores reflecting a higher level of knowledge.

Validity and Reliability Testing

Content validity was evaluated by three experts, including a public health practitioner, a community nursing lecturer, and a maternal and child health program coordinator. Empirical validity testing was conducted using Pearson's Product Moment correlation on 30 cadres with characteristics similar to the study participants. The correlation coefficients ranged from 0.415 to 0.619 and exceeded the critical value, indicating that all questionnaire items were valid. Reliability testing using Cronbach's alpha produced a coefficient of 0.807, demonstrating strong internal consistency and meeting the minimum acceptable standard of ≥ 0.70 (Nunnally & Bernstein, 1994). Therefore, the instrument was considered reliable for measuring knowledge before and after the intervention.

Procedure

The research procedure was carried out in three stages. The preparation stage included a literature review on growth and developmental screening and educational approaches for Posyandu cadres, development and adaptation of research instruments, obtaining approval from the Ciwaruga Health Center and the Ethics Committee, and coordinating schedules and venues with Posyandu coordinators. The implementation stage began with obtaining informed consent from all participants, followed by a 20 minute pretest to assess baseline knowledge. The educational intervention was then delivered through lectures supported by PowerPoint presentations, demonstrations of KMS (Kartu Menuju Sehat), usage, interpretation of growth charts, and simulation of KPSP (Kuesioner Pra Skrining Perkembangan) application. The educational session lasted approximately 120 minutes and was followed by a 10 minute

discussion and question-and-answer session to reinforce comprehension. Subsequently, a 20 minute posttest using the same questionnaire was administered to evaluate changes in knowledge. The final stage involved checking questionnaire completeness, data coding, statistical analysis, and preparation of the research report.

To ensure intervention fidelity, the educational program was delivered using a standardized training module developed based on the Indonesian Ministry of Health's SDIDTK guidelines and WHO recommendations on child developmental monitoring. All educational sessions were conducted by trained facilitators who underwent prior calibration to ensure consistency in content delivery. The educational materials, teaching methods, audiovisual media, duration of training, and discussion opportunities were standardized across all participants. Participant attendance was monitored, and all cadres completed the entire educational program. These procedures were implemented to ensure that each participant received the intervention consistently, thereby enhancing the reproducibility of the study.

Data Analysis

Descriptive analysis was used to summarize participants' characteristics and the distribution of pretest and posttest scores. Data normality was examined using the Kolmogorov–Smirnov test, as the sample size exceeded 30 participants (Ghasemi & Zahediasl, 2012). Inferential analysis was conducted using a paired t-test when data were normally distributed, or the Wilcoxon signed-rank test when normality assumptions were not met (Notoatmodjo, 2010). Statistical significance was determined at a p-value of < 0.05 to identify meaningful differences between pretest and posttest knowledge scores.

Several limitations should be acknowledged. First, the one-group pretest–posttest design does not fully control for threats to internal validity; therefore, causal relationships should be interpreted cautiously. Second, this study assessed knowledge only immediately after the educational intervention, and long-term knowledge retention was not evaluated. The absence of follow-up assessments (e.g., one or three months post-intervention) limits conclusions regarding the sustainability of the educational effect. Third, the study did not examine whether increased knowledge translated into improved screening practices, competency in using the KPSP and KMS, or better child health outcomes. Future studies should consider randomized or controlled study designs, incorporate longitudinal assessments of knowledge retention, and evaluate behavioral changes and clinical outcomes to provide stronger evidence regarding the effectiveness of cadre education.

RESULTS

This section describes the findings of the study. The data analyzed were primary data collected from measurements evaluating the effect of growth and developmental screening education on the knowledge of Posyandu cadres. The study involved 33 respondents. The results are presented as follows:

Distribution of Posyandu Cadres' Knowledge Before Receiving the Growth and Development Screening Educational Intervention

Table 1. Knowledge of Posyandu Cadres Prior to the Growth and Development Screening Educational Intervention

Knowledge	Frequency (n)	Percentage (%)
Poor Knowledge	29	87,8
Adequate Knowledge	2	6,1
Good Knowledge	2	6,1
Total	33	100,0

Based on Table 1, the findings show that before the educational intervention was implemented, the majority of Posyandu cadres had a low level of knowledge. Specifically, 29 respondents (87.8%) were classified in the low knowledge category, while 2 respondents (6.1%) had a moderate level of knowledge and another 2 respondents (6.1%) were categorized as having high knowledge. These results suggest that most cadres had not yet acquired sufficient understanding of growth and developmental screening prior to receiving the educational intervention.

Distribution of Posyandu Cadres' Knowledge After the Educational Intervention on Growth and Developmental Screening

Table 2. Knowledge of Posyandu Cadres After the Educational Intervention on Growth and Developmental Screening

Knowledge	Frequency (n)	Percentage (%)
Poor Knowledge	0	0
Adequate Knowledge	10	30,3
Good Knowledge	23	69,7
Total	33	100,0

Based on Table 2, the results indicate that following the educational intervention, 10 respondents (30.3%) were categorized as having a moderate level of knowledge, while the majority, 23 respondents (69.7%), achieved a high level of knowledge. These findings reflect a marked improvement in the cadres' understanding after the implementation of the educational program.

Distribution of Posyandu Cadres' Knowledge Before and After the Educational Intervention on Growth and Developmental Screening

Table 3. Knowledge of Posyandu Cadres Before and After the Educational Intervention on Growth and Developmental Screening.

		Knowledge After Education			Total	P- value
		Poor	Adequate	Good		
Knowledge Before Education	Poor	0 (0,0)	10 (30,3)	19 (57,5)	29 (87,8)	<0,001
	Adequate	0 (0,0)	0 (0,0)	2 (6,1)	2 (6,1)	
	Good	0 (0,0)	0 (0,0)	2 (6,1)	2 (6,1)	
Total		0 (0,0)	10 (30,3)	23 (69,7)	33 (100,0)	

The assessment of respondents' knowledge on child growth and developmental screening before and after the educational intervention revealed a statistically significant difference, as demonstrated by the Wilcoxon test with a p-value of < 0.001.

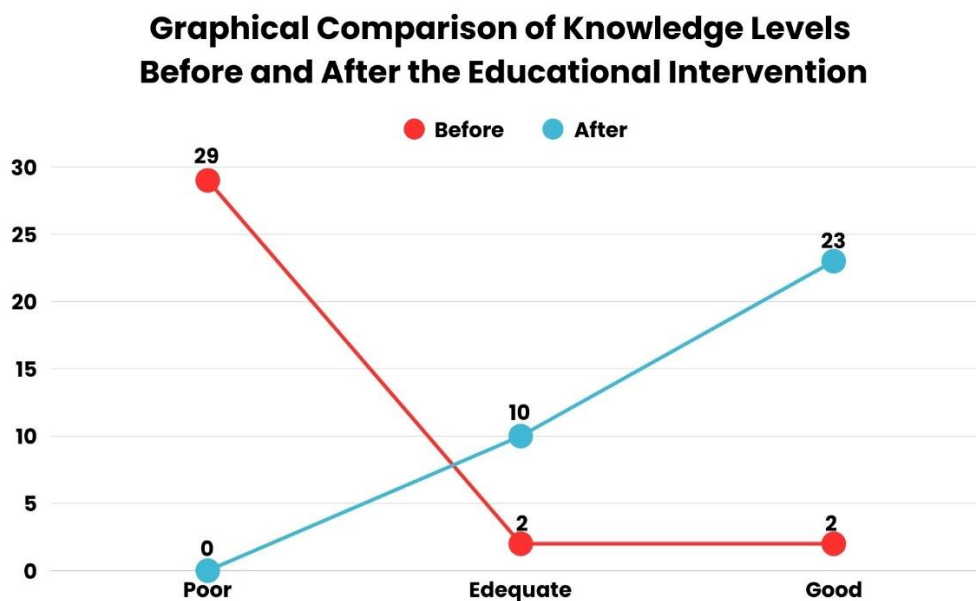


Figure 1. Overview of Posyandu Cadres Knowledge Changes Before and After the Educational Intervention

DISCUSSION

Distribution of Posyandu Cadres' Knowledge Prior to the Educational Intervention on Child Growth and Development Screening

The results of the assessment of Posyandu cadres' knowledge prior to the educational intervention showed that the majority of respondents had an inadequate level of knowledge regarding child growth and developmental screening. Of all participants, 29 cadres were classified as having poor knowledge, while only 2 cadres demonstrated moderate knowledge and another 2 cadres exhibited good knowledge. Overall, this distribution indicates that baseline knowledge among cadres was generally insufficient.

Developmental delays in toddlers remain a major public health issue that requires sustained governmental attention, as such conditions have long-term implications for individual quality of life and national productivity. To address this issue, the government has implemented various strategies aimed at promoting optimal growth and development through primary healthcare services. Standard services for toddlers include routine growth monitoring, developmental stimulation using the SDIDTK (Stimulasi, Deteksi, dan Intervensi Dini Tumbuh Kembang) refers to an Indonesian early childhood program that focuses on stimulation, early detection, and timely intervention to support optimal child growth and development within primary healthcare services. instrument, strengthening of Posyandu activities, early childhood education in Indonesian is PAUD (Pendidikan Anak Usia Dini) programs, family counseling through parenting classes utilizing the Maternal and Child Health (MCH) handbook, as well as balanced nutrition provision and vitamin A supplementation (Susanti, 2024).

The findings of this study are consistent with research conducted by (Rohmani et al., 2022), which reported that most respondents demonstrated limited knowledge prior to receiving education on child growth and developmental screening. Their study found that out of 50 respondents, 29 had poor knowledge and 21 had moderate knowledge. Posyandu cadres play a vital role in early detection of growth and developmental problems, including anthropometric measurements such as body weight, height or length, and head circumference,

as well as assessments of developmental domains encompassing gross motor, fine motor, language, and personal-social aspects. Any abnormalities identified through these assessments must be followed by appropriate referral and intervention.

Distribution of Posyandu Cadres' Knowledge After the Educational Intervention on Child Growth and Development Screening

Following the implementation of the educational intervention, there was a notable shift in the distribution of cadres' knowledge levels. The educational program was delivered through a structured and practice-oriented approach that combined lectures, interactive discussions, and hands-on demonstrations. The lecture sessions focused on fundamental concepts of child growth and development, principles of anthropometric measurement, interpretation of growth monitoring charts (KMS), and the use of the Kuesioner Pra Skrining Perkembangan (KPSP). These sessions were complemented by interactive discussions that allowed cadres to clarify misconceptions and actively engage with the material. In addition, practical demonstrations and simulations were conducted to enhance cadres' technical skills in measuring, recording, and interpreting growth and developmental data. As a result, the number of respondents categorized as having moderate knowledge increased to 10, while those with good knowledge rose substantially to 23 respondents, with no cadres remaining in the poor knowledge category. These findings indicate a significant improvement in cadres' understanding after participating in the educational program.

Health education is a strategic effort aimed at facilitating behavioral change among individuals, groups, and communities by enabling them to recognize, accept, and manage health-related problems. As a form of community education, it supports broader community development initiatives. The primary objective of health education is to promote a dignified and high-quality standard of living (Amanah, 2017). According to (Liyanovitasari et al., 2023), health education involves the dissemination of health information to increase knowledge, which may subsequently influence attitudes and behaviors. Enhanced knowledge can strengthen self-confidence, shape positive attitudes, and ultimately improve health-related practices (Sari et al., 2021).

Lectures are one of the commonly used methods for delivering health information verbally to target groups and are typically complemented by question-and-answer sessions. This method is characterized by a defined audience, structured content, opportunities for interaction, and the use of supporting media. The lecture method offers several advantages, including simplicity of implementation, cost-effectiveness, flexibility in duration, and accessibility for diverse audiences (Nurdianti et al., 2023).

Improving cadre knowledge through health education can be achieved using various approaches, such as lectures, group discussions, and practical demonstrations. Empowerment of cadres through health education, particularly using lecture-based methods, has been shown to significantly enhance knowledge levels. This is supported by findings from (Adistie, Lumbantobing & Maryam, 2018) cited in (Resty Noflidaputri & Herneli Yusana, 2022), which demonstrated that lectures and simulations positively affected cadres' knowledge related to early detection of stunting and stimulation of child growth and development. Similar outcomes were also reported by (Indanah et al., 2024).

Differences in Posyandu Cadres' Knowledge Before and After the Educational Intervention

The results of the Wilcoxon test presented in Table 1 revealed a statistically significant difference in cadres' knowledge levels before and after the educational intervention on child growth and developmental screening, with a p-value of < 0.001 . This finding indicates that the educational intervention had a meaningful effect on improving the knowledge of Posyandu cadres in the Ciwaruga Health Center working area in 2025.

Knowledge is the result of cognitive processes that occur when individuals perceive information through their senses, particularly vision and hearing. Behaviors that are supported by adequate knowledge, awareness, and positive attitudes tend to be more enduring, whereas behaviors lacking a strong knowledge foundation are often temporary (Notoatmodjo, 2018).

According to (Siti Yuyun Rahayu Fitri et al., 2021), developmental screening functions as an early detection strategy and serves as a foundation for planning subsequent interventions. Screening results assist parents and local health authorities in identifying potential growth and developmental problems, thereby enabling timely and appropriate actions to support optimal child development. These efforts contribute to the development of high-quality human resources in the future.

The findings of this study are also in line with (Sri Mulyanti et al., 2023), who reported a significant increase in knowledge following health education interventions. In their study, more than half of respondents initially demonstrated inadequate knowledge, which subsequently improved to a good level in the majority of participants after the intervention. Posyandu cadres play a critical role in early detection of child growth and development, particularly through strengthening their knowledge and competencies related to the SDIDTK (Stimulasi, Deteksi, dan Intervensi Dini Tumbuh Kembang) framework (Sandini Putri Umar et al., 2022). Similarly, (Rosi Kurnia Sugiharti, 2023) reported an increase in cadres' knowledge, with most respondents achieving good knowledge and none remaining in the poor category. These findings emphasize the importance of educational interventions as a key strategy for empowering Posyandu cadres through enhanced knowledge.

Several limitations of this study should be considered when interpreting the findings. This study employed a pre-experimental one-group pretest–posttest design without a control group, which limits the ability to establish strong causal relationships between the educational intervention and changes in knowledge levels. In addition, the relatively small sample size of 33 Posyandu cadres may reduce the statistical power of the results. Furthermore, the study was conducted in a single working area of the Ciwaruga Health Center, which may limit the generalizability of the findings to other settings with different contextual, demographic, or organizational characteristics. Therefore, future studies are recommended to use controlled experimental designs, involve larger sample sizes, and include multiple study sites to improve external validity and broader applicability.

Despite these limitations, the findings of this study offer important practical implications for community health policy and cadre training programs. The significant improvement in cadres' knowledge indicates that structured and practice-oriented educational interventions can be effectively integrated into routine Posyandu cadre training at the primary healthcare level. Health authorities and policymakers may consider adopting similar educational models as part of continuous capacity-building programs to strengthen early detection of child growth and developmental problems. Moreover, the integration of standardized training modules on anthropometric measurement, growth monitoring charts, and developmental screening tools into regular cadre development programs may contribute to improving the quality and consistency of community-based child health services.

Effective intervention methods include training programs, short courses, and collaborative interventions engaging all community stakeholders (Manalu, 2024). Cadres serve as the front line in reducing stunting at the community level (Manalu, 2024).

Although this study demonstrated a significant improvement in *Posyandu* cadres' knowledge following growth and developmental screening education, its implications extend beyond statistical significance. From a community nursing perspective, increased cadre knowledge may improve community screening coverage, facilitate earlier identification of developmental delays, strengthen family education, and enhance timely referrals within

Primary Health Care (PHC). As Community Health Workers (CHWs), trained cadres contribute to community empowerment by promoting caregiver participation in routine child health monitoring, thereby supporting early intervention and better long-term developmental outcomes. WHO recognizes strengthening CHW competencies as a key strategy for improving PHC performance and achieving Universal Health Coverage (WHO, 2025).

These findings also have important practical implications for *Posyandu* services. Rather than being implemented as a one-time intervention, growth and developmental screening education should be integrated into routine cadre capacity-building programs through standardized training, periodic refresher courses, supportive supervision by community nurses, and practical competency assessments using the KPSP and KMS. Such integration has the potential to improve the consistency and quality of developmental screening, strengthen referral pathways, and reinforce collaboration between *Posyandu* cadres and primary healthcare providers, consistent with WHO recommendations for strengthening community health worker programs (WHO, 2021; WHO, 2025).

Nevertheless, this study assessed only short-term knowledge acquisition immediately after the educational intervention. It remains unclear whether the observed improvement is sustained over time or translates into better screening performance and child health outcomes. Future studies should therefore evaluate knowledge retention, practical competency in using KPSP and KMS, screening accuracy, referral quality, and long-term child developmental outcomes using longitudinal or controlled study designs to provide stronger evidence for integrating cadre education into routine child health services.

CONCLUSION

This study confirms that educational interventions on child growth and developmental screening significantly improve the knowledge of *Posyandu* cadres in the Ciwaruga Health Center working area. Prior to the intervention, most cadres demonstrated knowledge levels ranging from low to moderate, reflecting notable limitations in their understanding of early detection procedures for toddler growth and development. After the implementation of structured educational activities consisting of lectures, interactive discussions, and hands-on demonstrations of screening techniques, a marked increase was observed in knowledge scores across all assessed indicators. These results are consistent with the proposed hypothesis, which assumed that growth and developmental screening education would have a positive and significant influence on cadre knowledge.

The Wilcoxon test results revealed a statistically significant difference between pretest and posttest scores ($p < 0.001$), indicating that a systematically designed health education program is effective in enhancing cadres' understanding of the concepts, stages, and interpretation of child growth and developmental screening outcomes. Consequently, the research hypothesis is accepted, providing empirical evidence that health education is a valuable strategy for strengthening the literacy and competence of cadres as frontline providers in community-based health services.

From an academic perspective, this study offers originality through the application of a structured educational model that emphasizes practical and demonstrative elements tailored to the duties and contextual conditions of *Posyandu* cadres. Evaluations of such practice-oriented educational approaches remain limited within primary healthcare-based *Posyandu* settings, thereby contributing methodological insights for the development of future cadre capacity-building initiatives. Moreover, the findings support the notion that educational interventions focusing on practical screening skills, rather than theoretical knowledge alone, result in more comprehensive and evenly distributed improvements in cadre knowledge.

From a practical standpoint, the observed enhancement in cadre knowledge serves as a critical foundation for optimizing Posyandu services, particularly in the early detection of growth and developmental disorders, stunting prevention, and ongoing child development monitoring. These findings highlight the importance of strengthening cadre training programs through evidence-based, interactive, and contextually appropriate educational strategies. Overall, this study suggests that investing in cadre capacity development is essential for improving the quality and effectiveness of community-based health services.

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CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest related to this study, including financial, personal, or institutional relationships that could influence the research process or outcomes.

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