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RESEARCH ARTICLE

Effect of IMCI and Severe Acute Malnutrition Training on Health Workers' Knowledge in East Kalimantan: A Pre-Experimental Study

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Abstract

Stunting is a disorder of children's growth and development caused by chronic malnutrition and recurrent infections during the First 1000 Days of Life (*HPK*). Health workers at health centers, as part of the nutrition team, play a significant role in implementing effective interventions to reduce stunting rates. One of the trainings provided to health workers is the Integrated Management of Childhood Illness (IMCI) and Severe Acute Malnutrition training. This study aimed to measure changes in the knowledge of health workers before and after receiving the IMCI and Severe Acute Malnutrition training. This pre-experimental study involved 84 health workers from three cities in East Kalimantan. The training utilized interactive lectures, role play, assignments, and practice sessions. To assess changes in knowledge, a pre-test was administered on the first day and a post-test on the last day of training. The knowledge assessment instrument consisted of 25 multiple-choice questions developed based on the IMCI and Severe Acute Malnutrition training module issued by the Ministry of Health of the Republic of Indonesia in 2019 and was validated by experts from the Provincial Health Training Center (Bapelkes) of East Kalimantan. Data were analyzed using a paired t-test, with a significance level of $p < 0,05$. A significant increase in knowledge was observed before and after the training (p-value = 0.0001). It was concluded that the IMCI and Severe Acute Malnutrition Training was effective in enhancing the knowledge of health workers. Therefore, it remains essential as a routine training effort to prevent stunting.

Keywords: stunting, malnutrition, health workers, integrated management of childhood illness, knowledge change

Introduction

Stunting is often referred to as stunted or short (Purnamasari, 2020). Stunting is a growth and development disorder in children caused by chronic malnutrition and recurrent infections during the First 1000 Days of Life (*HPK*) (Kementerian Kesehatan RI, 2022). A child is considered stunted if their height falls below the standard height-for-age for children in the normal population of the same age and gender. At the national level, the results of the 2022 Indonesian Nutritional Status Survey (*SSGI*) and the 2023 Indonesian Health Survey (*SKI*) show that the prevalence of stunting in Indonesia in 2023 decreased slightly from 21.6% in 2022 to 21.5% in 2023, although this figure still exceeds the 2020-2024 National Medium-Term Development Plan (*RPJMN*) target of 14%. At the provincial level, the prevalence of stunting in East Kalimantan also declined from 23.9% in 2022 to 22.9% in 2023. Meanwhile, at the city level, the City of Samarinda showed a similar downward tren, with stunting prevalence decreasing from 25.3% in 2022 to 24.4%

in 2023 (Kementerian Kesehatan RI, 2023). However, this figure still exceeds the WHO threshold of <20%. In contrast, the prevalence of wasting in Samarinda City increased from 9.3% in 2022 to 11.8% in 2023, which remains above the national target of <7% for wasting prevalence (Kementerian Kesehatan RI, 2023).

Preventing stunting is a shared responsibility. One effort in preventing stunting is to monitor growth, determine nutritional status, and screen the health of toddlers with the aim of detecting growth disorders and nutritional status in toddlers as early as possible so that appropriate management can be implemented (Kementerian Kesehatan RI, 2022). Healthcare workers at health centers, as part of the health center's nutrition team, play a significant role in the effective implementation of interventions to reduce stunting rates in East Kalimantan. This includes anthropometric measurements , determining nutritional status, screening young infants aged 0-2 months and sick children aged 2-59 months, receiving referrals for children with growth disorders and nutritional status, and managing cases according to the child's growth and nutritional status, including managing severe malnutrition in children (Kementerian Kesehatan RI, 2019a; Kementerian Kesehatan RI, 2019b). However, a problem was found in the insufficient knowledge and skills of healthcare workers at health centers in preventing stunting, which was caused by the lack of training for healthcare workers at health centers to carry out their duties in an integrated manner as a health center nutrition team (Tisnawati & Zulferi, 2018).

One of the essential trainings required for healthcare workers at health centers, particularly thjose servingin the nutrition team, is the Integrated Management of Childhood Illness (IMCI) and Severe Acute Malnutrition (SAM) training. (Kementerian Kesehatan RI, 2019a; Kementerian Kesehatan RI, 2019b) However, it is still necessary to evaluate the effectiveness of this program in improving their knowledge in managing stunting and malnutrition among children. The training combines interactive lectures, assignments, and practical sessions aimed at the strengthening the ability of health workers identify, assess, and manage nutritional problems among children under five using IMCI and SAM priciples (Kementerian Kesehatan RI, 2019a; Kementerian Kesehatan RI, 2019b). Previous studies have shown that such capacity-building activities significantly improve participant's knowledge; for instance, Purnamasari reported a marked increase in the knowledge of health cadres following similar training interventions (Purnamasari, 2020).

Based on this gap, the research question in this study is whether the IMCI and SAM training program can significantly improve the knowledge of healthcare workers in East Kalimantan. The study aims to assess changes in participants' knowledge before and after the intervention. The novelty of this research lies in its focus on evaluating the effectiveness of this capacity-building effort among healthcare workers in a region where stunting prevalence remains above the national target, thus providing evidence-based insights for strengthening local capacitystrategies in stunting prevention.

Methods

The research design used is pre-experimental. The sample size is 84 healthcare workers in East Kalimantan, originating from the working areas of Samarinda City, Kutai Kertanegara Regency, and Kutai Timur Regency. Sampling was done using a purposive technique in accordance with the inclusion criteria, which were healthcare workers actively working in healthcare facilities who had not previously participated in IMCI and severe acute malnutrition training.

The independent variables in this study are Integrated Management of Childhood Illness (IMCI) and severe acute malnutrition training. The training was conducted from May to July, 2024, at the Provincial Health Training Center of

East Kalimantan, organized by the *UPTD Bapelkes* of East Kalimantan Province. The training process will utilize interactive lectures in the classroom, role-playing, assignments, and practical training. The training was conducted over 10 days in the following stages: theoretical instruction for the first 6 days covering IMCI and severe acute malnutrition policies, general management of malnourished toddlers, assessment management of sick toddlers aged 2 months to 5 years, actions/treatment for sick toddlers aged 2 months to 5 years, follow-up services for sick toddlers aged 2 months to 5 years, outpatient and inpatient management of malnourished toddlers, assessment management of young infants under 2 months old, actions/treatment for young infants under 2 months old, follow-up services for young infants under 2 months old, management of malnourished toddlers under 6 months old, IMCI and malnutrition case studies, IMCI and severe acute malnutrition reporting, accompanied by assignments for each topic and role-playing counselling for sick toddlers aged 2 months to 5 years and young infants under 6 months; then, for the next 4 days, field practice was conducted at health centers for 3 days and at hospitals for 1 day, combining direct examination practice, cooking practice, and case presentations. On the first day of training, a pre-test was administered, and on the last day of training, a post-test was administered to all training participants. The pre-test and post-test questions consist of 25 multiple-choice questions. The stages of implementing Integrated Management of Childhood Illness (IMCI) and Severe Acute Malnutrition (SAM) training can be seen in Table 1.

Table 1. Schedule of Integrated Management of Childhood Illness (IMCI) and Severe Acute Malnutrition Training

Day 1 – 6	
Materials	- Pre-test (Day 1) - Theory/Material Delivery (6 days): ❖ IMCI and Severe Acute Malnutrition (SAM) Policy ❖ General Management of SAM Toddlers + Assignment ❖ Management of Sick Toddler Assessment (2 months - 5 years) + Assignment ❖ Actions/Treatment for Sick Toddlers (2 months - 5 years) + Assignment ❖ Management of Outpatient and Inpatient Care for SAM Toddlers + Assignment ❖ Follow-up Services for Sick Toddlers (2 months - 5 years) + Assignment ❖ Role Play Counselling for Sick Toddler Cases (2 months - 5 years) ❖ Management of Young Infant Assessment (<2 months) + Assignment ❖ Actions/Treatment for Young Infants (<2 months) + Assignment ϖ Management of SAM Toddlers <6 months + Assignment ϖ Follow-up Services for Young Infants (<2 months) + Assignment ❖ Role Play Counselling for Young Infant Cases <6 months ❖ IMCI and SAM Work Practice + Role Play ❖ IMCI and SAM Recording and Reporting + Assignment
Day 7 - 9	
Materials	- Field Practice at the Community Health Center (3 days): ❖ Practice examining sick toddlers aged 2 months – 5 years + Case Presentation ❖ Practice examining young infants <2 months + Case Presentation ❖ Practice examining malnourished toddlers aged 6 – 59 months on an outpatient basis + Case Presentation ❖ Practice of IMCI and Malnutrition Management

Day 10	
Materials	- Field Practice at the Hospital (1 day): ❖ Practice examining malnourished children aged 6-59 months (Inpatient) + Case Presentation ❖ Practice examining malnourished children aged <6 months (Inpatient) + Case Presentation ❖ Cooking Practice - Post-test
	-

(Source: Modul gabungan MTBS dan gizi buruk, Kementerian Kesehatan RI, 2019)

The dependent variable in this study is the change in knowledge of trained healthcare workers regarding Integrated Management of Childhood Illness (IMCI) and Severe Acute Malnutrition (SAM). The data obtained from the pre-test and post-test results were used to analyze changes in the participants' knowledge after the training. Data were analyzed using statistical software, with the significance level set at two-sided $p < 0.05$. A paired t-test was applied to compare the mean pre-test and post-test scores of healthcare workers, while a Kolmogorov-Smirnov test was conducted beforehand to assess data normality.

Results

Respondent Characteristics

The characteristics of the respondents, including gender, education level, age, and profession, can be seen in Table 2.

Table 2. Analysis of Respondent Characteristics in 3 Regencies/Cities in East Kalimantan

Characteristics	N	%
Gender		
Male	11	13,1
Female	73	86,9
Education Level		
Master's Degree	3	3,6
Bachelor's Degree or Diploma 4	61	72,6
Associate's Degree 3	20	23,8
Age		
20 - 30 years old	20	23,8
30-40 years old	34	40,5
40 - 50 years old	22	26,2
50 - 60 years old	8	9,5
Profesi		
Doctor	28	33,3
Nutritionist	25	29,8
Nurse	4	4,8
Midwife	27	32,1
Total	84	100

(Source: Primary Data, 2024)

Table 1 shows that the majority of respondents are female, totaling 73 people (86.9%), while there are 11 male respondents (13.1%). The majority of respondents have completed a Bachelor's degree or Diploma 4, totaling 61 people (72.6%), while 3 respondents (3.6%) have completed a Master's degree and 20 respondents (23.8%) have completed a Diploma 3. The age group of the respondents varies, with 20 people (23.8%) aged 20-30 years, 34 people (40.5%) aged 30-40 years, 22 people (26.2%) aged 40-50 years, and 8 people (9.5%) aged 50-60 years. In addition, the respondents' professions also vary, with 28 doctors (33.3%), 25 nutritionists (29.8%), 4 nurses (4.8%), and 27 midwives (32.1%).

Respondent Knowledge

Figure 1 shows that there was an increase in healthcare workers' knowledge before and after the Integrated Management of Childhood Illness (IMCI) and Severe Acute Malnutrition training for 84 healthcare worker participants. Based on Based on Figure 1, the mean score for the pre-test was 46.62 while the mean score for the post-test was 96.86. The standard deviation for the pore-test was 16.70 and for the post-test was 5.27. The difference in the average scores between the Pre-Test and Post-Test is 50.238. Since the p-value (0.0001) was less than 0.05, H0 was rejected and Ha was accepted, indicating a significant difference in knowledge before and after the training.

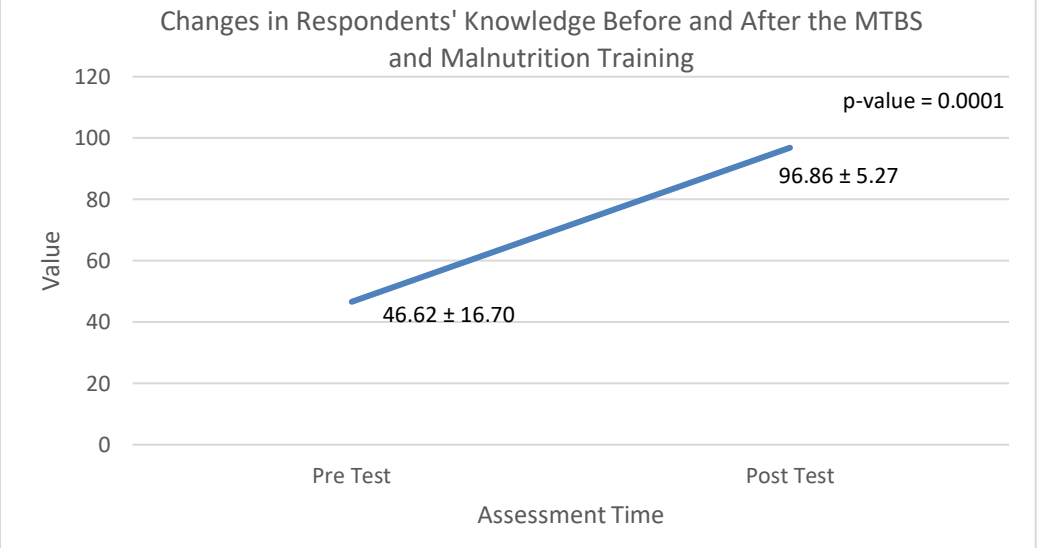

Figure 1. Changes in Respondents' Knowledge Before and After IMCI and Severe Acute Malnutrition Training, with Paired T-Test (significant level if $p < 0.005$).

Discussion

This study found that the Integrated Management of Childhood Illness (IMCI) and Severe Acute Malnutrition (SAM) training significantly improved the knowledge of healthcare workers in East Kalimantan. The paired t-test results ($p = 0.0001$) indicated a substantial increase in the mean knowledge scores between pre-test and post-test, confirming the effectiveness of structured training in enhancing the competence of health personnel. This aligns with findings from recent studies showing that targeted capacity-building interventions can substantially improve healthcare workers' knowledge and performance, particularly in low- and middle-income countries (LMICs) (Alhassan et al., 2022; Oduor et al., 2021).

Training remains one of the most effective strategies for strengthening the health system workforce. Evidence from multiple countries demonstrates that IMCI-based and nutrition-related training enhances diagnostic accuracy, adherence to treatment protocols, and overall quality of child health services (Yaya et al., 2023; World Health Organization [WHO], 2022). Similar to the findings by Mowla et al. (2021) and Purnamasari (2020), the present study confirms that structured training interventions can significantly raise knowledge levels among healthcare providers. However, other research, such as Sofingi et al., reported limited effects when training lacked sufficient duration, follow-up, or contextual adaptation, highlighting that knowledge improvement depends not only on the training material but also on local implementation conditions (Sofingi et al., 2018).

The local context of East Kalimantan presents unique challenges that may influence training outcomes. Geographic disparities, uneven distribution of qualified trainers, and limited access to continuous professional development often affect the sustainability of learning outcomes. Moreover, cultural beliefs and variations in community health-seeking behavior may influence how healthcare workers apply newly acquired knowledge in practice. Rural areas in East Kalimantan, for example, face difficulties in early detection of malnutrition due to transportation barriers and limited health infrastructure, making regular refresher training and supervision essential (Ministry of Health of the Republic of Indonesia, 2023; Rahman et al., 2022).

Several factors may have contributed to the positive results observed in this study. Interactive learning methods such as role-play, case discussions, and hands-on practice have been shown to improve retention and skill application among adult learners (Cant & Cooper, 2021; Kotozaki et al., 2020). Additionally, the combination of theoretical and field-based sessions during this training may have strengthened participants' ability to integrate knowledge into real-world clinical contexts. According to Knowles' theory of adult learning, active involvement and practical application are crucial in improving comprehension and long-term memory (Knowles et al., 2020).

From a broader perspective, these findings have important implications for health policy and practice. First, integrating IMCI and SAM refresher training into routine professional development programs could ensure sustained competence among healthcare workers. Second, policy-makers should allocate dedicated budgets for ongoing supervision, mentoring, and evaluation of training outcomes. Third, collaboration between the Provincial Health Office and academic institutions could facilitate localized module development tailored to regional needs and cultural contexts. As global evidence suggests, context-specific and regularly evaluated training interventions are more effective in improving service quality and child health outcomes (Yaya et al., 2023; WHO, 2022).

Therefore, these findings highlight the importance of continuous professional development in child health management. In summary, the IMCI and SAM training effectively enhanced healthcare workers' knowledge in East Kalimantan, aligning with global findings that capacity-building programs are key to improving child health services. Future research should explore long-term impacts on clinical performance and health outcomes, as well as the integration of digital learning platforms to expand access in remote areas. Continuous training remains essential to support Indonesia's national strategy for reducing stunting and achieving the Sustainable Development Goals (SDG 3 and SDG 2) by 2030.

Conclusion

The Integrated Management of Childhood Illness (IMCI) and Severe Acute Malnutrition (SAM) training was conducted successfully with a good process. There was an increase in knowledge before and after the training (p-value=0.0001), so it can be concluded that MTBS and Malnutrition training is effective in increasing healthcare workers' knowledge. This study still has various limitations, namely: 1) the study only involved healthcare workers in three cities in East Kalimantan, so the results may not be generalizable to other regions, 2) the pre-experimental method used in this study did not involve a control group, so a comparison with other methods that did not receive training could not be made, and 3) this study may have limitations in measuring long-term changes in healthcare workers' knowledge and application of knowledge after training.

Training on IMCI and Malnutrition for healthcare workers is important to continue regularly as one of the efforts to prevent stunting. Research to examine the impact of IMCI and Malnutrition training can be continued by increasing the number of healthcare workers used as samples, involving healthcare workers in a wider area of work as samples, increasing variables such as healthcare workers' adherence and skills, and adding a control group to the research.

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Author Contribution and Competing Interest

RAR: research idea, concept and methodology design, data collection, data analysis, manuscript draft writing.

RWW: concept and methodology design, data analysis, manuscript finalization.

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