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Effect of WhatsApp-based education on the knowledge and attitudes of integrated health service post cadres toward anemia prevention in children under five

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Abstract

Background: Anemia in children under five remains a major public health problem in Indonesia because it can affect growth, cognitive development, and immune function. Integrated health service post cadres play an important role in community-based anemia prevention programs. However, limited knowledge and attitudes among cadres may reduce the effectiveness of health promotion activities. Digital health education through WhatsApp has become a practical and accessible educational medium for improving cadre capacity.

Purpose: To assess changes in integrated health service post cadres' knowledge and attitudes regarding anemia prevention in children under five after receiving WhatsApp-based education.

Method: This study used a pre-experimental design with a one-group pretest-posttest approach. The study was conducted from April to June 2026 involving 40 Integrated health service post cadres from eight public health centers in Tegal City. Data were collected using knowledge and attitude questionnaires before and after the educational intervention delivered through WhatsApp. Data analysis was performed using the Wilcoxon Signed Rank Test.

Results: Before the intervention, most respondents had poor knowledge (47.5%) and moderate attitudes (40%) regarding anemia prevention in children under five. After the intervention, the proportion of respondents with good knowledge increased to 65%, while positive attitudes increased to 55%. The Wilcoxon Signed Rank Test showed a significant improvement in knowledge ($Z = -5.214$; $p < 0.001$) and attitudes ($Z = -4.112$; $p < 0.001$) after the WhatsApp-based education intervention.

Conclusion: WhatsApp-based education was effective in improving the knowledge and attitudes of Integrated health service post cadres regarding anemia prevention among children under five in Tegal City. WhatsApp can be used as an alternative digital health education medium because it is flexible, accessible, and supports continuous learning among community health cadres.

Keywords: Anemia prevention; Children under five; Health education; Integrated health service post cadres; WhatsApp.

INTRODUCTION

Anemia in toddlers remains a public health problem in Indonesia. This condition can affect growth, cognitive development, immune system, and quality of life (World Health Organization, 2023). Data from the Indonesian Ministry of Health in 2023 shows that the prevalence of anemia in toddlers remains quite high and requires serious attention in prevention

and management efforts (Ministry of Health of the Republic of Indonesia, 2021).

Central Java is one of the regions with a high rate of anemia in toddlers. Data from the Central Java Provincial Health Office in 2022 showed a prevalence of anemia in toddlers of 29.7%. Meanwhile, the Tegal City Health Office reported a prevalence of anemia in toddlers of 28.5%, with the highest cases in the

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Panggung and Mintaragen areas (Tegal City Health Office, 2023).

Preventing anemia in toddlers requires the involvement of integrated health post (Integrated health service post) cadres as the spearhead of public health services. Cadres play a role in educating mothers of toddlers about nutrition, consuming iron-rich foods, providing supplementation, and monitoring child growth and development. However, limited knowledge and attitudes of cadres can impact the effectiveness of health education in the community (Ministry of Health of the Republic of Indonesia, 2025).

Developments in communication technology provide opportunities for implementing digital-based health education. WhatsApp is a communication medium that is easy to use, flexible, and has a high level of community adoption. This medium allows for the continuous delivery of health information in the form of videos, images, and group discussions. Previous research has shown that education through WhatsApp is effective in increasing health knowledge among various community groups (Dorwal, Sachdev, Gautam, Jain, Sharma, Tiwari, & Raina, 2016; Wong, Choi, Cheng, Cheng, Kwong, Fong, & Chan, 2026).

The use of the internet and smartphones has long been researched and proven effective in improving public health. Internet access makes it easier for people to find information and engage in specific learning. Information searches are dominated by internet use via smartphones. This trend presents an opportunity for health practitioners to disseminate health information through social media (Korp, 2006; Laranjo, Arguel, Neves, Gallagher, Kaplan, Mortimer, & Lau, 2015). In today's era of technological and communication advancement, social media platforms like WhatsApp can be utilized as a health education tool. The advantages of WhatsApp include its ability to encompass all types of media, including the ease of sending unlimited text messages, images, posters, videos, files, and more. Furthermore, its group feature simplifies the simultaneous delivery and reception of information, allowing for the collection of large numbers of respondents. These advantages make WhatsApp an effective tool for delivering health education information (Yanti, Astuti, Sanjiwani, & Yanti, 2022).

Many toddlers experience anemia, this is because they experience a faster toddler growth phase, resulting in toddlers needing iron, folic acid and B12 to support their growth process, but if this is not met, it will result in decreased hemoglobin levels and cause anemia in toddlers (Humaira & Kartini, 2022).

RESEARCH METHOD

This study employed a quantitative pre-experimental design using a one-group pretest-posttest approach to evaluate the effect of WhatsApp-based health education on the knowledge and attitudes of Integrated health service post cadres regarding anemia prevention among children under five. The study was conducted from April to June 2026 in Tegal City, Central Java, Indonesia.

The study population consisted of active Integrated health service post cadres from eight public health centers integrated health service post in Tegal City. A total of 40 respondents were selected using a cluster sampling technique. Inclusion criteria were active Integrated health service post cadres, ownership of a smartphone, ability to operate the WhatsApp application, and willingness to participate in the study. All respondents completed the educational intervention and participated in both pretest and posttest assessments.

The independent variable was WhatsApp-based health education, while the dependent variables were the cadres' knowledge and attitudes regarding anemia prevention among children under five. Data were collected using a structured questionnaire consisting of two sections. The knowledge questionnaire comprised 15 true-or-false items related to anemia prevention, including causes, symptoms, nutritional management, and preventive measures. The attitude questionnaire consisted of 15 statements measured using a five-point Likert scale ranging from strongly disagree to strongly agree.

The educational intervention was delivered through a WhatsApp group over a predetermined period using digital educational materials, including posters, videos, and interactive discussions. Educational topics covered anemia prevention in children under five, iron-rich food consumption, appropriate nutritional practices, and the role of Integrated health service post cadres in community-based health promotion. Participants were

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encouraged to actively engage in discussions and ask questions throughout the intervention period.

Prior to data collection, the questionnaires were tested for validity and reliability to ensure their suitability for measuring respondents' knowledge and attitudes. Data collection was conducted in two stages: pretest assessment before the intervention and posttest assessment after completion of the educational program.

Data analysis was performed using descriptive and inferential statistics. Descriptive statistics were used to present respondents' characteristics and the distribution of knowledge and attitude scores. The Wilcoxon Signed Rank Test was employed to determine the differences in knowledge and attitude scores before and after the intervention. Statistical significance was established at $p < 0.05$.

RESEARCH RESULTS

Table Participant Characteristics and Pretest–Posttest Outcomes (N = 40)

Variable	Result	Z	P-value
Age (Mean±SD) (Years) (Range)	(45.6 ± 8.2) (30-60)		
30-40	10/25.0		
41-50	21/52.5		
50-60	9/22.5		
Occupation (n/%)			
Self-Employed	10/25.1		
Trader	13/32.5		
Homemaker	17/42.5		
Knowledge Pre-Test (n/%)		-5.214	0,001
Good	4/10.0		
Enough	17/42.0		
Poor	19/47.0		
Knowledge Post-Test (n/%)		-5.214	0.001
Good	26/65.0		
Neutral	9/22.0		
Poor	5/12.0		
Attitude (Pre-Test (n/%)		-4.112	0.001
Positive	10/25.0		
Moderate	16/40.0		
Negative	14/35.0		
Attitude (Post-Test (n/%)		-4.112	0.001
Positive	22/55.0		
Moderate	12/30.0		
Negative	6/15.0		

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The table shows that most respondents are in the 41-50 age group (21 people) (52.5%), while the 30-40 age group is 10 people (25%) and the 50-60 age group is 9 people (22.5%). Based on occupation, the majority of respondents are housewives (17 people) (42.5%), followed by traders (13 people) (32.5%) and self-employed (10 people) (25%). The results of the Wilcoxon Signed Rank Test show a Z value = -5.214 with a $p < 0.001$ ($p < 0.05$). These results indicate the influence of education through WhatsApp on increasing the knowledge of Integrated health service post cadres regarding the prevention of anemia in toddlers. The results of the Wilcoxon Signed Rank Test show a Z value = -4.112 with a $p < 0.001$ ($p < 0.05$). These results indicate a significant influence of education via WhatsApp on the attitudes of Integrated health service post cadres regarding the prevention of anemia in toddlers.

DISCUSSION

The findings of this study indicate that WhatsApp-based health education significantly improved the knowledge of Integrated health service post cadres regarding anemia prevention among children under five. Following the intervention, the proportion of respondents with good knowledge increased substantially. This finding suggests that digital health education delivered through WhatsApp can serve as an effective medium for improving cadres' understanding of child health issues.

The improvement in knowledge may be attributed to the flexibility and accessibility of WhatsApp as an educational platform. Unlike conventional face-to-face health education, WhatsApp enables participants to access educational materials repeatedly at their convenience. Educational videos, posters, and interactive discussions facilitate better comprehension and retention of information. Furthermore, continuous exposure to educational content supports the learning process by allowing respondents to review and discuss the materials with other participants.

These results align with previous research that found health education can improve Integrated health service post cadres' knowledge regarding early detection and prevention of anemia (Solehati, Sari, Lukman, & Kosasih, 2018). Other research also shows that educational media about childhood

anemia significantly improves the knowledge and attitudes of health cadres (Retnaningsih, Djanah, & Sukani, 2024).

In addition to improving knowledge, education via WhatsApp has also been shown to improve Integrated health service post cadres' attitudes regarding anemia prevention in toddlers. This change in attitude occurs because cadres receive continuous reinforcement of information through digital media. WhatsApp supports interactive learning processes, making cadres more active in receiving and understanding health information (World Health Organization, 2019; Gunawan, Aunguroch, Fisher, & McDaniel, 2020).

WhatsApp is considered a medium that aligns with current developments in public health communication technology. Most cadres have used WhatsApp in their daily activities, making the education process more practical and economical. The use of digital media also supports increased cadre participation in promotive and preventive activities in the community (Ministry of Health of the Republic of Indonesia, 2019).

WhatsApp is particularly suitable for community-based health education because it is widely used among Indonesian populations and requires minimal technological skills. The platform allows health educators to deliver educational content efficiently and continuously without geographical limitations. Consequently, WhatsApp-based interventions may provide a cost-effective strategy for enhancing the competencies of Integrated health service post cadres in maternal and child health programs.

The findings of this study have important implications for public health practice. Strengthening Integrated health service post cadres' knowledge and attitudes through digital health education may improve their ability to educate parents and caregivers regarding anemia prevention, nutritional practices, and child health monitoring. Therefore, integrating WhatsApp-based educational programs into routine Integrated health service post activities may support efforts to reduce anemia prevalence among children under five at the community level.

This study has several limitations. First, the use of a one-group pretest-posttest design without a control group limits the ability to attribute the observed changes solely to the intervention. Second, the

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relatively small sample size and the study setting confined to Tegal City may limit the generalizability of the findings. Future studies are recommended to employ randomized controlled designs involving larger and more diverse populations to further evaluate the effectiveness of digital health education interventions.

CONCLUSION

Integrated health service cadres demonstrated significant improvements in knowledge and attitudes regarding anemia prevention after participating in WhatsApp-based education. The platform may support flexible and continuous learning in community-based maternal and child health programs. However, the absence of a control group and the short-term evaluation limit causal interpretation. Further controlled studies should assess whether improvements in knowledge and attitudes are sustained and translated into better cadre practices and child health outcomes.

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