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Empowerment of Health Cadres in Improving Skills through Training on Early Detection and Danger Signs of Pregnancy in Kabunan Village, Bojonegoro, Indonesia

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ABSTRACT Indonesia continues to experience elevated maternal mortality rates, primarily attributed to inadequate detection of high-risk pregnancies. Antenatal care serves as a critical intervention for monitoring maternal-fetal health and identifying pregnancy-related complications. However, the effectiveness of early detection systems depends significantly on the competency of frontline health workers, particularly community health cadres who serve as the first point of contact in primary healthcare settings. This community service program aimed to enhance the knowledge and skills of health cadres in the early detection of high-risk pregnant women through systematic training interventions. The program targeted 30 Posyandu (integrated health post) cadres in Kabunan Village, Balen Community Health Center, Bojonegoro District. A multi-modal training approach was implemented, comprising didactic lectures, interactive discussions, distribution of educational leaflets, and hands-on simulation exercises utilizing the Poedji Rochjati Score Card for risk assessment. Pre- and post-intervention assessments were conducted to evaluate knowledge acquisition and skill development. The intervention demonstrated statistically significant improvements in cadres' knowledge ($p<0.05$). Post-training assessments revealed substantial gains in competency, with the average skill score for high-risk pregnancy detection reaching 84 out of 100. Counseling proficiency showed marked improvement, with 66.7% of participants achieving "very good" classification. The proportion of cadres demonstrating good knowledge levels increased from 3.93% to 8.30% following the training program. The comprehensive training program successfully enhanced cadres' competency in utilizing the Poedji Rochjati Score Card for early detection, appropriate referral, and preparedness for obstetric complications. These improvements in frontline health worker capacity have substantial potential to reduce maternal and neonatal mortality rates in Kabunan Village and similar rural healthcare settings through strengthened community-based surveillance systems.

INDEX TERMS Maternal Mortality, High-Risk Pregnancy Detection, Poedji Rochjati Score Card, Health Cadre Training, Antenatal Care

I. INTRODUCTION

Maternal and child health (MCH) constitutes a fundamental pillar of public health policy in Indonesia, representing a critical indicator within the National Long-Term Development Plan 2005-2025 [1]. Despite sustained governmental efforts, Indonesia continues to grapple with persistently elevated maternal mortality rates (MMR), positioning MMR reduction as a paramount priority in national health development initiatives [2]. The complexity of maternal mortality stems from multifactorial etiologies, including pregnancy-induced hypertension, eclampsia, obstructed labor, hemorrhage, and unsafe abortion complications [3]. Contemporary epidemiological evidence indicates that pregnancy-related complications such as anemia, gestational diabetes, hypertension, and the "four too" risk factors, maternal age extremes, short interpregnancy intervals, and high parity significantly contribute to adverse maternal outcomes [4], [5]. Regional surveillance data from Bojonegoro Regency reveal alarming trends in high-risk pregnancy prevalence. At Balen Community Health Center, high-risk pregnancies constituted 55.36% (227/410) of total pregnancies in 2021 and 55.25% (242/438) in 2022 [6]. Within Kabunan Village specifically, high-risk pregnancy cases escalated from 42.85% (9/21) in 2021 to 55% (11/20) in 2022, accompanied by documented maternal mortality attributed to pre-eclampsia and neonatal death in 2022 [7]. These statistics underscore the urgent necessity for strengthened surveillance mechanisms and early detection systems at the community level. Indonesia has

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implemented numerous strategic interventions to address maternal health challenges, including the Safe Motherhood Initiative (1990), Gerakan Kasih Ibu (1996), Expanding Maternal and Newborn Survival (2012), and Birth Waiting Homes (Rumah Tunggu Kelahiran) [8], [9]. International collaborative frameworks, particularly cross-sectoral partnerships, have proven instrumental in advancing maternal health outcomes across developing nations [10]. Central to these initiatives is the optimization of antenatal care (ANC) services, which serve as the cornerstone for monitoring maternal-fetal wellbeing, providing health education, and identifying obstetric risk factors through systematic screening protocols [11], [12]. The Poedji Rochjati Score Card (PRSC) represents an established risk stratification tool utilized in Indonesian maternal health systems for systematic assessment of pregnancy complications [13]. However, the efficacy of such screening instruments depends critically on the competency of frontline health workers who operationalize these tools in community settings [14]. Health cadres, as voluntary community health workers stationed at Posyandu (integrated health posts), occupy a pivotal position in Indonesia's primary healthcare infrastructure [15]. These cadres function as the initial point of contact for pregnant women, facilitating health promotion, disease prevention, and linkage to formal healthcare services [16], [17]. Despite their strategic positioning, existing evidence suggests substantial gaps in cadres' knowledge and technical proficiency regarding high-risk pregnancy detection, limiting the effectiveness of community-based surveillance systems [18], [19]. Previous research has predominantly focused on facility-based interventions and healthcare provider training, with limited attention to capacity-building initiatives targeting community health cadres [20], [21]. Furthermore, while theoretical knowledge enhancement has been emphasized in training programs, practical skill development in utilizing standardized risk assessment tools remains underexplored [22], [23]. The integration of comprehensive training modalities combining didactic instruction, interactive learning, and hands-on simulation represents a promising yet insufficiently investigated approach to enhancing cadre competency in rural settings [24], [25].

This community service program aimed to enhance the knowledge and practical skills of Posyandu health cadres in the early detection of high-risk pregnancies through structured training interventions utilizing the Poedji Rochjati Score Card in Kabunan Village, Balen Community Health Center, Bojonegoro District. This study makes several significant contributions to maternal health promotion in community settings:

1. Capacity Enhancement: Provides empirical evidence on the effectiveness of multi-modal training interventions in improving cadres' theoretical knowledge and practical competencies in high-risk pregnancy detection, addressing a critical gap in community health worker preparedness.
2. Standardized Risk Assessment: Demonstrates the feasibility and acceptability of implementing the Poedji Rochjati Score Card at the community level, strengthening systematic screening protocols for pregnancy complications in resource-limited settings.
3. Sustainable Community-Based Surveillance: Establishes a replicable model for strengthening grassroots maternal health surveillance systems through empowerment of voluntary health workers, potentially contributing to reduced maternal and neonatal mortality rates in rural Indonesian communities.

This article is organized as follows: Section II describes the methodology employed in the training intervention and evaluation framework; Section III presents the findings regarding knowledge and skill improvements among participating cadres; Section IV discusses the implications of the results, comparing outcomes with existing literature and addressing study limitations; and Section V concludes with recommendations for scaling community-based maternal health interventions.

II. METHOD

A. STUDY DESIGN AND POPULATION SAMPLING

This community service intervention employed a quasi-experimental pre-post design to evaluate the effectiveness of a structured training program on enhancing health cadres' knowledge and skills in early detection of high-risk pregnancies [26]. The study was conducted in Kabunan Village, located within the catchment area of Balen Community Health Center, Bojonegoro Regency, East Java, Indonesia. The intervention was implemented over a three-day period in June 2024 at the PKK Hall of Kabunan Village. This location was selected based on accessibility for participants and availability of adequate training facilities [27]. The target population comprised active Posyandu cadres serving in Kabunan Village's maternal and child health programs. Participants were recruited using a purposive sampling technique, which allowed for deliberate selection of cadres who met predetermined eligibility criteria and were actively engaged in community health service delivery [28]. A total of 30 Posyandu cadres were enrolled in the training program. The inclusion criteria specified: (1) active registration and current engagement as Posyandu cadres in Kabunan Village; (2) a minimum of one year of documented experience in Posyandu activities; and (3) voluntary informed consent to participate in the comprehensive training program. Exclusion criteria eliminated cadres who had been inactive in Posyandu operations during the preceding six-month period or declined participation in the intervention [29].

B. INTERVENTION COMPONENTS

The training intervention utilized a multi-modal pedagogical approach integrating theoretical instruction, interactive learning, and practical skill development [30]. The comprehensive curriculum encompassed three primary content domains: (1) fundamental concepts of high-risk pregnancy, including definitions, epidemiology, and maternal-fetal implications; (2) systematic instruction on the Poedji Rochjati Score Card (PRSC) utilization for standardized risk assessment; and (3) role delineation and communication strategies for cadres functioning as companions to pregnant women [31]. Educational methodologies incorporated interactive lectures, facilitated

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group discussions, case-based learning activities, and hands-on simulation exercises. Participants received instructional materials, including printed leaflets, educational folders, notepads, and reference guides for field application. The PRSC simulation component provided structured practice in completing the risk stratification instrument through realistic pregnancy scenarios, enabling participants to develop proficiency in documentation and risk classification procedures [32]. The intervention was executed through eight structured sessions distributed across three consecutive days. Day one commenced with participant registration, formal opening ceremonies attended by village leadership and health center administration, and baseline assessment through pre-test administration. Subsequent sessions addressed introductory concepts of high-risk pregnancy detection, risk factor identification, and danger sign recognition.

Interactive case study analyses were conducted wherein participants, organized into small groups, examined pregnancy scenarios to identify risk determinants and formulate appropriate intervention strategies [33]. Day two incorporated material review sessions, detailed exploration of cadre responsibilities in community-based surveillance, and practical simulations supervised by healthcare personnel. These simulations emphasized interview techniques, basic examination procedures, and accurate documentation practices. Additional sessions focused on culturally sensitive communication approaches with pregnant women and family members, utilizing role-play methodologies to reinforce skill acquisition [34]. Day three featured reflective review activities, development of individualized action plans for implementation in cadres' respective service areas, and comprehensive evaluation through post-test administration. Participants formulated context-specific operational plans incorporating high-risk pregnancy identification protocols, communication frameworks, and coordination mechanisms with formal healthcare providers [35].

C. DATA COLLECTION AND DATA ANALYSIS

Knowledge assessment was conducted using structured questionnaires administered as pre-test and post-test instruments to measure changes in theoretical understanding of high-risk pregnancy concepts and early detection principles. Skills evaluation employed the PRSC as both a training tool and assessment instrument, with participants' proficiency scored based on accuracy and completeness of form completion during simulation exercises [26]. Counseling competency was evaluated through observational assessment during role-play activities, with performance categorized using predetermined rubrics spanning "very good," "good," "adequate," and "needs improvement" classifications [31]. Quantitative data analysis utilized paired statistical testing to compare pre-intervention and post-intervention knowledge scores, determining the significance of observed improvements. A significance threshold of $p<0.05$ was established to identify statistically meaningful changes in knowledge levels [32]. Descriptive statistics were employed to characterize participants' demographic profiles, calculate mean skill scores for PRSC completion, and determine the distribution of counseling competency classifications. The proportion of participants demonstrating various knowledge levels was computed for both baseline and post-training assessments to quantify knowledge gains [33]. The community service program was implemented following coordination and approval from relevant local authorities, including Kabunan Village leadership and Balen Community Health Center administration. Participants provided voluntary informed consent after receiving comprehensive information regarding the training objectives, activities, and evaluation procedures. Confidentiality of individual performance data was maintained throughout the assessment and analysis processes [34]. Implementation involved a collaborative partnership among multiple stakeholders, including the academic team comprising three faculty members and five midwifery students from the Diploma III Midwifery Program in Bojonegoro, village government officials, Balen Community Health Center leadership, the area coordinating midwife, village midwife, and community health center nursing staff. This multi-sectoral collaboration facilitated resource mobilization, logistical coordination, and integration of the intervention within existing community health infrastructure [35].

III. RESULTS

FIGURE 1. Participant Attendance Distribution throughout Three-Day Posyandu Cadre Training Program

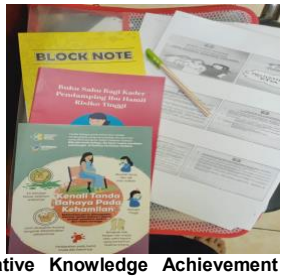

FIGURE 2. Comparative Knowledge Achievement Levels Following Comprehensive Cadre Training Intervention

FIGURE 3. Average KIE Competency Performance Levels Following Comprehensive Cadre Training Program

The cadre training intervention was implemented in Kabunan Village, Balen District, Bojonegoro Regency, in June 2024, with 30 Posyandu cadres enrolled as participants. Complete participation was achieved throughout the three-

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day training period, yielding a 100% attendance rate (FIGURE 1). This full engagement across all training sessions ensured consistent exposure to the comprehensive curriculum and facilitated accurate assessment of intervention effectiveness. The evaluation framework employed quantitative methodologies incorporating pre-test and post-test assessments to measure changes in participants' knowledge and competencies. Assessment instruments comprised multiple-choice questionnaires designed to evaluate theoretical understanding and structured observation sheets for skill evaluation. The instruments were developed based on validated indicators of cadre competence in high-risk pregnancy detection and proficiency in completing the Poedji Rochjati Score Card. Before implementation, the assessment tools underwent rigorous validation procedures. A pilot study was conducted with 10 Posyandu cadres from a neighboring village with comparable demographic and operational characteristics. Reliability analysis of the pilot data yielded a Cronbach's Alpha coefficient of 0.82, demonstrating robust internal consistency and confirming the instrument's psychometric adequacy for measuring the targeted competencies. This validation process ensured that the assessment tools reliably captured participants' knowledge acquisition and skill development throughout the intervention.

Evaluation of participants' theoretical knowledge was conducted through paired pre-test and post-test assessments administered at the commencement and conclusion of the training program. Statistical analysis revealed significant improvements in knowledge scores following the intervention, with p-values consistently below the 0.05 threshold, indicating that observed differences were statistically significant rather than attributable to chance variation. Disaggregated analysis of knowledge distribution demonstrated substantial shifts in competency levels. At baseline assessment, only 3.93% of participants demonstrated knowledge classified as "good" according to predetermined scoring criteria. Following completion of the comprehensive training curriculum, this proportion increased markedly to 8.30%, representing more than a twofold improvement in the percentage of cadres achieving high knowledge levels (FIGURE 2). This progression indicates successful knowledge transfer regarding high-risk pregnancy concepts, risk factor identification, danger sign recognition, and systematic assessment protocols utilizing the Poedji Rochjati Score Card. The significant enhancement in theoretical knowledge suggests that the multi-modal instructional approach effectively addressed pre-existing knowledge gaps and equipped participants with the essential foundational understanding necessary for competent high-risk pregnancy screening in community settings. Assessment of participants' competencies in health communication, information dissemination, and health education yielded favorable outcomes. The mean KIE skill score across all participants reached 84.38 out of a possible maximum score, positioning the cohort's performance within the "good" category according to standardized evaluation criteria (FIGURE 3). This result demonstrates that participants successfully acquired and applied principles of effective health communication during simulated interactions with pregnant women and their families. The high average performance in KIE skills indicates that the training effectively developed cadres' abilities to convey health information clearly, employ culturally appropriate communication strategies, and engage in meaningful dialogue with community members. These competencies are essential for cadres' effectiveness in motivating pregnant women to seek appropriate antenatal care services and adhere to recommended health behaviors. Structured evaluation of counseling competencies through observational assessment during role-play exercises revealed substantial skill development among participants. The distribution of performance classifications demonstrated that 66.7% of participants achieved "very good" ratings in counseling proficiency, while the remaining participants were distributed across "good" and "adequate" categories, with no participants classified in the "needs improvement" category.

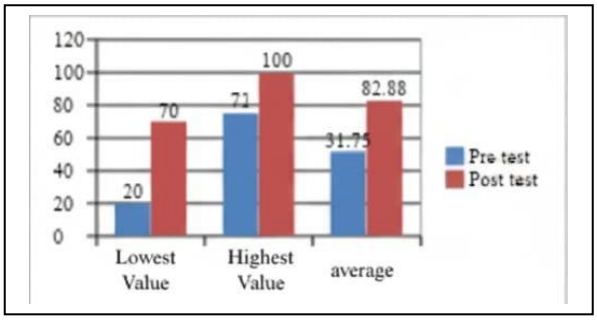

FIGURE 4. Pre-Test and Post-Test Scores for Knowledge of Early Detection of High-Risk Pregnancies

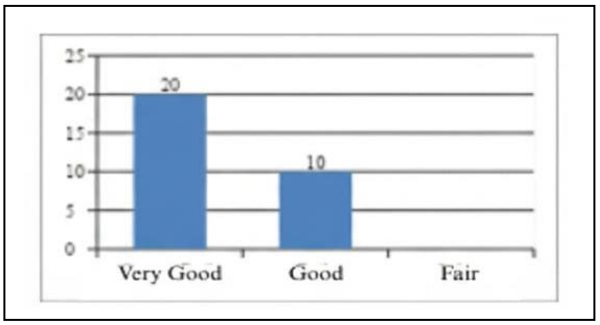

FIGURE 5. Post-Test Knowledge Scores on Early Detection of High-Risk Pregnancies

This outcome indicates that the majority of cadres successfully integrated theoretical knowledge with practical application, demonstrating competence in conducting counseling sessions that addressed high-risk pregnancy scenarios (FIGURE 4). The high proportion of participants achieving superior performance levels suggests effective skill transfer through the simulation-based learning components of the training program. The counseling competency results reflect participants' abilities to appropriately communicate risk information, provide supportive guidance, recognize situations requiring referral to higher-level care, and document relevant information systematically. These capabilities are critical for cadres

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functioning as frontline health promoters and facilitators of timely access to formal healthcare services. Practical assessment of participants' proficiency in completing the Poedji Rochjati Score Card yielded an average skill score of 84, indicating strong performance in utilizing this standardized risk assessment instrument. This result demonstrates that cadres successfully acquired the technical competencies necessary for systematic documentation, accurate risk scoring, and appropriate classification of pregnancy risk levels. The high average score suggests that participants can reliably implement the Poedji Rochjati Score Card in authentic field conditions, enabling consistent application of standardized screening protocols across the community (FIGURE 5).

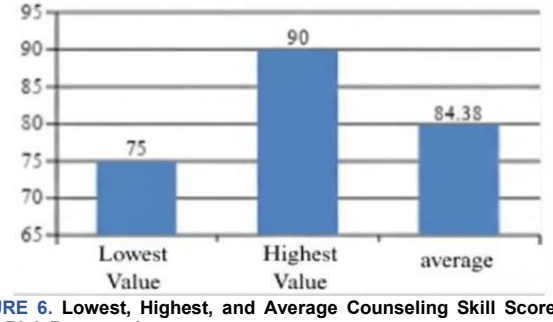

FIGURE 6. Lowest, Highest, and Average Counseling Skill Scores for High-Risk Pregnancies

This standardization is essential for ensuring systematic identification of high-risk pregnancies and facilitating appropriate clinical decision-making regarding referral and management strategies. Collectively, the evaluation results demonstrate that the comprehensive training intervention achieved its primary objectives of enhancing both theoretical knowledge and practical skills among Posyandu cadres. The statistically significant improvements in knowledge scores, coupled with high performance levels in KIE skills, counseling proficiency, and Score Card completion, provide convergent evidence of training effectiveness. The multi-dimensional assessment approach, encompassing cognitive knowledge, communication abilities, counseling competencies, and technical documentation skills, confirmed that participants developed the integrated capabilities necessary for effective performance in early detection of high-risk pregnancies. These outcomes suggest that the training program successfully prepared cadres to function as competent frontline health workers capable of contributing meaningfully to maternal health surveillance and risk mitigation efforts within their communities (FIGURE 6).

IV. DISCUSSION

The present community service intervention demonstrated substantial improvements in multiple dimensions of cadre competency, encompassing theoretical knowledge, practical skills, and communication abilities essential for early detection of high-risk pregnancies. The statistically significant increase in knowledge scores, evidenced by p-values below 0.05 in paired t-test analysis, confirms that the multi-modal training approach effectively addressed pre-existing knowledge deficits among Posyandu cadres. The progression of average knowledge scores from 3.93 at baseline to 8.30 post-intervention, accompanied by a notable expansion in score range distribution, indicates not merely superficial learning but rather substantive comprehension of high-risk pregnancy concepts, risk stratification principles, and systematic screening protocols [36]. These cognitive gains align with Bloom's taxonomy of educational objectives, which posits that knowledge acquisition is influenced by multiple factors, including chronological age, educational background, and information processing maturity [37]. The demographic profile of participating cadres, predominantly possessing secondary education credentials, provided a favorable foundation for adult learning processes. Educational attainment at this level typically correlates with enhanced cognitive flexibility, critical thinking capabilities, and receptivity to new information, thereby facilitating more efficient knowledge integration during structured training interventions [38].

The practical competency outcomes further substantiate the intervention's effectiveness. The average skill score of 84 for Poedji Rochjati Score Card completion indicates that participants successfully transitioned from theoretical understanding to operational proficiency in utilizing this standardized risk assessment instrument. This technical competency is particularly crucial given that the KSPR (Kartu Skor Poedji Rochjati) serves as the primary systematic screening tool within Indonesia's community-based maternal health surveillance infrastructure. The instrument's relative simplicity and structured format render it accessible for cadres with varied educational backgrounds, while maintaining standardization necessary for reliable risk identification across diverse community settings [39]. The counseling proficiency results, with 66.7% of participants achieving "very good" classifications and an average Communication, Information, and Education (KIE) score of 84.38, demonstrate successful integration of knowledge and interpersonal skills. This integration is essential because effective maternal health promotion requires not only factual accuracy but also culturally sensitive communication strategies, empathetic engagement, and motivational interviewing techniques that encourage pregnant women to seek appropriate care [40]. The high proportion of cadres demonstrating superior counseling abilities suggests that the simulation-based learning components, role-play exercises, and facilitated practice sessions effectively bridged the gap between theoretical knowledge and practical application in authentic community contexts. The comprehensive nature of observed improvements spanning cognitive, psychomotor, and affective learning domains indicates that the training successfully addressed the multidimensional competency requirements for effective community health work. Cadres now possess not only the knowledge to identify risk factors but also the technical skills to document findings systematically and the communication abilities to counsel pregnant women appropriately and facilitate referrals when necessary. The findings of this intervention demonstrate consistency with emerging evidence regarding the effectiveness of structured capacity-building programs for

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community health workers in maternal health contexts. A community-based empowerment model implemented in remote Indonesian regions through participatory approaches achieved comparable outcomes, with cadre training components contributing to substantial increases in complete antenatal care coverage from 54.3% to 83.7% and health facility deliveries from 61.7% to 89.2% [41]. These parallel findings reinforce the premise that systematic training interventions targeting frontline health workers can yield measurable improvements in both competency indicators and downstream health service utilization patterns. Similarly, research examining health education delivery through structured outreach methodologies has documented significant knowledge enhancement among target populations, particularly pregnant women receiving counseling from trained community health workers [42]. The observed average counseling score of 84 in the present study aligns with these prior investigations, suggesting that interactive pedagogical approaches combining didactic instruction with experiential learning components effectively develop the interpersonal and communication competencies essential for health education delivery.

A comprehensive narrative review synthesizing evidence on health cadre training programs across Indonesia identified maternal and child health as one of six primary training focus areas, while highlighting persistent challenges including resource limitations, geographical disparities, and variable quality of training implementation [43]. The present intervention addressed several of these identified challenges through multi-sectoral collaboration, systematic curriculum development, and rigorous evaluation protocols. However, the review's emphasis on the necessity for continuous training and technological integration underscores that single training episodes, regardless of immediate effectiveness, require reinforcement through periodic refresher courses and ongoing supportive supervision to maintain competency levels over time [44]. Contrasting findings emerge when examining the sustainability of training impacts. Research investigating knowledge retention following community health worker training programs has documented significant decay in competency levels at three to six months post-intervention in the absence of structured follow-up mechanisms [45]. This temporal dimension represents a critical consideration for interpreting the present study's outcomes, as immediate post-training improvements may not necessarily translate into sustained performance enhancement without systematic reinforcement strategies. The observed increases in knowledge and skills, while substantial, must therefore be understood as initial gains requiring consolidation through ongoing professional development activities rather than permanent competency acquisitions. The implementation of this community service intervention revealed several methodological and operational limitations that warrant consideration when interpreting findings and planning future initiatives. The absence of a control group in the study design limits causal inference regarding the observed improvements, as confounding variables such as concurrent exposure to health information through alternative sources or temporal trends in community awareness cannot be definitively excluded [36]. The quasi-experimental pre-post design, while pragmatically feasible for community-based interventions, provides weaker evidence of causality compared to randomized controlled trial methodologies.

Logistical challenges encountered during implementation included resource constraints affecting training materials distribution, spatial limitations of training venues, and inconsistent availability of Poedji Rochjati Score Card forms for field application. Several participants reported difficulties in maintaining regular access to KSPR forms following training completion, potentially limiting their ability to implement learned skills consistently in community practice [37]. These material resource deficits represent systemic barriers that transcend individual competency enhancement, highlighting the necessity for concurrent investments in health system infrastructure alongside human resource development initiatives. Participant engagement variability constituted another implementation challenge, with heterogeneity observed in active participation levels during interactive training components. While the majority of cadres demonstrated high enthusiasm and engagement, a subset exhibited more passive learning behaviors, attributed primarily to competing time demands from domestic responsibilities and occupational commitments [38]. This variability suggests that future interventions should consider flexible scheduling arrangements and potentially incentive structures to optimize participation quality across diverse participant profiles.

Contextual barriers related to sociocultural dynamics emerged as significant implementation challenges. Communication cultural variations among cadres, community perceptions regarding cadres' legitimacy as health advisors, and limited engagement from village leadership in some instances created obstacles to effective knowledge translation into community practice [39]. Several cadres reported difficulties in counseling pregnant women due to community mistrust, stigmatization of health interventions, or preference for traditional practices over biomedical approaches. These findings underscore that technical competency enhancement, while necessary, represents an insufficient condition for effective community health promotion in the absence of complementary strategies addressing sociocultural determinants of health-seeking behavior. The absence of long-term follow-up assessment represents a critical limitation, as immediate post-training outcomes may not accurately predict sustained competency or actual behavioral change in field practice. Research consistently demonstrates knowledge and skill decay over time without structured reinforcement mechanisms [40]. Future iterations of this intervention should incorporate longitudinal evaluation designs with assessment points at three, six, and twelve months post-training to characterize competency trajectories and identify optimal timing for refresher training activities. The implications of these findings extend across multiple dimensions of maternal health system strengthening. At the programmatic level, results demonstrate the feasibility and effectiveness of structured training interventions for enhancing community

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health worker competencies in resource-constrained settings. The replicability of this model across similar rural contexts suggests potential for scaled implementation as a strategy for strengthening community-based maternal health surveillance systems [41]. However, successful scaling requires attention to identified barriers, including sustainable resource allocation for training materials, establishment of supportive supervision mechanisms, and integration with referral systems to ensure that early detection findings translate into appropriate clinical management.

From a health systems perspective, the intervention highlights the critical role of frontline health workers in bridging gaps between communities and formal healthcare services. Enhanced cadre competency in early detection potentially contributes to reduced maternal and neonatal mortality through earlier identification and referral of high-risk cases, prevention of complications through health education, and improved linkage to antenatal care services [42]. However, realizing these potential benefits requires systemic changes beyond cadre training, including responsive referral mechanisms, adequate facility capacity to manage referred cases, and continuous quality improvement processes across the continuum of maternal health services. The integration of standardized screening tools such as the Poedji Rochjati Score Card represents a promising strategy for systematizing risk assessment in community settings. The demonstrated feasibility of training cadres to utilize this instrument suggests potential for broader adoption across Indonesia's primary healthcare infrastructure [43]. However, tool utilization must be accompanied by robust data management systems, quality assurance protocols, and feedback mechanisms linking community-level screening to facility-based clinical decision-making to maximize the instrument's utility for maternal health protection [44]. Future research should address identified knowledge gaps through longitudinal cohort studies examining sustained competency retention, mixed-methods investigations exploring sociocultural barriers to knowledge translation, and implementation science research identifying optimal strategies for integrating trained cadres within comprehensive maternal health systems. Additionally, economic evaluations quantifying the cost-effectiveness of cadre training interventions relative to maternal and neonatal health outcomes would inform resource allocation decisions and support evidence-based policy development [45].

V. CONCLUSION

This community service intervention was designed to enhance the competencies of Posyandu health cadres in early detection of high-risk pregnancies, identification of danger signs across the maternal care continuum encompassing antepartum, intrapartum, postpartum, and neonatal periods, with the objective of establishing sustainable, systematically implemented screening protocols in Kabunan Village, Balen District, Bojonegoro Regency. The intervention successfully achieved its primary aims, as evidenced by statistically significant improvements across multiple competency dimensions. Knowledge assessment demonstrated substantial cognitive gains, with the proportion of cadres achieving good knowledge levels increasing from 3.93% at baseline to 8.30% following training completion, representing more than a twofold enhancement in theoretical understanding of high-risk pregnancy concepts and systematic risk assessment principles. Practical skill development was equally robust, with participants attaining an average score of 84 in Poedji Rochjati Score Card completion proficiency, indicating strong technical competency in utilizing this standardized screening instrument for community-based maternal health surveillance. Communication and counseling abilities showed marked improvement, with 66.7% of participants classified as "very good" in health education delivery and an average Communication, Information, and Education skills score of 84.38, demonstrating successful integration of theoretical knowledge with interpersonal competencies essential for effective community health promotion.

These multidimensional improvements collectively indicate that the comprehensive training program effectively prepared cadres to function as competent frontline health workers capable of systematic high-risk pregnancy detection, appropriate health counseling, and timely referral facilitation. Future community service initiatives should prioritize sustainability through establishment of periodic refresher training programs at three to six-month intervals to consolidate competencies and prevent knowledge decay, implementation of supportive supervision mechanisms to reinforce field application of learned skills, and development of recognition systems including performance-based incentives to acknowledge cadres who demonstrate consistent excellence in executing early detection responsibilities and maintaining accurate, comprehensive documentation using the Poedji Rochjati Score Card according to standardized operational guidelines. Additionally, longitudinal evaluation frameworks should be integrated to assess sustained competency retention, actual behavioral change in field practice, and downstream impacts on maternal health service utilization patterns and clinical outcomes, thereby generating evidence to inform programmatic refinements and scaling strategies for community-based maternal health surveillance systems across similar rural Indonesian contexts.

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DATA AVAILABILITY

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request, subject to ethical approval and privacy considerations for participant confidentiality.

AUTHOR CONTRIBUTION

Aris Handayani conceptualized and designed the community service program, supervised the overall implementation, conducted data analysis and interpretation, and prepared the initial manuscript draft. Lilik Triyawati contributed to curriculum development, facilitated training sessions, participated in data collection and skill assessments, and provided critical revisions to the manuscript. Sri Wahyuni assisted in coordinating stakeholder engagement, oversaw logistical arrangements, contributed to participant recruitment and evaluation processes, and participated in manuscript editing. All authors collaboratively reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work, ensuring the integrity and accuracy of the reported findings.

DECLARATIONS

ETHICAL APPROVAL

Ethical approval is not available.

CONSENT FOR PUBLICATION PARTICIPANTS

Informed consent for publication of aggregated, de-identified data was obtained from all participants prior to the commencement of the community service activity.

COMPETING INTERESTS

The authors declare no competing interests, financial or otherwise, related to this community service program and its outcomes.

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