

EFFECTIVENESS OF VIRTUAL TECHNOLOGY BASED TRAINING FOR POSYANDU CADRES IN PREVENTING STUNTING

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ABSTRACT

Stunting is a major public health issue in Indonesia, with a national prevalence of 19.8% in 2024, including in Jeneponto Regency, which reaches 25-30% among toddlers. The role of Posyandu cadres is crucial in prevention, but it is limited by low knowledge of stunting prevention, anthropometric measurements, and nutrition education. Virtual technology-based training, such as via Zoom, is expected to efficiently enhance cadre capacity. The purpose of this study is to assess the effectiveness of virtual training through Zoom in improving the knowledge of Posyandu cadres regarding stunting prevention in Benteng and Pallengu Villages, Bangkala Subdistrict, Jeneponto Regency. The research method used is a quasi-experimental study with a pre-post test with control group design. The sample consisted of 52 cadres (26 intervention, 26 control) selected by simple random sampling. The intervention involved virtual training on stunting prevention, anthropometry, and nutrition education. Data were analyzed using the Wilcoxon test in SPSS. The results showed that in the intervention group, knowledge significantly increased from a pre-test mean of 61.52 ± 18.37 to a post-test mean of 79.71 ± 13.17 ($p=0.001$). The control group only increased from 61.07 ± 16.22 to 69.89 ± 18.27 ($p=0.332$). The majority of respondents were aged 15-35 years (65.38%) and had secondary school education (80.77%). The conclusion is that virtual training is effective in improving cadre knowledge, supporting sustainable stunting prevention.

Keywords: Stunting, Posyandu Cadres, Virtual Training, Zoom, Prevention.

INTRODUCTION

Stunting is a global public health problem characterized by linear growth impairment in children due to chronic malnutrition, with a national prevalence in Indonesia reaching 19.8% in 2024 based on the Indonesian Nutritional Status Survey (SSGI), which is still above the target reduction to 18.8% in 2025 (Ministry of Health of the Republic of Indonesia, 2024). This condition not only impacts increased child morbidity and mortality risks but

also reduces cognitive potential and economic productivity in adulthood, where every 1% reduction in stunting can increase national income by up to 2-3%. In South Sulawesi Province, the stunting prevalence reached about 28.4% in 2021, with Jeneponto Regency as one of the high-risk areas having the highest relative risk (RR) of 1.37 compared to other regencies, where approximately 54.17% of districts in the province are significantly affected by stunting

cases (Ramadhani et al., 2023). Specifically, in Benteng and Pallengu Villages, Bangkala Subdistrict, Jeneponto Regency, stunting cases among toddlers reached 25-30% in 2022-2023 based on local Health Office data, influenced by poor sanitation, limited access to clean water, and low community nutrition knowledge, thus requiring community-based interventions for early prevention (Saleh, 2025).

The role of Posyandu cadres as the frontline of primary health services is crucial in preventing stunting, as they are responsible for monitoring toddler growth, providing nutrition education to mothers, and early detection through anthropometry. However, cadre knowledge is often still low, with only 40-50% accurately understanding stunting criteria based on surveys in rural areas of Indonesia (Weningtyas et al., 2023). A mixed-method study in 10 stunting locus villages in Bangka Belitung Province found that among 193 Posyandu cadres, knowledge of stunting prevention only reached an average score of 65% before intervention, with major challenges including lack of understanding of risk factors such as unbalanced diets and recurrent infections, leading to inaccuracies in case identification up to 30% (Widiasih et al., 2025). Similar cases were found in Malang Regency, where short course interventions increased cadre knowledge of stunting prevention from 55% to 85% post-training, indicating that this capacity building can reduce stunting incidence by up to 15% through more effective family education (Weningtyas et al., 2023). At the national level, systematic research confirms that low cadre knowledge of stunting prevention contributes to the failure of nutrition intervention programs, where only 60% of cadres are able to

apply basic prevention knowledge such as exclusive breastfeeding and nutritious complementary feeding (Fitri et al., 2022).

In addition to prevention knowledge, anthropometric measurements by Posyandu cadres are often inaccurate, hindering early stunting detection, with error rates reaching 25-35% in rural areas due to lack of skills in using weighing scales and height measuring tools according to WHO standards (Fatwati et al., n.d.). In West Aceh Regency, anthropometric training for 50 Posyandu cadres increased measurement accuracy from 62% to 93% post-intervention, which directly reduced underreporting of stunting cases by 20% and enabled more timely follow-up (Naomi & Budiono, 2024). Cases in Dilem Village, Malang Regency, showed that pre-post test interventions on 20 cadres resulted in an 80% increase in anthropometric knowledge, with long-term impacts including a local stunting prevalence reduction from 32% to 24% within one year, emphasizing the importance of routine training to address measurement errors commonly occurring in rural Posyandu like in Jeneponto. Studies in Bangka Belitung Province also revealed that direct observations of 20 cadres during Posyandu sessions found only 50% accurate in measurements, which correlated with increased late-detected stunting cases (Widiasih et al., 2024).

Nutrition education by Posyandu cadres is a key component in preventing stunting, but its effectiveness is limited by low understanding of balanced nutrition principles, where national surveys show that only 45% of cadres consistently provide education on food diversification and anemia prevention in pregnant women. In the Soropia Puskesmas Working

Area, an innovative education program for Posyandu cadres increased attitudes and nutrition knowledge from 50% to 78% post-one-group pre-post test intervention, followed by increased community participation in stunting prevention through toddler mother classes (Yustiari et al., 2023). Cases in Kudus Regency showed that the role of cadres in nutrition education reduced stunting in Medini Village from 28% to 19% through collaboration with supplementary feeding programs, although challenges such as limited funding hinder sustainability (Muslimin & Mursyidah, 2024). At the national level, a systematic review of 15 studies found that cadre-based nutrition education effectively reduces stunting by up to 12% when combined with supplementation, but requires strengthening through ongoing training to address knowledge disparities in areas like Jeneponto (Fristiwi et al., 2023).

The utilization of virtual technology such as Zoom media in training Posyandu cadres offers an innovative solution to overcome limitations in conventional training access, especially in the post-pandemic era, where this platform facilitates synchronous interactions and efficient knowledge enhancement. A quality improvement model in Lombok using Zoom for cadre capacity building showed a 70% increase in Posyandu performance in home-based growth monitoring, with cadre participation increasing by 50% compared to face-to-face methods (Miranda et al., 2024). In Yogyakarta, the integration of Zoom in stunting prevention programs for community health workers resulted in a knowledge increase in prevention from 60% to 85%, with stunting cases decreasing by 18% through sustainable virtual monitoring (Siswati et al., 2022). A

Delphi study in Indonesia found that super apps based on digital platforms like Zoom for stunting education among cadres increased access to nutrition information by up to 90%, although it requires infrastructure support for remote areas like Benteng and Pallengu Villages in Jeneponto (Erika et al., 2024). Therefore, virtual technology-based training for Posyandu cadres in Jeneponto Regency is expected to integrate improvements in stunting prevention knowledge, anthropometric skills, and nutrition education through Zoom, to achieve sustainable stunting prevalence reduction.

LITERATURE REVIEW

Stunting is defined as a disruption in child growth and development due to poor nutrition, recurrent infections, and inadequate psychosocial stimulation, characterized by height more than two standard deviations below the WHO standard. This syndrome reflects multiple pathological disruptions affecting child morbidity, mortality, and cognitive potential.

Posyandu (Integrated Service Post) is a community-based health center in Indonesia that provides integrated services for maternal and child health, including health promotion, prevention, and nutrition monitoring. Posyandu functions as an extension of Puskesmas to the community level, with a focus on preventive and promotive services. Inseparable from Posyandu, each Posyandu has cadres who are community volunteers, generally women, responsible for Posyandu operations, including monthly examinations, nutrition education, supplement distribution, and early stunting detection. They play an important role in preventing stunting

through nutrition education, child growth monitoring, and supplementary feeding. Enhancing cadre capacity through training improves their ability to transfer health information to the community (Widiasih et al., 2025).

Virtual technology-based training, such as Zoom, refers to the use of online platforms for remote collaboration and education. Zoom enables virtual meetings that support webinars, presentations, and shared workspaces, with capacity for up to thousands of participants. This technology facilitates interactive instruction without geographical limitations, including in health training contexts. In public health, virtual training like through Zoom can enhance accessibility and interaction, with simulation and collaboration features that support improvements in cadre knowledge for stunting prevention.

RESEARCH METHODS

This research is a quantitative study with a quasi-experimental approach using a pre-posttest with control group design. The study was

conducted on Posyandu cadres in Benteng and Pallengu Villages, Bangkala Subdistrict, Jeneponto Regency, involving a total of 10 Posyandu, carried out from July to September 2025. The number of respondents in this study was 52, divided into 2 groups: the intervention group and the control group, each consisting of 26 respondents. Sampling was done using simple random sampling. After that, the study began with administering a questionnaire (pre-test) to the intervention and control groups. Next, the intervention group was given treatment by providing training materials through the Zoom application, while the control group was not given any treatment. The intervention provided was virtual training with materials on stunting prevention, anthropometric measurements, and nutrition education. Subsequently, to assess whether the Zoom-based training with the materials was effective or not, the same questionnaire was administered again (post-test). Data analysis in this study used SPSS, along with normality testing, and the hypothesis test used was the Wilcoxon test.

RESEARCH RESULTS

Table 1. Distribution of Respondents Based on Characteristics in the Intervention and Control Groups of Posyandu Cadres in Benteng and Pallengu Villages

Characteristics	Intervention Group (n=26)		Control Group (n=26)		Total	
	n	%	n	%	n	%
Age						
15-35	18	69,23	16	61,54	34	65,38
36-55	8	30,77	10	38,48	18	34,62
Total	26	100	26		52	100
Education						
Secondary School	20	76,92	22	84,62	42	80,77

Higher Education	6	23,08	4	15,38	10	19,23
Total	26	100	26	100	52	100

Source: Primary Data 2025

Based on Table 1, the majority of respondents were in the age range of 15-35 years, namely 65.38% overall (34 people). In the intervention group, 69.23% (18 people) were aged 15-35 years, while in the control group, the figure was slightly lower at 61.54% (16 people). For the age of 36-55 years, the intervention group had 30.77% (8 people), and the control group 38.46% (10 people). In terms of

education, most respondents had secondary school education, namely 80.77% overall (42 people). In the intervention group, 76.92% (20 people) had secondary school education, and 23.08% (6 people) higher education. In the control group, the figure was higher for secondary school at 84.62% (22 people), with 15.38% (4 people) higher education.

Table 2. Distribution of Respondents Based on Stunting Knowledge, Anthropometric Measurement Knowledge, and Nutrition Education Knowledge

Variable	Pre test				Post test			
	Intervention		Control		Intervention		Control	
	n	%	n	%	n	%	n	%
Knowledge								
Good	10	38,48	12	46,15	21	80,77	15	57,69
Adequate	16	61,54	14	53,85	5	19,23	11	42,31
Total	26	100	26	100	26	100	26	100

Source: Primary Data 2025

Based on Table 2, during the pre-test, in the intervention group, 38.46% (10 people) had good knowledge, and 61.54% (16 people) adequate. In the control group, 46.15% (12 people) good, and 53.85% (14 people) adequate. This shows that before the intervention, the knowledge levels of both groups were relatively balanced, with slightly more respondents in the

control group having good knowledge. After the intervention, in the intervention group, 80.77% (21 people) had good knowledge, and only 19.23% (5 people) adequate, indicating a significant increase. In the control group, 57.69% (15 people) good, and 42.31% (11 people) adequate, which also showed an increase but not as large as the intervention group.

Table 3. Normality Test Using Shapiro-Wilk

Knowledge	Group		Data Distribution
	Intervention	Control	
Pre test	0,002	0,005	Abnormal
Post test	0,063	0,004	Abnormal

Source: Primary Data 2025

Based on Table 3, during the pre-test, the p-value for the intervention group was 0.002, and for the control 0.005. Both values <0.05 , so the data distribution was declared not normal. During the

post-test, the p-value for the intervention group was 0.063 (>0.05 , indicating normal distribution), while for the control 0.004 (<0.05 , not normal).

Table 4. Effectiveness of Virtual Technology (Zoom) as a Training Medium to Increase Knowledge in Stunting Prevention

Knowledge	Mean \pm SD		P-Value	
	Intervention	Control	Intervention	Control
Pre test	61,52 \pm 18,37	61,07 \pm 16,22	0,001	0,332
Post test	79,71 \pm 13,17	69,89 \pm 18,27		
Difference	18,19 \pm 33,29	8,82 \pm 18,09		

Source: Primary Data 2025

Based on Table 4, during the pre-test, the mean score in the intervention group was 61.52 \pm 18.37, and in the control 61.07 \pm 16.22, indicating almost the same initial knowledge level. The p-value for the change in the intervention group was 0.001 (significant, 0.05). Then during the post-test, the mean score in the intervention group

increased to 79.71 \pm 13.17, and in the control 69.89 \pm 18.27—indicating a larger increase in the intervention. The score difference (post minus pre) in the intervention was 18.19 \pm 33.29, and in the control 8.82 \pm 18.09. This indicates that the intervention resulted in a greater knowledge increase.

DISCUSSION

The results of this study show that virtual technology-based training through the Zoom application is effective in improving the knowledge of Posyandu cadres related to stunting prevention, anthropometric measurements, and nutrition education. In the intervention group, there was a significant increase in knowledge from pre-test (mean 61.52 \pm 18.37) to post-test (mean 79.71 \pm 13.17), with a p-value of 0.001 (<0.05) based on the Wilcoxon test, indicating a statistically meaningful change. Meanwhile, the control group only experienced a small increase (pre-test mean 61.07 \pm 16.22 to post-test 69.89 \pm 18.27) with a p-value of 0.332 (>0.05), which is not significant. This difference indicates that virtual intervention directly

contributes to cadre capacity building, with a higher mean difference in the intervention group (18.19 \pm 33.29) compared to the control (8.82 \pm 18.09). These findings align with the concept that virtual training facilitates accessibility and interactivity, especially in rural areas like Jeneponto Regency, where geographical limitations often hinder conventional programs.

The distribution of respondents based on demographic characteristics also supports the interpretation of the results. The majority of respondents were aged 15-35 years (65.38%) and had secondary school education (80.77%), reflecting the typical profile of Posyandu cadres in Indonesia as young community

volunteers with secondary education backgrounds. This young age group tends to be more adaptive to virtual technology, as shown by the significant knowledge increase in the intervention group. This is in line with a study in Bangka Belitung Province which found that cadres under 35 years old have higher technology adaptation rates, so virtual training increases stunting prevention knowledge by 20-30% compared to older age groups (Widiasih et al., 2025). Additionally, the dominance of secondary school education did not hinder the intervention's effectiveness, as the simplified training materials through Zoom enabled better understanding, even though low educational backgrounds are often challenges in public health programs.

The specific knowledge increase in aspects of stunting prevention, anthropometry, and nutrition education in the intervention group (from 38.46% good category in pre-test to 80.77% in post-test) confirms the potential of virtual technology in addressing cadre knowledge gaps. Before the intervention, the knowledge levels of both groups were relatively balanced (38-46% good), but post-intervention, the intervention group showed more dominant improvement. This can be explained by Zoom's interactive features, such as live discussions and simulations, which allow cadres to practice anthropometric measurements virtually, thus reducing common measurement errors in rural Posyandu (such as 25-35% error rates mentioned in the literature). These findings are consistent with research in West Aceh Regency, where virtual anthropometric training for Posyandu cadres increased measurement accuracy from 62% to 93%, ultimately reducing stunting underreporting by up to 20% (Naomi

& Budiono, 2024). Furthermore, the increase in nutrition education through virtual training supports the role of cadres in promoting balanced nutrition, in line with a study in the Soropia Puskesmas Working Area which reported an increase in nutrition knowledge from 50% to 78% post-innovative training, followed by higher community participation in stunting prevention (Yustiari et al., 2023).

The effectiveness of this virtual training is also supported by the non-normal data distribution in most tests (pre-test for both groups and post-test for control), which validates the use of non-parametric tests like Wilcoxon. The significant p-value in the intervention group indicates that the intervention not only quantitatively increases knowledge but also has practical implications, such as the potential reduction in stunting prevalence in Benteng and Pallengu Villages, which previously reached 25-30%. This is similar to the quality improvement model in Lombok, where Zoom training for cadres increased Posyandu performance by up to 70% and cadre participation by 50%, contributing to home-based stunting prevention (Miranda et al., 2024). In Yogyakarta, the integration of Zoom in stunting prevention programs also reduced stunting cases by up to 18% through knowledge increases from 60% to 85% (Siswati et al., 2022). Additionally, a national Delphi study emphasizes that virtual applications like Zoom increase access to nutrition information by up to 90%, although infrastructure challenges in remote areas need to be addressed for sustainability (Erika et al., 2024).

Nevertheless, this study has limitations, such as a small sample size (52 respondents) and short intervention duration (July-September 2025), which may not reflect long-term impacts.

Additionally, external factors such as internet access in Jeneponto could affect generalizability. For future research, longitudinal studies with larger samples and integration of direct impact evaluations on stunting prevalence are recommended, as well as comparisons with other virtual platforms like Google Meet. Overall, these results confirm that virtual training is an innovative and scalable strategy to strengthen the role of Posyandu cadres in stunting prevention in Indonesia, in line with the national target of reducing stunting to 18.8% in 2025.

CONCLUSION

This study concludes that virtual technology-based training for Posyandu cadres through the Zoom application is effective in improving knowledge related to stunting prevention, anthropometric measurements, and nutrition education. In the intervention group, there was a significant increase in knowledge scores from a mean of 61.52 to 79.71 (p-value 0.001), while the control group only experienced a non-significant increase (p-value 0.332). These findings indicate the potential of virtual strategies to overcome geographical limitations in rural areas like Jeneponto Regency, supporting the national target for reducing stunting prevalence, although further studies with larger samples are needed for long-term impact evaluation.

RECOMMENDATION

A recommendation for future researchers is to further investigate various other virtual technologies using different techniques, then compare them to determine which is the most effective for technological development.

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