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Age, Education Level, and Length of Service: A Triad of Factors Influencing the Performance of Community Health Workers in a Community-Based Stunting Prevention Program in Barito Kuala Regency

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ABSTRACT

Stunting remains a critical public health challenge in Indonesia. Posyandu cadres serve as frontline community health workers whose performance is vital for accelerating stunting reduction. This study aimed to evaluate the influence of age, educational level, and length of service on the performance of Posyandu cadres in Barito Kuala Regency. A quantitative cross-sectional study was conducted involving 377 Posyandu cadres selected through multistage random sampling. Data were collected using a structured Individual Work Performance Questionnaire (IWPQ). Data analysis included univariate, bivariate, and multivariate binary logistic regression to determine the predictors of cadre performance. The findings revealed that age and educational level significantly impacted cadre performance. Specifically, age was inversely associated with performance ($p = 0.020$; OR = 0.754), indicating that younger cadres outperformed their older counterparts. Furthermore, a higher educational level was positively correlated with high performance ($p = 0.011$; OR = 1.394). Conversely, length of service did not significantly influence performance outcomes ($p = 0.387$; OR = 1.290), suggesting that longer work experience does not necessarily equate to improved field efficacy. The performance of Posyandu cadres in community-based stunting prevention is driven by functional capacities linked to younger age and higher educational backgrounds, rather than accumulated years of service. Policymakers should prioritize educational qualifications and maintain an optimal age composition when designing capacity-building and recruitment strategies to optimize community health interventions.

Key Messages:

- Age and educational level are significant determinants of cadre performance, with performance being optimal among younger cadres with higher levels of education.
- Length of service does not show a significant influence and is therefore not a dominant factor in explaining variations in cadre performance.
- Efforts to improve cadre performance should focus on strengthening practical and contextual capacities, while taking into account educational background and age composition in cadre development.

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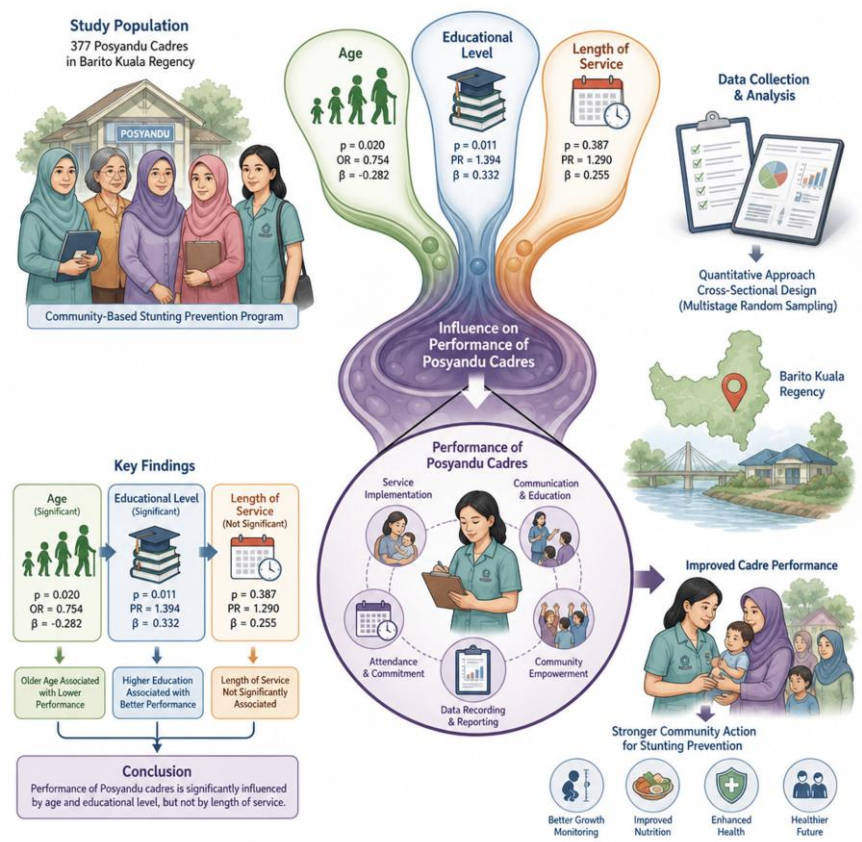
GRAPHICAL ABSTRACT



INTRODUCTION

Stunting remains one of the most serious public health issues in Indonesia and has the potential to hinder national development by reducing the quality of human resources (1). Stunting is a condition characterized by impaired growth and development in children due to chronic malnutrition, recurrent infections, and inadequate psychosocial stimulation. Globally, approximately 148.1 million children under five (22.3%) are stunted, and in Indonesia, the prevalence remains far from the national target of 14% by 2024 (2). The effects of stunting are not limited to physical growth impairments; they also impact cognitive development, reduce learning ability, and increase the risk of both infectious and non-infectious diseases in the future (1).

In recent years, Indonesia has made progress in reducing the prevalence of stunting, although this issue remains a public health challenge. Data from the Indonesian Nutrition Status Survey (SSGI) show a decline from 24.4% in 2021 to 21.6% in 2022, and a further decrease to 19.8% in 2024 (3,4). The 2023 Indonesia Health Survey (SKI) also reported a similar figure, namely 21.5% (5). This trend reflects the success of various child nutrition improvement programs, although implementation challenges at the field level still require ongoing attention and management. At the regional level, South Kalimantan saw a decline from 30% (2021) to 22.9% (2024), although there was a slight increase in 2023 (24.7%). One district in South Kalimantan that showed a significant decline is Barito Kuala District, with a prevalence rate dropping from 33.6% (2022) to 16.5% (2024) (2,3,4). This significant decline indicates that efforts to control stunting have been effective, although sustained strategies are still needed to prevent the prevalence from rising again.

Posyandu (Integrated Health Service Posts) are a form of Community-Based Health Initiatives (Indonesian: Upaya Kesehatan Bersumberdaya Masyarakat, abbrevoated as UKBM) aimed at bringing basic health services closer to mothers and children as the frontline in reducing stunting at the community level (6). The public can access services such as monitoring of toddler growth and development, immunizations, nutrition counseling, and other basic health services (7). Posyandu not only serves as a health clinic but also plays a role in the early detection of growth disorders and interventions during the

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first 1,000 days of life (8). Therefore, the performance of posyandu cadres can be one of the determining factors in the success of the program to accelerate the reduction of stunting. According to Robbins (1996), an individual's performance is influenced by ability, motivation, and opportunity (9). Health workers, including posyandu volunteers, play a crucial role in implementing and evaluating public health initiatives. Interactions between health workers and the community can take various forms, such as home visits and the provision of accurate health information (10). In the context of posyandu volunteers, age, education, and length of service can influence their experience, insight, and maturity in carrying out their duties.

According to psychosocial development theory, individuals in young to middle adulthood tend to be better able to form social relationships, build commitments, and complete tasks with a high sense of responsibility (11). It turns out that the performance of healthcare workers is influenced by various multidimensional factors, both individual and organizational, with age being one of the factors that contributes to shaping performance (12). One factor that influences the performance of healthcare workers in providing services is their level of education (13). A higher level of education tends to make it easier for someone to absorb information (14). A study of KOSPEN community health workers in Malaysia found that workers with higher education performed 4.3 times better than those with only a basic education ($p = 0.001$) (15). The length of service of staff members is also a key factor influencing performance. Longer tenure can strengthen skills, increase responsibility, and foster consistency in service delivery (9). A study by Landingin (2024) of 100 health workers in the Philippines found that length of service was significantly associated with counterproductive work behavior ($p = 0.035$)(16).

Based on the above description, this study aims to analyze the influence of age, educational level, and length of service on the performance of posyandu cadres in reducing stunting rates in Barito Kuala Regency. The research findings are expected to provide empirical evidence regarding the factors contributing to cadres' performance, while also serving as input for local governments in designing more effective capacity-building programs for cadres. With evidence-based strengthening, efforts to accelerate the reduction of stunting are expected to be more targeted and sustainable, in line with national targets and the global health development agenda within the Sustainable Development Goals (SDGs).

METHODS

This study employed a quantitative approach with a cross-sectional design. The research was conducted in Barito Kuala Regency, South Kalimantan Province in August 2025. The study population consisted of all posyandu cadres in Barito Kuala Regency, totaling 2,423 individuals. The sample size was determined using multistage random sampling with the Slovin formula at a 5% margin of error. Based on the calculations, the minimum sample size required was 343 respondents. To account for dropouts, the sample size was increased by 10%, resulting in a total sample of 377 respondents for this study.

The independent variables in this study were age, education level, and length of service, while the dependent variable was the performance of posyandu cadres. Data on age, education level, and length of service, were obtained from the respondents' identification forms filled out by the cadres, while performance was measured using a structured questionnaire. The performance questionnaire utilized the Individual Work Performance Questionnaire (IWPQ), which was adapted in 2018 and demonstrated good discriminant indices ranging from 0.447 to 0.734.

Data analysis was conducted using descriptive methods to describe the characteristics of the respondents, followed by univariate analysis (describing the frequency distribution of each variable according to the established categories), bivariate analysis (determining the relationship between independent and dependent variables using the chi-square test), and multivariate analysis (determining the effect of independent variables on dependent variables through binary logistic regression). Data processing in this study was assisted by the use of SPSS software.

CODE OF ETHICS FOR HEALTH RESEARCH

This study has obtained ethical approval (ethical clearance) and is officially deemed eligible for research by the Ethics Committee of the Faculty of Medicine and Health Sciences, Lambung Mangkurat University, No. 115/KEPK-FKIKULM/EC/VI/2025; therefore, the entire research process was conducted in

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accordance with applicable research ethics principles.

RESULT

Table 1 details the sociodemographic characteristics and performance levels of the respondents. The predominant age group was late adulthood, comprising 35.5% (n=134) of the sample, whereas late adolescents made up the smallest proportion at 12.7% (n=48). Nearly half of the cadres reported high school as their highest educational attainment (47.7%, n=180), with college-educated respondents representing the minority (9.5%, n=36). The sample was largely experienced; a significant majority (74.3%, n=280) had a tenure exceeding three years. Overall, most respondents demonstrated high performance (67.6%, n=255) compared to those exhibiting low performance (32.4%, n=122).

Table 1. Frequency Distribution of Respondents

Characteristics	Category	n	%
Age	Late Adolescence (17-25 years)	48	12.7
	Early Adulthood (26-35 years)	91	24.1
	Late Adulthood (36-45 years)	134	35.5
	Early Old Age (46-55 years)	104	27.6
Education Level	Basic	161	42.7
	Intermediate	180	47.7
	Advanced	36	9.5
Length of Service	New (≤ 3 years)	97	25.7
	Long-term (> 3 years)	280	74.3
Cadres Performance	Low	122	32.4
	High	255	67.6

Statistical analyses revealed that both age and educational attainment are significantly associated with cadre performance, whereas length of service is not (Table 2). Optimal performance was predominantly observed among late adolescents (87.5%) and individuals with a college education (86.1%). Conversely, substandard performance was most prevalent among the early elderly (38.5%) and those with only a primary education (41.0%). Both age ($p = 0.010$) and education level ($p = 0.002$) demonstrated a statistically significant relationship with performance outcomes. Although cadres with shorter tenure showed a tendency toward higher performance (70.1%) compared to those with longer tenure (who exhibited a 33.2% low-performance rate), this difference was not statistically significant ($p = 0.547$).

Table 2. Relationship Between Independent Variables and Volunteer Performance

Variable	Cadres Performance						*p-value*
	Low		High		Total		
	n	%	n	%	n	%	
Age							
Late Adolescence (17-25 years)	6	12.5	42	87.5	48	100	
Early Adulthood (26-35 years)	28	30.8	63	69.2	91	100	0.010
Late Adulthood (36-45 years)	48	35.8	86	64.2	134	100	
Early Old Age (46-55 years)	40	38.5	64	61.5	104	100	
Education Level							
Basic	66	41	95	59	161	100	0.002
Intermediate	51	28.3	129	71.1	180	100	
Advanced	5	13.9	31	86.1	36	100	
Length of Service							
New (≤ 3 years)	29	29.9	68	70.1	97	100	0.547
Long-term (> 3 years)	93	33.2	187	66.8	280	100	

A two-stage multivariate analysis was conducted to identify the predictors of cadre performance (Table 3). In the initial model (Model 1), both age and educational attainment emerged as significant

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factors. Advancing age demonstrated an inverse relationship with performance (OR = 0.721; 95% CI: 0.577–0.933; p = 0.013), indicating that older cadres were less likely to exhibit high performance. Conversely, a higher education level significantly increased the likelihood of high performance (PR = 1.403; 95% CI: 1.806–1.813; p = 0.010). Length of service did not significantly influence performance (OR = 1.290; p = 0.387) and was subsequently excluded. In the refined model (Model 2), age and education retained their statistical significance. The inverse association with age persisted (OR = 0.754; 95% CI: 0.595–0.956; p = 0.020), as did the positive association with education (PR = 1.394; 95% CI: 1.080–1.801; p = 0.011). Ultimately, after controlling for age, educational attainment exhibited the largest effect size, identifying it as the strongest predictor of high cadre performance in this study.

Table 3. Logistic Regression Modeling of Factors Influencing Volunteer Performance

Variable		B	t	*p-value*	PR	95% CI	
						Lower	Upper
Model 1	Age	-0.328	6.183	0.013	0.721	0.577	0.933
	Education Level	0.338	6.697	0.010	1.403	1.086	1.813
	Length of Service	0.255	0.777	0.387	1.290	0.732	2.274
	Constant	**0.054**	**0.005**	**0.941**	**1.056**		
Model 2	Age	-0.282	5.434	0.020	0.754	0.595	0.956
	Education level	0.332	6.489	0.011	1.394	1.080	1.801
	Constant	**0.393**	**0.392**	**0.531**	**1.481**		

DISCUSSION

The Effect of Age on Cadre Performance

The results of the study indicate that the age variable has a significant effect on the performance of posyandu volunteers in reducing stunting, with a p-value of 0.013 in Model 1 and 0.020 in Model 2. The direction of the relationship indicated by the negative regression coefficient (β = -0.282) suggests that younger cadres tend to perform better than older cadres. These findings indicate that in the implementation of posyandu activities, younger age is actually a factor that supports the optimization of cadre performance. Younger volunteers tend to have an advantage in terms of physical energy, mobility, and the ability to adapt to the demands of active, field-based work. Posyandu activities aimed at reducing stunting are not merely administrative; they also require direct engagement with the community, such as weighing toddlers, conducting home visits, and providing health education. These activities demand good stamina and flexibility in interacting with various target groups. Additionally, younger cadres are generally more adaptable to advancements in technology and information, which can support the effective implementation of data-driven health programs and reporting (17).

These findings are consistent with previous research, which found that healthcare workers aged 55 and older had significantly lower work ability scores compared to younger age groups. The decline in physical ability with age is one of the factors that can affect work productivity, particularly in jobs that require physical activity and direct fieldwork (18). Therefore, physical capacity is a key factor contributing to performance.

Theoretically, age is often associated with greater maturity, experience, and better decision-making abilities. Older individuals generally have a longer life experience and are thus considered more mature in completing tasks in a focused and consistent manner (11). This is supported by research indicating that older healthcare workers tend to have higher job satisfaction, particularly regarding relationships with colleagues and job stability, although younger healthcare workers are more likely to experience dissatisfaction related to career development opportunities and workloads (19).

Several previous studies have shown results that differ from the findings of this study. One study found that older age was associated with better performance among posyandu cadres (p-value 0.007; OR 3.35) (11). Similar results in other studies also indicate a significant association between age and volunteer performance (p-value 0.022), where greater maturity is associated with improved performance (20). These differing study results suggest that the influence of age on performance is context-dependent. In this

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study, the high demands of fieldwork likely made the physical advantages of youth more dominant compared to the experience of older individuals. Additionally, differences in respondent characteristics and environmental conditions may also influence this relationship.

The Effect of Educational Level on Cadre Performance

The results of the study indicate that educational level has a significant association with the performance of posyandu cadres (p-value = 0.002). In the multivariate analysis, highest level of education had a significant effect in both Model 1 (p-value = 0.010; OR = 1.403) and Model 2 (p-value = 0.011; OR = 1.394), with a positive direction of association (β = 0.332). Volunteers with higher levels of education were approximately 1.4 times more likely to perform well compared to those with lower levels of education. The consistency of results across both models indicates that education is a relatively robust factor influencing volunteer performance, independent of the effects of age and length of service.

Education plays a role in enhancing individuals' cognitive abilities, particularly in understanding, processing, and applying information (14). Additionally, the education received can expand knowledge that supports the performance of duties (21). In the implementation of posyandu activities, these skills are crucial because cadres are required to master various aspects, ranging from health education materials, recording and reporting procedures, to an understanding of the dynamic policies of the stunting reduction program. Cadres with higher levels of education have greater potential to possess better capacity to support the application of this information in service practice.

This finding aligns with a study on community health workers in Malaysia, which showed that workers with higher education had significantly better performance (p-value = 0.001). Although the magnitude of the effect in this study is smaller compared to that finding, the same direction of the relationship indicates consistency that education plays a tangible role in improving worker performance. This difference in the magnitude of the effect may be due to differences in program context, volunteer characteristics, or the support systems available in each region (15).

However, the fact that a significant proportion of high-performing cadres still come from the primary education group indicates that formal education is not the sole determinant of performance. This finding suggests that other factors outside the research model may influence cadre performance. Therefore, education is better understood as a factor that increases the likelihood of good performance, but it is not deterministic.

Regardless, education still plays a fundamental role in shaping individual capacity, particularly in understanding and implementing health information. A study found that educational level is significantly associated with the ability to understand and implement health information (p-value = 0.002; OR = 2.82) (22). Although the context is slightly different, these findings reinforce that education is a crucial foundation in supporting the effectiveness of community-based health programs, including in the realm of posyandu cadre performance.

The Effect of Length of Service on Cadre Performance

The results of the multivariate analysis indicate that length of service does not have a significant effect on the performance of posyandu cadres (p-value = 0.387; OR = 1.290). Furthermore, in subsequent modeling stages, the length of service variable was not included in the final model after controlling for other variables such as age and educational level. These findings indicate that length of service is not a proven primary predictor in explaining variations in volunteer performance in stunting reduction efforts.

Length of service is generally associated with increased experience and understanding of duties. However, the duration of service does not necessarily guarantee effective performance of tasks. A long tenure does not necessarily lead to an increase in practical knowledge or skills relevant to program needs, and thus does not always reflect a higher level of performance (23). In the implementation of posyandu activities, cadres' performance better reflects their ability to understand their roles, adapt to program dynamics, and apply knowledge in service delivery (24).

These findings indicate that cadres with shorter tenure do not necessarily perform worse. New cadres tend to be enthusiastic and open to learning, so they are still able to perform their duties well despite their limited experience (25). Conversely, cadres with longer tenure do not necessarily demonstrate higher

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performance, as performance is determined not only by the length of experience but also by various other factors not measured in this study (26). Therefore, tenure is better understood as a factor that does not directly determine the quality of a cadre's performance.

Research findings indicate that tenure is not significantly associated with the performance of health cadres (AOR = 1.14; p-value = 0.809) (27). However, this finding differs from other studies that found a significant association between tenure and cadre performance (p-value = 0.000; OR = 14.00) (28). These differences indicate that the relationship between tenure and performance is contextual and can be influenced by the characteristics of the cadres as well as the conditions under which the program is implemented in each region. Thus, tenure in this study was not found to have a significant effect on the performance of posyandu cadres. This suggests that the length of time a person has been in service is not necessarily linked to improved work quality; therefore, other factors beyond tenure likely play a more dominant role in determining cadre performance.

Overall, this study makes an empirical contribution by demonstrating that the determinants of posyandu cadres' performance in reducing stunting do not fully align with common assumptions or previous findings. Unlike some previous studies that emphasized the dominance of older age and longer tenure as performance-enhancing factors, this study found that younger age and higher education levels were actually more consistently influential factors, while tenure was not found to be significant in the multivariate model. These findings reinforce the understanding that cadres' performance in the context of dynamic field-based programs is more influenced by functional capacities such as adaptability, information literacy, and physical readiness rather than the accumulation of experience alone. Thus, this study adds a contextual perspective that cadres' individual characteristics need to be understood more specifically in accordance with program demands, without generalizing the role of work experience as the primary determinant of performance.

CONCLUSION

This study shows that age and educational level are significant factors influencing the performance of posyandu cadres in reducing stunting, whereas length of service does not show a significant influence. Age has a negative relationship with performance, meaning that younger cadres tend to perform better. Meanwhile, educational level has a positive relationship with performance, meaning that cadres with higher education have a greater chance of demonstrating good performance. On the other hand, length of service is not a significant predictor in the multivariate model, so the length of experience is not directly related to improved cadre performance in the context of this study.

Based on these conclusions, it is recommended that policymakers focus on improving cadres' performance by strengthening their practical and context-specific capacities in the field, and consider educational background during the recruitment and training processes. Additionally, it is necessary to maintain an appropriate age composition among cadres to support the effectiveness of field activities. Meanwhile, length of service should be considered merely as one factor, not as the primary indicator in performance evaluations. Further research is recommended to examine other factors beyond individual characteristics not measured in this study, such as motivation, organizational support, and supervision, given that length of service was not found to have a significant impact on cadre performance. Furthermore, the use of mixed methods could be considered to explore in depth how these factors influence cadre performance in the implementation of stunting reduction programs.

DECLARATION OF THE USE OF AI

The authors declare that no artificial intelligence (AI), AI-assisted technologies, or large language models (LLMs) were used in the conception of the study, data analysis, or the drafting, writing, and editing of this manuscript. The only exception is the graphical abstract, which was created using the design platform Illustrae (https://illustrae.co/). The authors take full responsibility for the content and accuracy of the graphical abstract and the entire manuscript.

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CONFLICT OF INTEREST

The author declares that there is no conflict of interest in this research.

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