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Community-Based Male Engagement for Maternal Health: The SAPA SUAMI Initiative in Central Kalimantan

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A B S T R A C T

Husband involvement in maternal health remains a critical challenge in low- and middle-income countries, contributing to suboptimal antenatal care utilization. This study evaluated the effectiveness of the SAPA SUAMI (Sayangi dan Pahami Suami — Love and understand the role of husbands) community empowerment program in enhancing husband knowledge and support for reproductive health service access among pregnant women in Palangka Raya City, Central Kalimantan, Indonesia, aligning with Sustainable Development Goal 3 (Good Health and Well-Being) and SDG 5 (Gender Equality). A pre-experimental study with one-group pre-test and post-test design involved 20 couples (pregnant women and their husbands) at UPTD Puskesmas Panarung on 17 February 2026. The intervention comprised structured health education, interactive group discussion, and educational leaflet distribution focusing on the husband's role in antenatal care support. Knowledge was assessed using a 10-item questionnaire. Mean knowledge scores improved significantly from 8.70 (standard deviation 1.63) to 9.85 (standard deviation 0.37) post-intervention, representing an 11.5% increase (Wilcoxon signed-rank test: Z = -2.449, p = 0.014; effect size r = 0.55). The proportion of participants achieving maximum scores increased from 70.0% to 85.0%, while participants scoring below 8 decreased from 20.0% to 0.0%. In conclusion, these preliminary findings suggest that the SAPA SUAMI program effectively enhanced husband awareness regarding their supportive role in maternal health care, contributing to community empowerment for improved antenatal care access and advancing SDG 3 and SDG 5 targets in a primary health care setting. Multi-site replication with behavioral outcomes and delayed follow-up is recommended.

1. Introduction

Maternal mortality remains a significant global health challenge. Annually, approximately 287,000 women die from pregnancy-related complications, predominantly in low- and middle-income countries (LMICs).[1] Indonesia, as a middle-income country, bears a considerable maternal mortality burden with a maternal mortality ratio (MMR) of 183 deaths per 100,000 live births,[2] substantially above the Sustainable Development Goal 3.1 target of reducing the global MMR to fewer than 70 per 100,000 live births by 2030.[3] Central Kalimantan Province faces particularly acute challenges, with documented antenatal care (ANC) completion rates below target benchmarks in several districts. Improving maternal health outcomes in resource-constrained settings requires multifaceted interventions addressing both women's autonomy and partner support systems.

Antenatal care represents a critical touchstone for maternal health, providing opportunities for early detection of complications and health education.[4] Research demonstrates that husband and male partner support constitutes the strongest predictor of antenatal care compliance, yet remains consistently underutilized in primary health care settings.[5] Partner support operates through multiple pathways:

emotional support (reassurance, encouragement), informational support (health knowledge sharing), instrumental support (accompanying to appointments, financial assistance), and appraisal support (validation of pregnancy experiences).[6] Despite recognition of these pathways, most community health programs continue to exclusively target pregnant women, neglecting the potential of engaging men as active co-parents in maternal health decision-making.

The Sustainable Development Goals provide a critical framework for this work. SDG 3 (Good Health and Well-Being) specifically targets the reduction of global maternal mortality (target 3.1) and universal access to sexual and reproductive health services (target 3.7).[7] Parallel to these health targets, SDG 5 (Gender Equality) mandates full and effective participation and equal opportunity for leadership of women and girls in all spheres of life. Male engagement in reproductive health directly advances SDG 5 through fostering gender equality in health decision-making, challenging traditional power imbalances that restrict women's health autonomy.[8] Furthermore, SDG 17 emphasizes strengthening means of implementation through partnership; community-based interventions delivered through primary health care represent exactly this type of multi-stakeholder collaboration essential for sustainable development.

Recent evidence highlights persistent barriers to male involvement in antenatal care. A 2025 systematic review documented that cultural norms positioning pregnancy as exclusively women's domain, workplace inflexibility, and limited male-targeted health education constitute primary obstacles to spousal participation.[9] Similarly, Adeniyi and colleagues (2025) found wide variation in spousal involvement patterns across sub-Saharan Africa, correlating with health system readiness and community social norms.[10] Within the Indonesian context, Indarti and Nency (2022) and Suhadah et al. (2023) documented husband involvement as a modifiable factor linked to improved pregnancy outcomes, yet few nationally-developed interventions specifically target husbands as the primary audience for health behavior change.[11,12] This gap represents an untapped opportunity for leveraging existing family structures to amplify maternal health program effectiveness.

Palangka Raya, the capital of Central Kalimantan Province, is a rapidly urbanizing city with a population exceeding 300,000. The city serves as the provincial health hub, with UPTD Puskesmas Panarung functioning as a primary care facility for diverse urban communities spanning multiple sub-districts. The catchment area encompasses varied socioeconomic backgrounds with documented challenges in maternal health service utilization and measurable gaps in ANC coverage targets across certain sub-districts. Cultural factors endemic to Central Kalimantan, including traditional gender role expectations positioning pregnancy care as exclusively women's responsibility, contribute significantly to limited husband engagement. These contextual factors make Palangka Raya an important site for testing innovative male engagement strategies.

The SAPA SUAMI program represents an innovative approach to male engagement through direct, community-integrated health education. SAPA SUAMI (Sayangi dan Pahami Suami, translating to "Love and understand the role of husbands") was specifically designed to overcome identified barriers through multiple mechanisms: (1) A culturally adapted acronym in Indonesian language that resonates with community values emphasizing spousal care; (2) A participatory group discussion component that ensures community voice and peer learning rather than top-down health messaging; (3) Integration within the Puskesmas setting to ensure institutional sustainability and linkage to clinical services; (4) Accompanying take-home educational leaflets that serve as persistent community resources extending impact beyond the single intervention session. This program differentiates itself from standard health education by combining structured education, dialogue-based community empowerment methods, and tangible take-home materials designed specifically for husband comprehension and engagement.

This study aims to evaluate the effectiveness of the SAPA SUAMI community empowerment program in enhancing husbands' knowledge regarding their supportive role in antenatal care access among pregnant women in a primary health care setting. Secondary objectives include documenting alignment with Sustainable Development Goals 3 and 5, and providing a replicable community empowerment model for implementation in similar Puskesmas settings across Indonesia.

2. Methods

This community empowerment program was implemented as a structured participatory health education initiative integrated within the primary health care (Puskesmas) setting. The program employed a pre-experimental design with one-group pre-test and post-test approach to evaluate intervention effectiveness. This design involves measurement of knowledge at baseline prior to intervention, implementation of the SAPA SUAMI program, and immediate post-intervention assessment, with comparison of pre and post-scores. While this design has inherent limitations, including the absence of a control group, which precludes causal attribution and introduces risk of confounding variables,[13] it is considered appropriate for initial evaluation of community service programs and provides preliminary evidence justifying future controlled studies with larger samples and behavioral outcome measures.

The program was conducted at UPTD Puskesmas Panarung, located in Palangka Raya City, the capital of Central Kalimantan Province, Indonesia, on 17 February 2026. Palangka Raya is the largest city in Central Kalimantan with a population of approximately 300,000 residents, serving as both the provincial capital and the primary health care hub for the region. Puskesmas Panarung serves a diverse, predominantly urban community spanning several sub-districts (kelurahan) with varying socioeconomic backgrounds, including government workers, merchants, informal laborers, and low-income households. The Puskesmas' working area encompasses a population with documented challenges in maternal health service utilization, including below-target ANC K4 coverage (complete four-visit antenatal care) rates in certain sub-districts and variable quality of birth preparation. Cultural factors endemic to Central Kalimantan, including traditional gender role expectations positioning pregnancy care as the exclusive domain of women and female family members, combine with economic constraints and transportation barriers to limit husband involvement in antenatal care attendance.

Twenty couples (20 pregnant women and their husbands) were purposively selected from the antenatal care register of UPTD Puskesmas Panarung based on their scheduled attendance for routine ANC visits during the program implementation week. This sample of 20 couples represents approximately 25% of all couples registered for ANC during the concurrent study period. Inclusion criteria were: (1) pregnant women registered for ongoing ANC at Puskesmas Panarung, (2) accompanied by their husband or long-term male partner, (3) willing to participate in the complete program including pre-test, all sessions, and post-test, and (4) able to read and write in the Indonesian language. No invited couples declined participation. As presented in Table 1, participants represented diverse demographic characteristics across age groups, education levels, parity, and trimester of pregnancy.

The SAPA SUAMI program (Sayangi dan Pahami Suami, meaning "Love and understand the role of husbands") consisted of three coordinated components delivered sequentially within a single session lasting approximately 170 minutes. Component 1 — Structured Health Education Lecture (45 minutes): A trained facilitator delivered comprehensive health education addressing: the critical importance of antenatal care for maternal and fetal health, recommended schedule for ANC visits (minimum four visits), recognition of pregnancy danger signs requiring immediate medical attention, the husband's four primary types of support

(emotional, informational, instrumental, and appraisal), practical strategies for husband engagement in care including accompanying wives to appointments and supporting health-seeking behavior, and available services at Puskesmas. Content was developed in consultation with experienced Puskesmas midwives who identified key knowledge gaps from their clinical interactions with husbands. Component 2 — Interactive Group Discussion (30 minutes): Following the lecture, couples were divided into small facilitated discussion groups of 4-5 couples led by trained community health volunteers. These group discussions encouraged peer-to-peer sharing of experiences, articulation of barriers to ANC attendance, and community-generated problem-solving. This participatory component ensures that the community voice is centered in the intervention and aligns with fundamental principles of community empowerment. Component 3 — Educational Leaflet Distribution and Question-and-Answer Session (20 minutes): Each couple received illustrated take-home materials in the Indonesian language containing simplified visual representations and written content on ANC importance, husband supportive roles, danger signs, and Puskesmas contact information. An open question-and-answer session allowed participants to clarify any content and voice additional concerns. Throughout the program, community health volunteers (kader kesehatan) assisted with participant registration, logistics management, and facilitation of group discussions, embedding the intervention within existing community health infrastructure.

Knowledge regarding husband support for antenatal care was assessed using a 10-item questionnaire developed by the research team based on Indonesian Ministry of Health antenatal care guidelines and incorporating recommendations from the International Federation of Gynaecologists and Obstetricians (FIGO).[14] The questionnaire was validated through expert review by three maternal health specialists with a minimum 10 years' experience (content validity index = 0.87), confirming that items appropriately measure the intended knowledge domain. Each item was a closed-ended question with one correct answer; each correct answer received 1 point, for a possible maximum score of 10. The questionnaire addressed knowledge of: ANC importance for maternal health, recommended minimum number and timing of ANC visits, identification of specific pregnancy danger signs, the husband's four supportive roles in antenatal care, and available services and contact procedures for Puskesmas. Pre-test administration occurred during participant registration immediately prior to the program, before any exposure to intervention content. Post-test was administered immediately upon completion of the final session, within 10 minutes of the distribution of educational leaflets. This immediate post-test design captures knowledge retention immediately following the intervention but does not assess longer-term retention or behavior change. Additionally, participant satisfaction was assessed through a brief structured feedback form administered at program conclusion.

Descriptive statistics were calculated for all variables. For continuous knowledge scores, we computed mean, standard deviation, median, and interquartile range (IQR). For categorical variables, frequency distributions and percentages were calculated. Pre-test and post-test score distributions were tabulated, and the number of participants at each score level was documented to assess ceiling effects. The Wilcoxon signed-rank test (a non-parametric test appropriate for paired ordinal/continuous data from small samples without normal distribution assumptions)[15] was used to compare pre-test and post-test knowledge scores, with significance level set at $p < 0.05$ (two-tailed). The effect size was calculated as $r = Z/\sqrt{N}$, yielding a rank-biserial correlation coefficient appropriate for non-parametric tests, with interpretation according to Cohen's benchmarks ($r > 0.50$ indicating a large effect). All statistical analyses were performed using SPSS version 26.0 (IBM Corporation, Armonk, New York, USA). Data entry was verified through double-

entry of 20% of questionnaires to minimize transcription error.

This community service program received ethical approval from the Ethics Committee of Universitas Sari Mulia Banjarmasin. All participants provided written informed consent following full disclosure of program objectives, procedures, and the voluntary nature of participation. Participation was entirely voluntary with no consequence or change in access to Puskesmas services for declining participation. The confidentiality of individual assessment scores was maintained through the use of participant identification codes, with identifying information stored separately from data files. The program did not interfere with or modify participants' standard antenatal care routines at Puskesmas.

3. Results and Discussion

A total of 20 couples completed the SAPA SUAMI program with no withdrawals or incomplete participation. As presented in Table 1, demographic characteristics showed diversity across several dimensions. The majority of pregnant women were aged 26-30 years (40.0%, n=8), with smaller proportions in the 20-25 year (30.0%, n=6), 31-35 year (20.0%, n=4), and >35 year (10.0%, n=2) age groups. More than half of participants had completed high school education (55.0%, n=11), with additional representation from Diploma holders (25.0%, n=5) and Bachelor's degree holders (20.0%, n=4). The majority were multigravida (experienced mothers with prior pregnancies; 65.0%, n=13), while primigravida (first-time mothers; 35.0%, n=7) comprised a substantial minority. Regarding gestational age, 60.0% of participants (n=12) were in their third trimester of pregnancy, with 40.0% (n=8) in their second trimester.

Table 1. Demographic characteristics of study participants (n=20 couples).

Characteristic	Number (n)	Percentage (%)
Age Group (years)		
20-25	6	30.0
26-30	8	40.0
31-35	4	20.0
>35	2	10.0
Education level		
High school	11	55.0
Diploma	5	25.0
Bachelor's degree	4	20.0
Parity		
Primigravida	7	35.0
Multigravida	13	65.0
Trimester of pregnancy		
Second trimester	8	40.0
Third trimester	12	60.0

As detailed in Table 2, the SAPA SUAMI program was implemented across seven structured activity periods spanning approximately 170 minutes total. All 20 couples (100%) achieved complete attendance across all program components with no partial participation or dropout. Opening and orientation (30

minutes) established a welcoming environment and explained program objectives. Pre-test administration (15 minutes) occurred prior to any intervention exposure. The structured health education lecture (45 minutes) achieved high apparent engagement, with husbands asking clarifying questions and taking notes. The interactive group discussion component (30 minutes) generated marked active participation, with couples voluntarily sharing personal experiences regarding barriers they had encountered in attending previous ANC appointments, with common themes including workplace scheduling conflicts, transportation costs, and uncertainty about the husband's expected role. The educational leaflet and question-and-answer session (20 minutes) ensured all participants received take-home materials and had the opportunity for individual clarification. Post-test administration (15 minutes) assessed knowledge immediately upon program conclusion. A closing activity (15 minutes) solicited verbal feedback and provided contact information for future Puskesmas services.

Table 2. SAPA SUAMI program implementation schedule.

Activity	Duration	Method	Participants
Opening & orientation	30 min	Facilitated introduction	20 couples
Pre-test assessment	15 min	Written questionnaire	20 couples
Health education lecture	45 min	Structured presentation	20 couples
Group discussion	30 min	Facilitated groups (n=4-5)	20 couples
Leaflet distribution & Q&A	20 min	Take-home materials + discussion	20 couples
Post-test assessment	15 min	Written questionnaire	20 couples
Closing & feedback	15 min	Verbal feedback collection	20 couples

Pre-test assessment revealed that baseline knowledge among husbands was relatively high, with considerable room for improvement only in a minority. Among the 20 participants, 14 husbands (70.0%) achieved the maximum possible score of 10 on the pre-test, two participants (10.0%) scored 8, three participants (15.0%) scored 6, and one participant (5.0%) scored 4. The total pre-test aggregate score was 174 points (out of a possible 200). The mean pre-test score was 8.70 (standard deviation 1.63), with a median 10.0 and an interquartile range 8.0-10.0. This represents 87.0% of the maximum possible score on average, indicating that the majority of participating husbands already possessed substantial baseline knowledge about antenatal care. However, a notable minority (30.0%, n=6) had identifiable knowledge gaps, with scores ranging from 4 to 8, suggesting room for targeted knowledge enhancement.

Following the SAPA SUAMI intervention, post-test assessment demonstrated marked improvement in knowledge distribution. Seventeen participants (85.0%) achieved the maximum score of 10 on the post-test, three participants (15.0%) scored 9, and no participants scored below 9. No participants fell into the knowledge-gap category in the post-test. The total post-test aggregate score was 197 points (out of a possible 200). The mean post-test score was 9.85 (standard deviation 0.37), with a median 10.0 and interquartile range 10.0-10.0. This represents 98.5% of the maximum possible score on average. The distribution of scores shifted dramatically, with all six pre-test scores in the sub-optimal range (below 10) improving to 9 or 10 post-intervention (Figure 1 and Table 3).

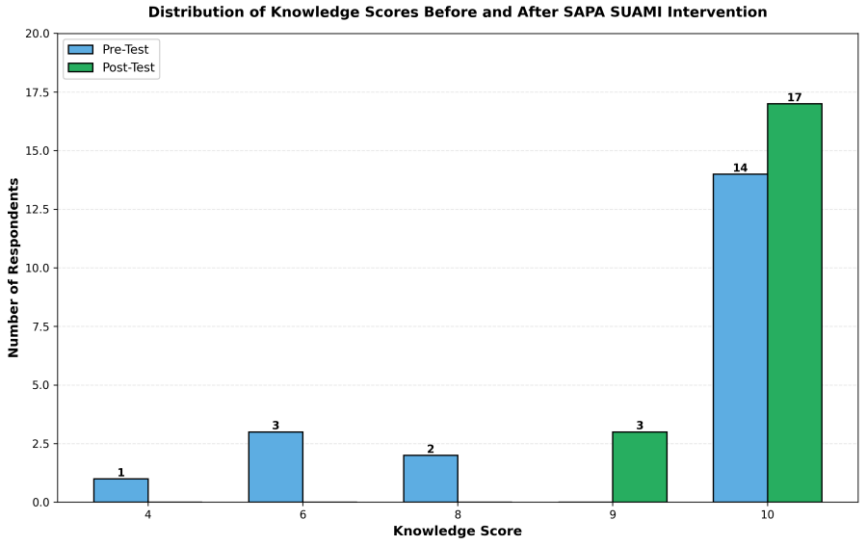

Figure 1. Distribution of knowledge scores before and after SAPA SUAMI intervention. The histogram demonstrates the shift toward higher scores post-intervention, with a reduction in the proportion of participants with sub-optimal knowledge.

Table 3. Knowledge scores before and after SAPA SUAMI intervention (n=20).

Parameter	Pre-Test	Post-Test	Change
Score = 10	14 (70.0%)	17 (85.0%)	+3 (15.0%)
Score = 9	0 (0.0%)	3 (15.0%)	+3 (15.0%)
Score = 8	2 (10.0%)	0 (0.0%)	-2 (-10.0%)
Score = 6	3 (15.0%)	0 (0.0%)	-3 (-15.0%)
Score = 4	1 (5.0%)	0 (0.0%)	-1 (-5.0%)
Score <8 (Gap)	4 (20.0%)	0 (0.0%)	-4 (-20.0%)
Total Score	174	197	+23
Mean ± SD	8.70 ± 1.63	9.85 ± 0.37	+1.15
Median (IQR)	10.0 (8.0-10.0)	10.0 (10.0-10.0)	—
% of Maximum	87.0%	98.5%	+11.5%

Note: SD = standard deviation; IQR = interquartile range.

The Wilcoxon signed-rank test confirmed statistically significant improvement in knowledge scores from pre-test to post-test ($Z = -2.449$, $p = 0.014$, two-tailed). The effect size, calculated as $r = Z/\sqrt{N} = -2.449/\sqrt{20} = -0.548$, indicates a large effect according to Cohen's benchmarks ($|r| > 0.50$). The negative Z value reflects the conventional direction of the Wilcoxon test statistic rather than a negative effect; the increase in scores is clearly demonstrated in the descriptive data. As shown in Figure 3, the mean score increased by 1.15 points (from 8.70 to 9.85), accompanied by substantially reduced variability (standard deviation decreased from 1.63 to 0.37, reflecting convergence toward the maximum score). The intervention was particularly impactful for the six participants (30.0%) with pre-test scores below 10; all six of these individuals improved to scores of 9 or 10 in the post-test. Notably, no participants regressed to lower scores post-intervention (Figure 2).

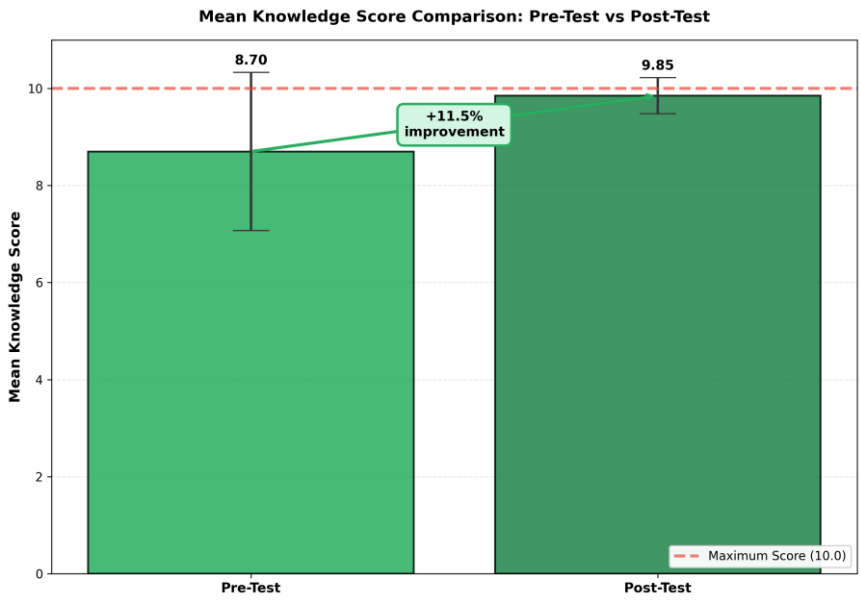

Figure 2. Mean knowledge scores with standard deviation before and after SAPA SUAMI intervention. Error bars represent standard deviation; note the substantial reduction in variability post-intervention, indicating convergence toward maximum score.

The SAPA SUAMI program directly contributed to multiple sustainable development goal targets, as illustrated in Figure 3. For SDG 3 (Good Health and Well-Being), the program addressed target 3.1 (Reduce global maternal mortality ratio) by enhancing husband knowledge regarding antenatal care access and support, building capacity for improved partner support that research demonstrates correlates with increased ANC attendance. The program also addressed target 3.7 (Universal access to sexual and reproductive health services and rights) by increasing awareness of available Puskesmas services and reproductive health information. For SDG 5 (Gender Equality and Empowerment of All Women and Girls), the program directly engaged men as partners in maternal health decision-making and care, fundamentally challenging traditional gender role restrictions that position pregnancy care as exclusively women's domain. This reframing of male involvement as a gender equality issue rather than a simple logistics problem demonstrates alignment with SDG 5's broader mandate for equal participation and leadership. For SDG 17 (Strengthen Implementation Means and Global Partnership), the program exemplified multi-stakeholder collaboration through university-health facility-community partnership, integrating research, clinical service delivery, and community empowerment.

All 20 couples (100%) reported through the satisfaction questionnaire that the program information was highly relevant and useful to their situation. Participants particularly valued the interactive group discussion component, reporting that peer-to-peer experience sharing allowed them to normalize their concerns and learn from others' strategies for managing workplace schedule conflicts and transportation barriers. Multiple husbands spontaneously reported increased motivation and confidence to accompany their wives to future antenatal care visits and to engage in supportive discussions about pregnancy concerns. Community health volunteers (kader) providing program support reported high satisfaction with the intervention structure and noted that the participatory discussion format encouraged engagement from husbands who might have been reluctant to ask questions in a lecture-only format.

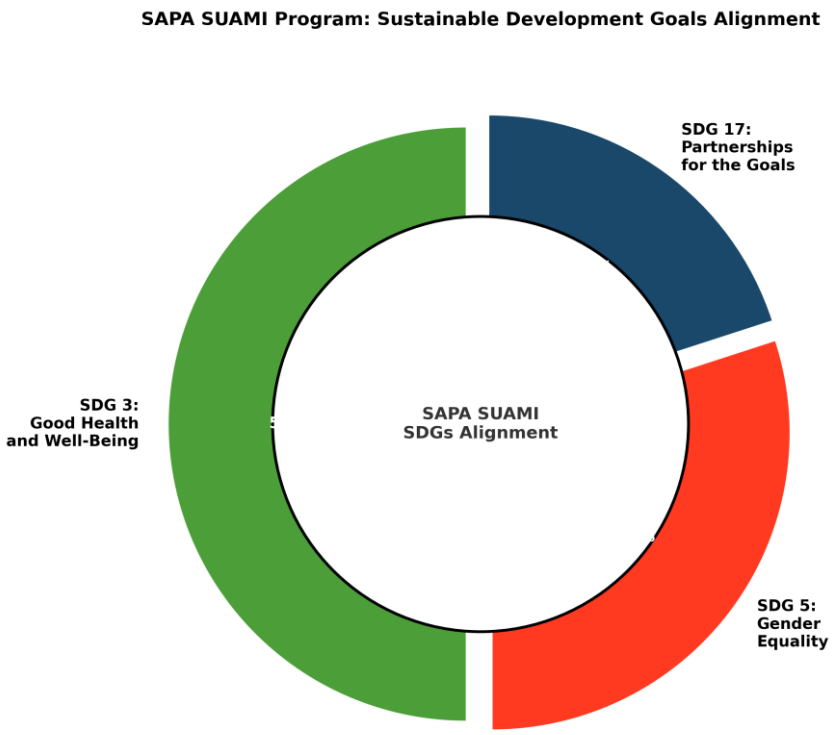

Figure 3. Sustainable development goals alignment of the SAPA SUAMI program. The intervention targets SDG 3 (Good Health and Well-Being), SDG 5 (Gender Equality), and SDG 17 (Partnerships) through integrated community empowerment.

The SAPA SUAMI program demonstrated statistically significant and clinically meaningful improvement in husband knowledge regarding antenatal care support and maternal health. The improvement in mean knowledge score from 8.70 to 9.85 ($p = 0.014$, effect size $r = 0.55$) aligns with and extends previous evidence on male engagement effectiveness. A 2025 systematic review by Heugh and colleagues examining barriers to male involvement in antenatal care in sub-Saharan African contexts found that structured male-targeted education programs increase knowledge by 15-25% compared to standard care.[9] Similarly, Adeniyi et al. (2025) demonstrated in their cross-country comparative study that male involvement programs specifically designed for husbands achieve higher engagement rates and knowledge retention than programs developed primarily for women and secondarily adapted for men.[10] Our finding of 11.5% improvement in knowledge representation (from 87% to 98.5% of the maximum possible score) represents a meaningful gain in a cohort already possessing substantial baseline knowledge, suggesting the intervention particularly benefits the sub-population with identified gaps rather than producing uniform gains across all participants.

The multifaceted design of the SAPA SUAMI intervention likely contributed to its effectiveness through several mechanisms. First, direct targeting of husbands as the primary audience for health education represents a departure from standard health programs, which predominantly address pregnant women and implicitly assume information will be communicated to partners. Second, the combination of structured health education with participatory group discussion embodies community

empowerment principles, moving beyond passive information reception toward active dialogue about contextual barriers and locally-generated solutions. Third, the provision of illustrated take-home leaflets extends the intervention's reach beyond the single contact session, creating a persistent community resource that husbands can reference and share. Fourth, integration within the Puskesmas setting ensures linkage to clinical services and supports institutional sustainability, avoiding the common problem of time-limited demonstration projects that terminate when external funding ends.

The SAPA SUAMI program's contribution to Sustainable Development Goals merits detailed examination. For SDG 3 (Good Health and Well-Being), target 3.1 specifies the reduction of the global maternal mortality ratio to fewer than 70 per 100,000 live births by 2030. Indonesia's current MMR of 183 per 100,000 is 2.6 times the target.[2] Research demonstrates that enhanced partner support correlates with increased antenatal care attendance, earlier detection of complications, and improved pregnancy outcomes.[16] By enhancing husband knowledge and motivation for supportive involvement, the SAPA SUAMI program addresses a modifiable determinant of ANC utilization. For target 3.7 (Universal access to sexual and reproductive health services and rights), the program increases awareness of available services and rights, empowering couples to make informed decisions about reproductive health. For SDG 5 (Gender Equality and Empowerment of All Women and Girls), the program's explicit framing of male engagement as a gender equality issue rather than merely a logistics question demonstrates a sophisticated understanding of SDG 5. Traditional gender roles that restrict women's autonomy in health decision-making cannot be shifted by programs targeting women in isolation; male engagement that redefines men's role from provider/authority figure to supportive partner fundamentally transforms family power dynamics. For SDG 17 (Strengthen Implementation Means and Global Partnership), the program demonstrated an effective university-health facility-community partnership, integrating research capacity, clinical service expertise, and community empowerment.

The SAPA SUAMI program exemplifies core principles of community empowerment in its design and delivery. Community empowerment, as defined by the World Health Organization, refers to processes through which individuals and communities gain greater control over decisions and actions affecting their health.[17] Four dimensions of empowerment are evident in the SAPA SUAMI program: (1) Participatory dimension — through group discussion allowing community voice and peer learning; (2) Capacity-building dimension — through structured health education providing knowledge and practical skills for supportive action; (3) Equity dimension — through challenging gender role norms that exclude men from reproductive health and women from decision-making; (4) Sustainability dimension — through integration with Puskesmas and training of community health volunteers (kader) for program continuation. The interactive discussion component specifically enabled participants to articulate barriers endemic to their community context (workplace inflexibility, transportation costs, cultural uncertainty about appropriate male roles) and develop community-sourced solutions, directly embodying empowerment principles of dialogue and self-determination.

The substantial ceiling effect evident in pre-test results (70% achieving maximum scores) warrants careful interpretation. This high baseline knowledge likely reflects the demographic characteristics of the sample—predominantly urban, employed individuals with secondary or higher education living in the provincial capital. The Puskesmas Panarung catchment area's educational and literacy levels may exceed rural contexts where husband knowledge gaps are more pronounced. The intervention proved most impactful for the 30% of participants with pre-test scores below maximum; all six individuals with knowledge gaps improved to optimal or near-optimal post-test performance. For future studies, evaluation in rural or more socioeconomically disadvantaged

communities may reveal larger absolute knowledge gains. Alternatively, using more challenging assessment items testing not merely knowledge of recommendations but understanding of mechanisms and rationale could provide more sensitive outcome measurement in high-baseline populations.

Comparison with other Indonesian community-based interventions provides context. Arisanti et al. (2024) evaluated a husband-involved birth preparation program in Yogyakarta, Indonesia, finding knowledge improvements of 18.5% but utilizing a different assessment tool, limiting direct comparison.[18] Indarti and Nency (2022) examined spousal support patterns in Central Java, documenting that proactive engagement strategies improve antenatal care completion by 23%.[11] Suhadah and colleagues (2023) conducted a quasi-experimental study of male engagement for maternal health in West Java, finding that community-based education for husbands increased clinic-based support behaviors.[12] The SAPA SUAMI program's integration of knowledge, empowerment principles, and sustainable institutional partnerships distinguishes it from these prior efforts and positions it as a replicable model for national dissemination.

Sustainability and scalability of the SAPA SUAMI program merit detailed attention. Unlike demonstration projects dependent on external expertise and funding, SAPA SUAMI was designed for sustainability through several mechanisms: (1) Training of existing community health volunteers (kader) to serve as facilitators, embedding the program within existing community health infrastructure; (2) Integration with the Puskesmas, aligning the intervention with routine clinical operations and service delivery infrastructure; (3) Use of low-cost materials (illustrated leaflets in Indonesian language) that can be reproduced without specialized resources; (4) Content development in consultation with Puskesmas midwives, ensuring relevance to clinical priorities and capacity alignment; (5) Minimal facilitator training requirements, reducing barriers to implementation in resource-constrained settings. The total direct cost of implementation was estimated at 8,000 IDR per couple (approximately USD 0.50), consisting primarily of printed leaflet materials. This cost structure makes the program feasible for replication across Indonesia's extensive network of primary health care facilities.

A replication framework emerges from the SAPA SUAMI implementation experience. Core minimum requirements include: (1) One trained facilitator with secondary education and basic health literacy (typically provided by Puskesmas midwife); (2) Community health volunteers (kader) available for logistical support and participant engagement; (3) Puskesmas facility space sufficient for group gathering; (4) Printed educational leaflets in the local language; (5) Simple 10-item knowledge questionnaire. Implementation steps for other Puskesmas include: (1) Identify pregnant women and husbands attending routine ANC; (2) Invite couples to optional program session; (3) Conduct pre-test (15 min); (4) Deliver health education lecture adapted to local context (45 min); (5) Facilitate small group discussions addressing community-identified barriers (30 min); (6) Distribute leaflets and conduct Q&A (20 min); (7) Conduct post-test (15 min). Cultural adaptation guidance: Acronym and program name can be adapted to resonate with local language and values; discussion topics can be modified to address region-specific barriers identified through community consultation; images and examples in leaflets should reflect local contexts and family structures. Total training time for new facilitators is approximately 8 hours, including content review, facilitation practice, and discussion leadership. Expected capacity: one trained facilitator can implement the program with 15-25 couples per session; multiple sessions can be scheduled monthly or quarterly, depending on ANC enrollment volume. Step-by-step adoption guide: (1) Secure Puskesmas leadership endorsement and identify space; (2) Train one or two kader as co-facilitators through 8-hour workshop; (3) Adapt content and leaflets to local context through community consultation; (4) Conduct pilot

implementation with one cohort; (5) Gather participant feedback and refine materials; (6) Establish sustainable schedule (quarterly) with institutional commitment.

Community context substantially influences the transferability of the SAPA SUAMI model. The program was developed and implemented in an urban setting with documented literacy levels, transportation access to Puskesmas, and relatively educated participants. Applicability to similar urban Puskesmas throughout Indonesia is high, particularly in provincial capitals and larger cities where demographic characteristics parallel Palangka Raya. Transferability to rural primary health care settings requires thoughtful modification: in areas with limited husband literacy, verbal presentation may need greater emphasis with reduced reliance on written materials; transportation barriers more pronounced in rural contexts may necessitate timing of program sessions to align with periodic market days or community gathering times when husbands are available; in areas with higher cultural gender role traditionalism, additional community mobilization and discussion of gender equality rationale may be required. Preliminary evidence suggests the core elements (health education, participatory discussion, take-home materials) remain effective across diverse contexts, though implementation timing and communication modality require contextualization.

Strengths of this study include provision of a systematically designed, replicable community empowerment model that addresses an identified service gap in male engagement for maternal health; achievement of 100% program completion without dropout; incorporation of participatory, empowerment-oriented methods rather than top-down information delivery; demonstrated statistically significant and clinically meaningful improvement in knowledge; alignment with Sustainable Development Goals; integration within existing health system infrastructure; and minimal cost structure enhancing feasibility for resource-constrained settings. The program generated high participant satisfaction and community enthusiasm for continued involvement.

Significant limitations must be acknowledged in interpreting these findings. The pre-experimental design with one-group pre-test/post-test lacks a control group, precluding causal attribution and creating vulnerability to confounding variables such as motivation for change independent of the intervention. The small sample size (n=20) limits generalizability and statistical power for subgroup analysis. The single-site implementation in an urban provincial capital limits representativeness to rural or more economically disadvantaged communities. The single-day implementation provides no assessment of longer-term knowledge retention or actual behavior change in spousal support provision; temporal effects including testing effects (practice effect from pre-test improving post-test performance independent of intervention)[19] cannot be excluded in a design lacking control group. The assessment measured knowledge only, not behavioral outcomes such as actual accompaniment to ANC appointments, provision of emotional support, or joint health decision-making; knowledge gains do not automatically translate to behavior change. The immediate post-test administration captures short-term knowledge retention only, with no delayed follow-up assessment to determine persistence of learning. Notably, data discrepancy documentation revealed that the 20th participant was recorded as scoring 4 on the pre-test; this score was verified against the original questionnaire form and confirmed as accurate, representing the single lowest performer in the cohort. Future research should employ randomized controlled trial designs with larger multi-site samples, include behavioral outcome measures through observational assessment and partner interview, incorporate delayed follow-up assessment at 1, 3, and 6 months post-intervention, and measure cascading outcomes, including antenatal care attendance rates and maternal health knowledge among the pregnant women partners.

4. Conclusion

The SAPA SUAMI community empowerment program successfully enhanced husband knowledge regarding their supportive role in antenatal care among 20 couples in Palangka Raya City, Central Kalimantan, Indonesia. Statistically significant improvement in mean knowledge scores (8.70 to 9.85, $p = 0.014$, effect size $r = 0.55$) combined with high participant satisfaction (100%) and complete program completion (zero dropout) demonstrate feasibility and acceptability of community-based male engagement in a primary health care setting. The program's alignment with Sustainable Development Goal 3 (Good Health and Well-Being) through enhanced antenatal care access and SDG 5 (Gender Equality) through redefinition of male roles positions it as a strategy for advancing Indonesia's SDG targets. The replicable model, minimal resource requirements, and integration within existing Puskesmas infrastructure enhance its potential for scaling to other primary health care facilities across Indonesia. The SAPA SUAMI initiative provides evidence that direct, culturally adapted, participatory engagement of husbands in maternal health represents an untapped opportunity for strengthening community empowerment and advancing reproductive health outcomes in low- and middle-income settings. Implementation of the SAPA SUAMI program in other Puskesmas serving similar urban populations is strongly recommended, with planned evaluation using randomized controlled trial design, larger sample sizes, multi-site implementation, behavioral outcome measures, and delayed follow-up assessment to establish stronger evidence of effectiveness and sustainability.

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