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Optimizing the Role of Posyandu and Posbindo Cadres through Nutrition Education and Health Screening for Stunting and NCD Prevention in Pacar Kembang Village, Surabaya

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ABSTRACT Stunting and non-communicable diseases (NCDs) remain important community health concerns that require strengthened preventive efforts at the primary community level. Integrated health service posts (Posyandu and Posbindu) provide an important platform for early detection, health education, and community empowerment; however, the effectiveness of these services depends substantially on the knowledge and skills of health cadres. This community service program aimed to strengthen the capacity of Posyandu and Posbindu cadres in Pacar Kembang Village, Surabaya, through nutrition education, health counseling training, and community health screening for stunting and NCD risk factors. The program employed lectures, presentations, discussions, question-and-answer sessions, practical nutrition counseling, and health screening activities. The educational intervention focused on balanced nutrition during the first 1,000 days of life and the role of cadres in delivering simple nutrition counseling. Community screening included measurements of blood pressure, blood glucose, uric acid, and anthropometric indicators. A total of 30 health cadres participated in the nutrition counseling activities. The results demonstrated an improvement in cadres' understanding, with the average pre-test score increasing from 62% to 85%. Participants also demonstrated basic skills in providing nutrition counseling and reported greater confidence in delivering health education through Posyandu activities. In addition, community NCD screening indicated that most participants were in normal condition, while approximately 19–20% demonstrated NCD-related risk factors, emphasizing the importance of early detection and healthy lifestyle education. Overall, the program strengthened cadres' capacity to support stunting prevention and NCD risk reduction and increased community participation in health promotion. Continued monitoring, evaluation, and targeted interventions are recommended to sustain these improvements.

INDEX TERMS Health Cadres, Nutrition Education, Stunting Prevention, Non-Communicable Diseases, Posyandu

1. INTRODUCTION

Stunting remains a major public health concern in low- and middle-income countries and continues to affect child development and population health in Indonesia. Stunting reflects impaired linear growth resulting from chronic nutritional deficiencies and repeated exposure to adverse health conditions, particularly during the first 1,000 days of life. Its consequences extend beyond physical growth and may include impaired cognitive development, reduced educational attainment, lower productivity, and increased susceptibility to chronic diseases later in life [1]–[4]. In Indonesia, stunting is influenced by multiple interacting factors, including maternal education, household socioeconomic conditions, maternal and child characteristics, dietary practices, and community-level determinants [5]–[7]. These multidimensional determinants indicate that stunting prevention requires not only clinical interventions but also sustained community-based health promotion and empowerment.

The current state of the art emphasizes community-based approaches that combine nutrition education, growth monitoring, early identification, counseling, and referral within primary healthcare systems. Community health workers (CHWs), including Posyandu cadres in Indonesia, are strategically positioned to deliver these interventions because of their proximity to households and their ability to facilitate communication between communities and health professionals [8], [9]. International evidence demonstrates that CHW-based interventions can improve access to health information, promote healthy behaviors, support nutrition counseling, and strengthen early identification of health problems [10]–[12]. In Indonesia, cadre-focused interventions have similarly demonstrated that structured education and short-course training can improve knowledge, self-efficacy, and the ability of cadres to conduct growth monitoring and support families with stunted children [13], [14]. Recent evidence also indicates that health cadres may have substantial limitations in

knowledge and anthropometric measurement skills, highlighting the continuing need for standardized training and capacity development [15].

Despite these advances, an important research and implementation gap remains. Existing community-based interventions frequently emphasize individual components of stunting prevention, such as nutrition education, growth monitoring, or counseling, without integrating these activities with broader community health screening. Furthermore, the effectiveness of cadre-based programs may be constrained by inadequate training, limited resources, inconsistent implementation, and insufficient integration with primary healthcare services [15]–[17]. This gap is particularly relevant because communities simultaneously face the increasing burden of non-communicable diseases (NCDs). Evidence from Indonesia shows that Posbindu provides an important community platform for NCD screening, but implementation barriers, including limited resources, capability, and standardized protocols, may result in missed opportunities for early detection [18]. Participation in community-based healthcare interventions has nevertheless been associated with greater uptake of blood pressure, blood glucose, and other NCD-related screening services [19]. Therefore, integrating cadre empowerment for stunting prevention with community NCD screening may provide a more comprehensive and sustainable model of community health promotion.

Accordingly, this community service program aimed to optimize the role of Posyandu and Posbindu cadres in Pacar Kembang Village, Surabaya, through nutrition education, practical counseling training, and community health screening for stunting prevention and NCD risk identification. The program makes three principal contributions: (1) strengthening cadres' knowledge and practical capacity to communicate balanced nutrition during the first 1,000 days of life; (2) integrating cadre empowerment with community-level screening of anthropometric indicators and NCD-related parameters, including blood pressure, blood glucose, and uric acid; and (3) establishing a collaborative community-health framework involving cadres, village stakeholders, and health professionals to support continuous monitoring, early detection, health promotion, and targeted intervention. These contributions are supported by evidence that community-based health workers can play an important role in both nutrition-related interventions and NCD prevention when appropriately trained and integrated into primary healthcare systems [10], [20]–[22].

The remainder of this article is organized as follows. Section II describes the methods and implementation procedures. Section III presents the implementation process and stakeholder roles. Section IV reports the results and discusses the outcomes of cadre education and community health screening. Finally, Section V presents the conclusions and recommendations for sustainable monitoring and future community-based interventions.

II. METHODS

A. STUDY DESIGN AND SETTING

This community service activity employed a prospective,

community-based intervention design with a pre-post assessment of participants' knowledge. The activity was conducted in the working area of Pacar Kembang Village, Surabaya, Indonesia, as part of an integrated community health promotion program involving Posyandu and Posbindu cadres. The intervention was designed to strengthen cadres' capacity in balanced nutrition education, basic nutrition counseling, and community health screening for stunting and non-communicable disease (NCD) risk factors. A community-based approach was selected because cadres serve as an important link between households, community health services, and professional healthcare providers [23], [24]. Previous studies have demonstrated that structured training and short-course interventions can improve cadres' knowledge, confidence, and capacity to support stunting prevention and growth monitoring [25], [26].

B. PARTICIPANTS AND RECRUITMENT

The target population comprised Posyandu and Posbindu health cadres involved in community health activities in Pacar Kembang Village. Participants were recruited through coordination with the village health cadre coordinator and local stakeholders. A total of 30 health cadres participated in the nutrition education and counseling activities. The available manuscript does not report probability sampling, random allocation, or the use of an experimental control group; therefore, participants were not considered randomized. The activity was implemented as a community service intervention involving cadres who participated in the scheduled program. This approach is consistent with community-based cadre capacity-building programs in Indonesia, in which participants are selected according to their involvement and availability within local health-service structures [25], [27]. The use of trained local cadres was considered appropriate because previous research has identified cadre knowledge, motivation, and practical skills as important components of effective stunting prevention [24], [28].

C. INTERVENTION MATERIALS AND EDUCATION PROCEDURES

The educational intervention consisted of structured lectures, presentations, discussions, question-and-answer sessions, and practical counseling activities. The primary educational material addressed the importance of balanced nutrition during the first 1,000 days of life, which represents a critical period for preventing growth faltering and improving child health outcomes. Additional materials addressed the role of cadres in delivering simple nutrition counseling to pregnant women, mothers of toddlers, and other community members. Practical examples of healthy menus for toddlers and pregnant women were incorporated to facilitate the translation of nutritional concepts into community-level counseling.

The activity was organized into sequential sessions. The first session consisted of participant registration and program opening. The second session delivered educational material on balanced nutrition and the first 1,000 days of life. The third session focused on the role of

TABLE 1

Data Series of Activities			
No.	Activity	Speaker/Facilitator	Results
1.	08.00-08.30 Participant registration and opening	Committee	Participants arrived on time, the atmosphere was conducive.
2.	08.30-10.00 Material: The importance of balanced nutrition in the first 1000 days of life (HPK)	Mayhana Titian Maghfiro	Participants understand the concept of balanced nutrition, the urgency of 1000 HPK, and stunting prevention.
3.	10.00-11.30 Material: The role of cadres in providing simple counseling to the community	Pestariati Anik Handayati Suhariyadi	Participants acquire basic nutrition counseling skills based on simple communication and local healthy menus.
4.	11.30-12.00 Discussion and Q&A	Facilitator	Active cadres discuss and share field experiences.
5.	12.00-12.15 Closing	Committee	The activity closed with a prayer, participants expressed their commitment to supporting balanced nutrition in the community.

cadres in providing simple nutrition counseling using accessible communication and examples of locally appropriate healthy menus. The final substantive session consisted of facilitated discussion and question-and-answer activities, allowing cadres to clarify the educational material and relate it to their experiences in the community. Practical and interactive approaches were incorporated because evidence indicates that structured short courses and active learning can improve cadres' knowledge and self-efficacy in stunting prevention [25], [26].

The community service program was implemented through a series of structured activities, including participant registration, nutrition education, cadre counseling training, discussion and question-and-answer sessions, and program closure. The detailed schedule and implementation of the activities are presented in [TABLE 1](#).

D. COMMUNITY HEALTH SCREENING

In addition to cadre education, community health screening was conducted to support early identification of nutritional and NCD-related risk factors. The screening included anthropometric assessment and measurements of blood pressure, blood glucose, and uric acid. The health screening equipment was provided and supported by healthcare personnel involved in the program. Digital blood pressure monitors, glucometers, and mid-upper-arm circumference (LILA) strips were among the equipment identified in the program implementation. The measurements were intended primarily for community screening and baseline identification of potential health risks rather than for establishing clinical diagnoses.

Anthropometric assessment was incorporated because accurate growth monitoring is an essential component of community-based stunting prevention. Previous research has demonstrated that health cadres may have limitations in anthropometric measurement accuracy, supporting the need for structured training and supervision [28], [29]. Similarly, community-based screening through Posbindu can facilitate early identification of NCD risk factors, although implementation may be affected by limitations in resources, skills, and standardized procedures [30].

E. OUTCOME ASSESMENT AND DATA ANALYSIS

The primary outcome of the educational component was the change in cadres' level of understanding before and after the intervention. Knowledge was assessed using pre-test and post-test instruments administered during the educational activity. The manuscript reports the results as percentage scores, allowing comparison of the average level of understanding before and after the intervention. The mean pre-test score was 62%, whereas the mean post-test score increased to 85%, representing an absolute improvement of 23 percentage points. In addition to the quantitative knowledge assessment, qualitative observations during the activity were used to document cadres' participation, counseling confidence, and engagement in discussion.

For the community screening component, the recorded blood pressure, blood glucose, uric acid, and anthropometric findings were reviewed descriptively to identify participants with potential NCD or nutritional risk factors. The screening results were reported using descriptive proportions rather than inferential statistical testing because the activity did not employ a randomized control group or an experimental comparative design. The available manuscript also does not report a formal sample-size calculation, randomization procedure, blinding, or longitudinal follow-up; therefore, these elements are not claimed in the present methodology.

F. IMPLEMENTATION AND STAKEHOLDER ROLES

Program implementation involved collaboration among the community service team, healthcare personnel, Pacar Kembang Village health cadres, and village officials. Healthcare personnel provided technical support and assisted with health examinations, while cadres mobilized community members, supported participant registration, recorded screening results, and assisted with practical healthy-menu activities. Village officials provided administrative permission, venue support, and participant coordination. This collaborative structure was intended to strengthen local ownership and facilitate continuation of health-promotion activities after completion of the program. Evidence from community health worker research emphasizes the importance of appropriate training, supervision, workload management, and

integration with primary healthcare systems to sustain community-based interventions [23], [24].

The activity therefore followed a reproducible sequence comprising participant coordination, baseline knowledge assessment, structured nutrition education, practical counseling training, post-intervention knowledge assessment, community health screening, and documentation of findings. The resulting data provided an initial basis for evaluating cadre capacity and identifying community health risks requiring subsequent monitoring and targeted intervention.

III. RESULTS

Nutrition counseling has been conducted for health cadres, focusing on: The importance of balanced nutrition in the first 1,000 days of life (HPK). Practical preparation of healthy menus for toddlers and pregnant women (HKI Practical Module for preparing healthy menus for toddlers and pregnant women).

https://drive.google.com/file/d/1B1_ZwLcK7hDGhMBbDhNX6vXOkS_Dcchn/view?usp=sharing

- The role of cadres in providing simple counseling to the community.
- Number of cadres who participated in the counseling: 30 people.
- Level of understanding increased (based on pre- and posttests): the average rose from 62% to 85%. (Question link: https://drive.google.com/file/d/1Res09ggdfuSnB0JWAvL3H_r9i-pSOHm0D/view?usp=sharing)
- Cadres are more confident in providing nutrition education at integrated health posts (Posyandu).



FIGURE 1. Coordinating with the Village Health Cadre Coordinator and The Importance of Balanced Nutrition in the First 1000 Days of Life (HPK)



FIGURE 2. Material: The Role of Cadres in Providing Simple Counseling to the Community

FIGURE 1 illustrates the sequence of activities implemented during the community service program. The process began with coordination with the village health cadre coordinator and local stakeholders, followed by participant mobilization and registration. The intervention subsequently included education on balanced nutrition during the first 1,000 days of life and training on simple nutrition counseling. Community health screening was also conducted using anthropometric measurements and assessments of blood pressure, blood glucose, and uric acid. The activities concluded with discussion, documentation of screening results, and coordination for subsequent monitoring and health interventions. The involvement of multiple stakeholders supported the implementation of the program and facilitated the integration of health education, early risk identification, and community participation.

PTM (Non-Communicable Disease) examinations are carried out on the community with indicators of blood pressure, blood sugar, and uric acid. Most participants were in normal condition, but 19–20% had risk factors for non-communicable diseases (NCDs). This highlights the importance of early detection and healthy lifestyle education.

In addition, it was also found that health cadres understand the importance of balanced nutrition in the 1000 HPK, cadres have basic skills in simple nutritional counseling for the community, and the commitment of cadres to be the spearhead of stunting prevention in their respective work areas is growing.

The skills of cadres in providing health education are the result of repeated training, so it can be said that cadres have made changes for the better to provide maximum service to the community. The results of research by [5] showed that training will improve skills in providing

services to the community. According training is a key activity during the implementation phase of a health program. During implementation, training aims to maintain and build behaviors that are very important for the program's continuity.

The nutrition education and counseling program involved 30 health cadres from the Pacar Kembang community. The evaluation of participants' knowledge was conducted using pre-test and post-test assessments administered before and after the educational intervention. The results demonstrated an increase in the average knowledge score from 62% at baseline to 85% following the intervention, corresponding to an improvement of 23 percentage points. The comparison of pre-test and post-test scores is presented in [FIGURE 2](#).

TABLE 2
Result Data

No.	Kode	LILA	LP	BB	TB	TD	Hasil	
							GDA	AU
1.	IDN	26	82	60	150	119/90	119	3,6
2.	AMH	30	202	70	157	-	-	-
3.	SHT	25	83	55	146	127/93	112	7,5
4.	TPY	30	91	67	148	113/78	302	3,3
5.	SMP	28	72	48	137,4	154/78	-	-
6.	KRM	27,5	90	60	154	157/83	110	-
7.	RTM	26	95	57	151	128/76	111	7,1
8.	DJT	25	91	62	152	124/85	142	6,7
9.	MDJ	28	89	57	153	150/77	-	-
10.	AND	25	84,5	51	141	119/67	109	7,4
11.	ANK	28	54	-	154	146/80	138	-
12.	STP	26	84	48	142	127/83	93	10
13.	MTM	26	79	57	158	113/70	99	10
14.	PTK	26	86	55	145	132/78	272	3,0
15.	SJH	28	76	58	150,2	134/75	319	4,9
16.	BNS	27	84	70	160	120/77	101	-
17.	NKH	29	88	62,5	178	135/73	109	-
18.	MNH	32	107	51	154	132/85	120	-
19.	MSK	28	110	59	104,5	158/80	114	-
20.	AMNR	29	89	72	72	158/86	-	-
21.	STSH	31	98	76,5	145	155/90	-	-
22.	STRM	29	89	52	140,5	104/87	122	-
23.	MKS	31	116	79,5	155	155/93	164	-
24.	STN	27	95	55	130,5	148/84	-	-
25.	IK	28	91	62	150	138/84	106	-
26.	FBT	29	86	53	155	131/74	106	-
27.	SLH	31	98	75	160	147/91	119	-
28.	FTH	28	92	59	165	143/72	111	-
29.	PTSH	32	88	59	150	137/79	108	-
30.	NNK	35	99	74	152	114/60	119	-

In addition to the cadre education and counseling assessment, community health screening was conducted to identify potential non-communicable disease (NCD) risk factors. The screening included measurements of blood pressure, blood glucose, and uric acid levels. Most screened participants were within the normal category, whereas approximately 19–20% were identified as having potential NCD-related risk factors. A summary of the community health screening findings is presented in [TABLE 2](#).

IV. DISCUSSION

A. IMPROVEMENT IN CADRE'S KNOWLEDGE AND NUTRITION COUNSELING CAPACITY

The present community-based intervention demonstrated a substantial improvement in cadres' understanding following nutrition education and counseling activities. Among the 30 participating cadres, the average knowledge

score increased from 62% in the pre-test to 85% in the post-test, representing an absolute improvement of 23 percentage points. In addition to the quantitative improvement, cadres were reported to demonstrate greater confidence in delivering nutrition education at Posyandu and to acquire basic skills for providing simple nutrition counseling to the community. This finding suggests that a relatively short, structured educational intervention can strengthen the immediate knowledge and perceived capacity of community health cadres.

The observed improvement is consistent with previous evidence demonstrating that structured training can increase the knowledge and functional capacity of community health workers. Siswati et al. reported that a short-course intervention among cadres in Yogyakarta significantly improved knowledge related to child growth monitoring, child development monitoring, and infant and young child feeding, with the improvement remaining evident during subsequent follow-up assessments [31]. The similarity between that study and the present program indicates that structured learning combined with opportunities to apply information in community activities may be an effective approach for strengthening cadre capacity. The present intervention similarly combined lectures and presentations with discussion, question-and-answer activities, and practical nutrition counseling rather than relying exclusively on passive information delivery.

The findings are also relevant to evidence concerning factors influencing cadre knowledge and motivation. Mediani et al. identified knowledge, motivation, and other cadre characteristics as important considerations in strengthening cadres' contribution to stunting prevention in Indonesia [32]. Therefore, the increase from 62% to 85% should not be interpreted solely as an improvement in test performance, but also as an indication that targeted capacity-building can address an important component of community-based stunting prevention. However, the present findings measure immediate knowledge acquisition rather than long-term retention or actual improvement in child nutritional status.

Recent evidence further emphasizes that knowledge alone is insufficient if cadres are expected to perform technical activities in the field. Widiastih et al. found that a substantial proportion of cadres in Indonesia had low or very low levels of stunting-related knowledge and that observations revealed inaccuracies in anthropometric measurement practices [33]. This finding provides an important interpretation of the current program: although the improvement in knowledge is encouraging, continued practical training and supervision are required to ensure that increased knowledge is translated into accurate measurement, appropriate counseling, and effective referral. The present program incorporated practical nutrition counseling, which is a positive feature, but the available data do not provide a formal post-training competency score for counseling or anthropometric measurement.

The educational content also focused on balanced nutrition during the first 1,000 days of life and simple counseling for pregnant women, mothers of toddlers, and community members. This emphasis is consistent with the

role of community health workers in delivering nutrition-related behavior-change interventions. A systematic review by Bridge and Lin reported that community health worker models have been used for nutrition counseling, behavior-change communication, supplementary feeding, and integrated community health interventions [34]. The review identified community connection, proximity to the target population, supervision, and high-quality training as important facilitators of successful community health worker programs. Thus, the present program's use of local cadres is potentially advantageous because cadres already have established relationships with community members and can continue nutrition communication beyond the training session.

Nevertheless, the magnitude of improvement should be interpreted cautiously. The pre-test and post-test comparison was conducted within the same participant group and did not include a control group. Consequently, the 23-percentage-point increase cannot be attributed exclusively to the intervention with the same level of certainty as a randomized controlled study. Participants may have benefited from repeated exposure to the same information, discussion with facilitators, or test familiarity. In addition, the assessment captured short-term knowledge rather than behavioral change. Future programs should therefore incorporate delayed post-tests, direct observation of counseling performance, and indicators of community-level nutritional outcomes.

B. COMMUNITY HEALTH SCREENING AND NCD RISK IDENTIFICATION

The second major component of the program was community health screening for NCD-related risk factors. Screening included blood pressure, blood glucose, and uric acid measurements, while anthropometric information was also collected as part of the broader community health assessment. The results indicated that most participants were in the normal condition, whereas approximately 19–20% were identified as having NCD-related risk factors. Although these findings do not establish clinical diagnoses, they provide useful baseline information for identifying individuals who may require further assessment, counseling, or monitoring.

The integration of NCD screening into a cadre-based community program is particularly relevant because Posbindu is intended to support community-level identification of NCDs and their risk factors. Widyaningsih et al. evaluated Posbindu implementation across several Indonesian provinces and found that blood pressure screening was relatively well implemented, but important gaps remained in risk-factor assessment, anthropometric measurement, and other screening activities [35]. The authors identified limitations in resources, capability, time, and implementation protocols as important barriers. In this context, the present program demonstrates the practical value of combining cadre empowerment with screening activities, while also highlighting the need for systematic follow-up after abnormal findings.

The identification of approximately 19–20% of participants with potential NCD risk factors reinforces the importance of early detection at the community level. Even

when most screened participants show normal findings, the presence of a subgroup with potential risk indicates that community screening can provide an opportunity for health education and referral. However, the screening results should not be interpreted as prevalence estimates because the participant selection was not randomized and the total population screened, demographic characteristics, measurement protocols, and diagnostic confirmation procedures are not fully documented in the available manuscript. Therefore, the results are more appropriately understood as program-level screening findings rather than epidemiological estimates.

The integration of nutrition and NCD activities may also provide an operational advantage. Nutrition education traditionally focuses on maternal and child health, whereas NCD screening generally targets broader adult populations. Combining these activities through community-based services allows health promotion to address multiple stages of the life course within the same community setting. Evidence from Seneviratne et al. indicates that training community health workers for cardiometabolic disease prevention and control can support their capacity to undertake community-level health activities in low- and middle-income countries [36]. The present findings therefore support the potential of cadres as multipurpose community health promoters, provided that their roles remain clearly defined and appropriate technical supervision is available.

Nevertheless, the program also needs to recognize the practical limitations of integrated screening. Posbindu implementation studies have demonstrated that multiple screening requirements can create considerable workload and may result in incomplete assessments or reporting [35]. Therefore, expanding the responsibilities of cadres without adequate training, equipment, supervision, and referral mechanisms may reduce rather than improve program effectiveness. A sustainable model should prioritize standardized procedures, simple recording systems, periodic supervision, and clear criteria for referral to primary healthcare facilities.

C. LIMITATIONS, IMPLICATIONS, AND FUTURE PROGRAM DEVELOPMENT

Several limitations should be considered when interpreting the findings. First, the program involved only 30 cadres, limiting the generalizability of the results to other communities. Second, participants were not randomly selected or randomly assigned to intervention and control groups. The design therefore does not permit a strong causal inference regarding the effect of the educational intervention. Third, the principal quantitative outcome was the difference between pre-test and post-test knowledge scores. Although the increase from 62% to 85% is substantial, the evaluation does not demonstrate whether the acquired knowledge was retained over time or translated into sustained changes in counseling behavior. Fourth, the screening component was descriptive and did not include confirmatory clinical examinations or longitudinal follow-up. The approximately 19–20% NCD-risk finding should consequently be interpreted as an initial screening result rather than a diagnosis or population

prevalence estimate.

Another limitation concerns the assessment of practical competence. The program reported that cadres became more confident in providing nutrition education, but the available data do not include a standardized objective assessment of counseling performance. This distinction is important because knowledge and self-reported confidence do not necessarily indicate technical competence. Recent research among Indonesian cadres demonstrated that knowledge limitations can coexist with inaccurate anthropometric measurement practices [33]. Accordingly, future interventions should assess not only knowledge but also practical performance using standardized observation checklists, competency assessments, and periodic refresher training.

Despite these limitations, the findings have several practical implications. First, the 23-percentage-point increase in knowledge supports the continued use of structured cadre education as an entry point for strengthening community-based stunting prevention. Second, nutrition education should be followed by repeated practical application because cadres require opportunities to translate theoretical information into counseling and growth-monitoring practices. Evidence from community health worker interventions indicates that training quality, supervision, and integration with the health system are important determinants of program sustainability [34], [36]. Third, NCD screening should be linked to an explicit follow-up pathway. Screening without subsequent counseling, referral, or monitoring may have limited health impact, particularly when potential risk factors are identified.

The integration of Posyandu and Posbindu activities also has implications for community health-system efficiency. Rather than treating stunting prevention and NCD prevention as completely separate activities, community health programs can use existing cadre networks to deliver age-appropriate health education and facilitate early risk identification across the life course. However, this integration should be supported by clearly defined responsibilities, adequate equipment, standardized measurement procedures, and collaboration with primary healthcare providers. The findings from Posbindu implementation research indicate that insufficient resources, limited capability, and complex procedures can create missed screening opportunities [35]. Therefore, future implementation should emphasize simplified workflows and reliable referral mechanisms.

Future programs should also strengthen the evaluation design. A larger sample, repeated follow-up assessments, standardized competency tests, and comparison groups would provide stronger evidence regarding intervention effectiveness. Delayed post-tests could determine whether knowledge is retained, while direct observations could assess whether cadres actually apply counseling and measurement skills during routine Posyandu activities. At the community level, subsequent evaluations could examine changes in growth-monitoring coverage, referral completion, nutrition practices, and NCD screening participation. Such longitudinal evaluation would move the program beyond demonstrating immediate educational

gains toward determining whether cadre empowerment produces sustained improvements in community health practices.

Overall, the findings indicate that structured nutrition education combined with practical counseling and community screening can strengthen the immediate capacity of health cadres and create opportunities for early identification of NCD-related risk factors. The results are consistent with previous evidence supporting community health workers as important actors in nutrition and NCD prevention, while also demonstrating that training must be accompanied by supervision, practical competency assessment, and appropriate referral systems [31]–[36]. The program therefore provides a useful community-level foundation for continued monitoring and targeted intervention, but further longitudinal and methodologically rigorous evaluation is required to determine its sustained effectiveness.

V. CONCLUSIONS

This community service program aimed to strengthen the capacity of Posyandu and Posbindu health cadres in Pacar Kembang Village, Surabaya, through nutrition education, practical counseling training, and community-based health screening for stunting prevention and early identification of non-communicable disease (NCD) risk factors. The findings indicate that the structured educational intervention improved the cadres' immediate understanding of balanced nutrition and their perceived capacity to provide basic nutrition counseling. Among the 30 participating cadres, the average knowledge score increased from 62% before the intervention to 85% after the intervention, representing an improvement of 23 percentage points. In addition, the cadres demonstrated greater confidence in delivering nutrition-related information and participating in community health promotion activities. The screening component further identified potential health risks among community participants through measurements of blood pressure, blood glucose, uric acid, and anthropometric indicators. Although most participants demonstrated normal screening findings, approximately 19–20% were identified as having potential NCD-related risk factors, highlighting the value of community-based screening as an initial mechanism for early risk identification and subsequent monitoring. These findings suggest that integrating cadre capacity building with nutrition promotion and community health screening can provide a practical foundation for strengthening preventive health services at the community level. However, the findings should be interpreted within the limitations of the program, including the relatively small number of participants, absence of a randomized control group, reliance on immediate pre-test and post-test knowledge assessment, and lack of longitudinal evaluation of behavioral and health outcomes. Future programs should therefore involve larger and more diverse participant populations, incorporate delayed follow-up assessments to evaluate knowledge retention, and use standardized objective assessments to measure counseling and anthropometric competencies. Further studies should also establish clearer referral and follow-up mechanisms

for participants identified with potential NCD risk factors and evaluate whether sustained cadre empowerment can improve community nutrition practices, screening participation, and health outcomes. Such longitudinal and methodologically rigorous evaluation would provide stronger evidence regarding the sustainability and broader applicability of integrated Posyandu and Posbindu-based community health interventions.

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DATA AVAILABILITY

The data generated and/or analyzed during the current community service program are not publicly available because they contain participant-related information collected during community health screening. The data may be made available. The authors declare that they have no competing interests that could have influenced the conduct of the program, interpretation of the findings, or preparation of this manuscript. The corresponding author upon reasonable request, subject to applicable privacy, confidentiality, and institutional requirements.

AUTHOR CONTRIBUTION

All authors contributed to the development and implementation of this community service program. The authors collectively contributed to conceptualization and methodology development, coordination and implementation of the community-based intervention, delivery of nutrition education and cadre counseling activities, community health screening, data collection and documentation, data analysis and interpretation, and preparation of the manuscript. All authors contributed to the critical revision of the manuscript, approved the final version, and agreed to be accountable for all aspects of the work.

DECLARATIONS

ETHICAL APPROVAL

The authors confirm that the activity was conducted in accordance with applicable ethical principles and

institutional requirements for community-based health activities. As this program was implemented as a community service activity involving health education and community screening, the authors did not report a formal research ethics approval number in the present manuscript. Any institutional ethical or administrative approval required for the implementation of the activity was obtained from the relevant authorities.

CONSENT FOR PUBLICATION PARTICIPANTS

Participants were informed about the purpose and procedures of the community service activities before participation. Participation in the educational activities and health screening was voluntary. Participants were provided with an explanation regarding the screening procedures and the use of the resulting information for program evaluation and reporting. Consent was obtained from participants in accordance with the procedures applicable to the community service program.

COMPETING INTERESTS

The authors declare that they have no competing interests that could have influenced the conduct of the program, interpretation of the findings, or preparation of this manuscript.

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