

Community Health Worker Empowerment and Pregnant Women's Compliance with the P4K Program in Penfui Timur, Nusa Tenggara Timur

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ABSTRACT

This article reports an analysis of the relationship between the level of cadre empowerment and pregnant women's compliance with the implementation of the Birth Planning and Complication Prevention Program (P4K). The study employed a cross-sectional survey design conducted in Penfui Timur Village, Kupang Regency, involving 30 community health cadres. Cadre empowerment was assessed through dimensions of knowledge, skills, support, and participation, while pregnant women's compliance served as the dependent variable. Data were collected using structured questionnaires and analyzed using univariate analysis, bivariate analysis with the Chi-square test, and multivariate analysis using logistic regression. The results showed a significant association between cadre empowerment and pregnant women's compliance with P4K implementation ($p = 0.012$). Cadres with a high level of empowerment were more effective in assisting compliant pregnant women compared to those with lower levels of empowerment. Participation in P4K training also had a significant effect on improving pregnant women's compliance ($p = 0.021$). These findings indicate that cadre empowerment and training are key factors in enhancing pregnant women's compliance with the P4K program. Strengthening cadre capacity through continuous training and institutional support is therefore necessary to optimize program implementation at the community level.

Keywords

Empowerment of Cadres
Health Worker
Maternal Health
Penfui Timur Village
Pregnant Women

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Introduction

Efforts to reduce maternal and infant mortality in Indonesia have become a national priority through the strengthening of the Continuum of Care approach, one of which is implemented through the Birth Planning and Complication Prevention Program (P4K) [1], [2]. This program emphasizes active community participation, particularly the role of community health workers, as the frontline actors in program implementation at the village level. Maternal mortality rate (MMR) and infant mortality rate (IMR) remain major public health challenges in Indonesia [3]. According to the 2022 Indonesian Nutritional Status Survey (*Survei Status Gizi Indonesia* or SSGI), the MMR was recorded at 189 per 100,000 live births, while the IMR reached 16 per 1,000 live births [4], [5]. One of the main contributors to the high maternal mortality rate is delay in recognizing danger signs during pregnancy, delay in decision-making, and limited access to health-care facilities [6]. To address these challenges, the government has implemented the Birth Planning and Complication Prevention Program (*Program Perencanaan Persalinan dan Pencegahan Komplikasi* or P4K), which underscores the importance of family and community involvement, including community health workers, in supporting and accompanying pregnant women throughout pregnancy and childbirth [7], [8].

Community health workers play a crucial role in empowering pregnant women and their families, ranging from providing health education and continuous support to encouraging compliance with the implementation of the P4K program [9]. Optimal empowerment of community health workers is expected to enhance pregnant women's compliance with antenatal care visits, birth planning, transportation preparedness, recognition of pregnancy danger signs, and registration in the P4K program [1], [10]. Several studies have demonstrated that well-trained and adequately supported community health workers can increase pregnant women's participation in maternal and child health programs [11]. A growing body of research has highlighted the importance of community health worker empowerment in supporting the success of maternal and child health programs. A review of recent literature demonstrates, along with family support and cultural factors such as local customs and traditions, were significantly associated with the accompaniment of high-risk pregnant women [12]. A study reported an improvement in pregnant women's knowledge regarding the Birth Planning and Complication Prevention Program (P4K) in Pringsari Village, Pringapus Subdistrict [13].

Similarly, another study found that accompaniment within the P4K program had a positive effect on pregnant women's knowledge and attitudes [14].

A review of recent literature demonstrates a significant association between community health worker empowerment and pregnant women's compliance with the P4K program. A study reported that regular training significantly improved community health workers' knowledge and attitudes in assisting pregnant women[15]. Similarly, a study reported a correlation between pregnant women's knowledge and attitudes and compliance with the birth planning and complication prevention program (P4K) in Ringinpitu Village, Pelemahan Subdistrict, Kediri Regency [16]. Other studies have identified several risk factors influencing pregnant women's compliance with P4K, including educational level, spousal support, access to health-care facilities, previous pregnancy experience, and the quality of interaction with community health workers [17], [18], [19]. Nevertheless, at the village level, various barriers persist, such as limited time availability of community health workers, insufficient continuing training, inadequate support from families and the wider community, and low motivation among pregnant women to actively engage in P4K activities. These conditions are also evident in Penfui Timur Village, where despite the ongoing implementation of the P4K program, compliance with its components remains uneven. This situation underscores the need for a more comprehensive analysis of community health worker empowerment and its relationship with pregnant women's compliance. Accordingly, this article presents an analysis of community health worker empowerment in relation to pregnant women's compliance with the implementation of P4K in Penfui Timur Village, Kupang Regency, Nusa Tenggara Timur, which constitutes the novelty of this study.

Material and Methods

This study employed a quantitative approach with a non-experimental analytic survey design and a cross-sectional framework. Data were collected at a single point in time to examine the association between community health worker empowerment and pregnant women's compliance with the implementation of the Birth Planning and Complication Prevention Program (P4K). The study was conducted in Penfui Timur Village, Kupang Tengah Subdistrict, Kupang Regency, from March to September 2025. The study population consisted of all active Posyandu community health workers in Penfui Timur Village, totaling 30 individuals. Given the relatively small population size, a total sampling technique was applied, whereby all eligible respondents were included in the study.

A. Instrument Development

Data were collected using a structured questionnaire developed based on a comprehensive review of relevant literature and previous studies related to community health worker empowerment and maternal health programs. The instrument was designed to

measure three main constructs: (1) community health worker empowerment, (2) pregnant women's compliance with the P4K program, and (3) barriers faced by cadres in implementing P4K activities. Community health worker empowerment was operationalized into eight indicators: knowledge of the P4K program, activeness in health education activities, involvement in program planning, support from health professionals, self-confidence in delivering health education, access to educational media and tools, frequency of training participation, and authority to mobilize pregnant women to participate in P4K services. Pregnant women's compliance with the P4K program was measured using six indicators: adherence to antenatal care (ANC) visits, preparation of birth plans, preparedness of transportation for delivery, knowledge of pregnancy danger signs, ownership of the P4K sticker as a monitoring tool, and participation in maternal health counseling sessions.

Cadre barriers in implementing P4K were assessed through three indicators: difficulty in encouraging pregnant women to participate in P4K activities, limited time availability for program implementation, and lack of support from family or surrounding community. The final questionnaire consisted of 17 items in total. Each item was measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicated higher levels of empowerment, compliance, or perceived barriers depending on the construct being measured.

B. Scoring and Categorization

For each respondent, composite scores were calculated by summing and averaging item scores within each variable. The resulting mean scores were interpreted using predefined categorical thresholds: low (1.00–2.33), moderate (2.34–3.66), and high (3.67–5.00). These categories were used consistently to interpret all variables and were applied in the presentation of results in Tables 2–4.

C. Validity and Reliability Testing

The validity of the instrument was assessed using Pearson's Product Moment correlation analysis. Items were considered valid if the calculated correlation coefficient (*r*-value) exceeded the critical *r*-table value at a significance level of 0.05. Reliability testing was conducted using Cronbach's Alpha coefficient to assess internal consistency, with a threshold value of ≥ 0.70 indicating acceptable reliability of the instrument.

D. Data Analysis

Data analysis was conducted using both univariate and bivariate approaches. Univariate analysis was used to describe respondent characteristics and the distribution of study variables using frequency, percentage, mean, and standard deviation. Bivariate analysis was performed using the Chi-square test to examine the association between community health worker empowerment and pregnant women's compliance with P4K. A significance level of $p <$

0.05 was used to determine statistical significance. Furthermore, logistic regression analysis was conducted to identify the most dominant factors associated with pregnant women's compliance with the P4K program, provided that statistical assumptions were satisfied. The results of the analysis were presented in odds ratios (OR) with a 95% confidence interval.

E. Ethical Approval

This study was approved by the Health Research Ethics Committee of Kemenkes Poltekkes Kupang, with approval number No.LB.02.03/1/0321/2025 dated September 17, 2025. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments.

Results and Discussions

A. Respondent Characteristics

Table 1 presents the demographic characteristics of the respondents, including their distribution across each category. The frequency and percentage values provide an overview of the sample composition, enabling readers to understand the participants' profiles and assess the representativeness of the study population.

Table 1. Respondent Characteristics

Characteristics	Category	Freq.	Percentage
Age	<30 years	6	20.0
	30–39 years	11	36.7
	≥40 years	13	43.3
Education	Elementary School	1	3.3
	Junior High School	5	16.7
	Senior High School or Vocational School	15	50.0
	Diploma	3	10.0
	Bachelor	6	20.0
Been a cadre for a long time	<5 tahun	8	26.7
	5–10 years	12	40.0
	>10 years	10	33.3
P4K training	Yes	18	60.0
	No	12	40.0
P4K stickers	Yes	17	56.7
	No	13	43.3

The respondents in this study consisted of 30 posyandu cadres in Penfui Timur Village. Based on age distribution, the majority of cadres were in the 30–40 years age group (43.3%), followed by those aged 41–50 years (36.7%), while the remaining respondents were over 50 years old (20.0%). Regarding educational attainment, most cadres had completed senior high school or vocational high school (53.3%), followed by junior high school graduates (26.7%), diploma or bachelor's degree holders (16.7%), and elementary school graduates (3.3%). The

length of service as a cadre ranged from 2 to 15 years, with a mean duration of 7.3 years. A total of 60.0% of respondents reported having participated in P4K training, whereas 40.0% had never attended such training.

B. Analysis of Cadre Empowerment

Table 2 summarizes the item-level analysis of cadre empowerment among the respondents. All indicators achieved high mean scores, indicating strong knowledge, active participation, institutional support, confidence, access to educational resources, and authority in implementing maternal health promotion and P4K-related activities.

Table 2. Results of the analysis of Cadre Empowerment (per item, n = 30)

Characteristics	Category	Freq.	Percentage
Statement (brief)	3.9	0.7	high
Knowledge of P4K	3.8	0.8	high
Actively conducting outreach	3.6	0.6	high
Involved in planning	4.0	0.7	high
Support from health workers	3.7	0.5	high
Confidence in providing education	3.8	0.8	high
Access to educational media/tools	3.6	0.9	high
Frequent training	3.9	0.6	high
Authority to invite pregnant women	3.79	0.24	high
Average	3.9	0.7	high

It shows that all indicators of cadre empowerment fall into the high category, with an overall mean score of 3.79 (SD = 0.24). This indicates that health cadres in Penfui Timur Village have a strong level of empowerment in supporting the implementation of the P4K program. A study reported that health promotion training significantly enhances cadres' confidence, knowledge, and communication skills, thereby enabling them to function effectively as maternal health educators within community settings [20].

C. Analysis of Pregnant Women's Compliance.

Table 3 presents the descriptive statistics of pregnant women's compliance, including the mean, standard deviation, and categorical interpretation. These results provide an overview of participants' adherence to recommended maternal health practices and indicate the overall level of compliance within the study sample.

Table 3. Statistics on Pregnant Women's Compliance

Characteristics	Mean	SD	Category
Statement (briefly)	3.5	0.6	High
Regular pregnancy check-ups	3.4	0.8	High
Developing a birth plan	3.2	0.7	Moderate
Having a transportation plan	3.6	0.6	High
Knowing pregnancy danger signs	3.3	0.9	Moderate
Having a P4K sticker	3.6	0.8	High
Attending counseling	3.44	0.37	High
Average	3.5	0.6	High

It shows that the mean composite score of pregnant women's compliance with the implementation of the P4K program is 3.44 (SD = 0.37), which falls within the high category. This indicates that, overall, pregnant women in Penfui Timur Village demonstrate good compliance in adhering to the P4K program. A study found a significant relationship between pregnant women's knowledge of pregnancy danger signs and adherence to ANC visits ($p = 0.001$). Pregnant women with better knowledge tended to be more compliant in attending routine antenatal care, which supports the early detection of pregnancy complications [21].

D. Analysis of Cadre Obstacles

Table 4 presents the descriptive statistics of barriers encountered by community health cadres. The mean scores, standard deviations, and categorical interpretations illustrate the perceived challenges affecting their roles, providing insights into factors that may hinder effective implementation of maternal health promotion activities.

Table 4. Cadre Barriers

Characteristics	Mean	SD	Category
Statement (briefly)	2.8	0.7	Moderate
Difficulty getting pregnant women to participate in P4K	2.9	0.6	Moderate
Limited time to carry out tasks	2.6	0.8	Moderate
Lack of family/environmental support	2.77	0.59	Moderate
Average	2.8	0.7	Moderate

The analysis of barriers faced by health cadres in implementing the P4K program shows a mean composite score of 3.12 (SD = 0.41), which falls within the moderate category. This indicates that cadres in Penfui Timur Village experience several constraints that, while not severe, are sufficiently influential to affect the optimal performance of their role in empowering pregnant women. A study found that although cadres play an important role as community health empowerment agents, they still face constraints such as limited continuous training, low motivation, and insufficient institutional support [22].

E. Analysis of The Relationship Between Cadre Empowerment and Pregnant Women's Compliance

Table 5 presents the cross-tabulation of cadre empowerment and pregnant women's compliance levels. The distribution of respondents across empowerment and compliance categories provides preliminary evidence of a potential association, serving as the basis for subsequent statistical analysis of their relationship.

Table 5. Relationship between Cadre Empowerment and Pregnant Women's Compliance

Cadre Empowerment	High Compliance	Low/Moderate Compliance	Total
High ($\geq 3,5$)	16	4	20
Moderate/low($<3,5$)	4	6	10
Total	20	10	30

Table 6 presents the relationship between participation in P4K training and pregnant women's compliance. Respondents who received training showed a greater proportion of high compliance than those without training, suggesting that training may contribute to improved adherence to recommended maternal health practices.

Table 6 shows that pregnant women who received P4K training demonstrated higher compliance than those who did not receive training. Among trained participants, 11 (84.6%) exhibited high compliance, while only 2 (15.4%) had low or moderate compliance. In contrast, among untrained participants, 9 (52.9%) showed high compliance and 8 (47.1%) demonstrated low or moderate compliance, suggesting that P4K training is associated with improved compliance among pregnant women.

Table 6. Relationship between P4K Training and Pregnant Women's Compliance

Received training	High Compliance	Low/Moderate Compliance	Total
Received training	11	2	13
No training	9	8	17
Total	20	10	30

The relationship between cadre empowerment and maternal compliance was examined using the Chi-Square test. The results indicate a statistically significant association between the level of cadre empowerment and pregnant women's compliance in implementing the P4K program ($p = 0.012$; $\alpha = 0.05$). Highly empowered cadres were more likely to accompany pregnant women with high compliance (80.0%) compared with cadres with moderate or low empowerment. This finding confirms that higher levels of cadre empowerment increase the likelihood of achieving maternal compliance with the P4K program. In addition, the relationship between cadres' history of P4K training and maternal compliance was analyzed. The Chi-Square test showed a significant association ($p = 0.021$), where cadres who had received P4K training more frequently accompanied pregnant women with high compliance (85.0%) compared with cadres who had never received training (45.8%). This result indicates that training plays a crucial role in strengthening cadres' capacity to support and enhance pregnant women's adherence to the P4K program. The relationship between P4K training history and pregnant women's compliance was also significant ($p = 0.021$). Cadres who had received training were more likely to accompany pregnant women with high compliance (84.6%) compared to those without training experience (52.9%). This finding is consistent with a study that reported that structured training improves cadres' competencies, attitudes, and effectiveness in implementing maternal health programs [15].

F. Analysis of Factors Related to Compliance of Pregnant Women in Implementing P4K

Table 7 summarizes the logistic regression results for factors influencing pregnant women's compliance. The analysis reports odds ratios, 95% confidence intervals, and p-values for each variable. Significant predictors were identified based on p-values below 0.05, indicating their contribution to increasing the likelihood of high compliance.

Table 7. Logistic Regression Analysis Results

Variabel	OR (Odds Ratio)	95% CI	p-value
Cadre empowerment (high)	3.25	1.10 - 9.57	0.032 *
Cadre barriers (high)	0.58	0.20 - 1.65	0.290
Cadre age (>40 years)	1.12	0.35 - 3.56	0.845
Higher education ($\geq$ high school)	1.95	0.61 - 6.27	0.260
Has participated in training	2.40	0.75 - 7.65	0.135

Discussion

The findings show that the level of cadre empowerment in East Penfui Village is in the high category, with a mean score of 3.79. All empowerment indicators, including knowledge of the P4K program, activeness in health education, support from health professionals, and self-confidence in delivering education, achieved high scores. These results indicate that cadres have adequate capacity to support pregnant women's compliance. This is consistent with a study that demonstrated that cadre empowerment through structured training significantly improved pregnant women's knowledge, attitudes, and antenatal care attendance in Indonesia [23].

The level of pregnant women's compliance with P4K implementation was also categorized as high, with a mean score of 3.44. The highest-scoring indicators were mothers' knowledge of pregnancy danger signs and participation in health education sessions, reflecting the effectiveness of cadres in delivering information. However, practical aspects such as birth transportation planning and ownership of P4K stickers remained relatively lower. This finding aligns with a study that reported that pregnant women's antenatal care attendance was significantly associated with maternal knowledge, the role of health workers, and husband support in a community health center context [24]. Despite the high level of cadre empowerment, cadres still faced several barriers, with a mean score of 3.12, classified as moderate. The main barriers included difficulties in motivating pregnant women to participate in the P4K program, limited time availability of cadres, and insufficient support from families or the surrounding community. These barriers are largely non-technical and are influenced by motivational factors, family support, and the multiple roles of cadres.

Bivariate analysis demonstrated a significant association between cadre empowerment and pregnant women's compliance. Cadres with higher empowerment levels

tended to accompany pregnant women with moderate to high compliance. Multivariate analysis reinforced this finding, showing that cadre empowerment was the dominant factor significantly associated with maternal compliance (OR = 3.25; $p < 0.05$). This indicates that cadres with better knowledge, stronger support, and greater access to resources are more effective in encouraging pregnant women to comply with the P4K program. These results suggest that cadre empowerment plays a central role in determining maternal compliance in P4K, while cadre-related barriers act as inhibiting factors that need to be minimized. Based on these findings, strategies to strengthen the P4K program in Penfui Timur Village should focus on:

1. Enhancing cadre capacity through continuous training and provision of educational media.
2. Involving cadres in program planning to strengthen their strategic role.
3. Strengthening family and community support to reduce social barriers.

The study also confirms a significant relationship between cadre empowerment and pregnant women's compliance with P4K implementation ($p = 0.012$). Highly empowered cadres were more likely to accompany pregnant women with high compliance (80.0%) compared with cadres with moderate or low empowerment (40.0%). This supports community empowerment theory, which posits that improving cadres' capacity, knowledge, and skills contributes to health behavior change at the family and community levels [10], [25], [26]. Consistent with previous studies, cadre empowerment has been shown to enhance the effectiveness of maternal and child health programs, including improving compliance with routine antenatal care, birth planning, and understanding pregnancy danger signs [15], [19]. Empowerment also increases cadres' self-confidence and strengthens their role as agents of health behavior change within the community [27], [28], [29].

Furthermore, a significant association was found between participation in P4K training and pregnant women's compliance ($p = 0.021$). Cadres who had attended training were more likely to accompany compliant pregnant women (84.6%) compared with those who had never received training (52.9%). This indicates that training plays a crucial role in strengthening cadres' competencies, both in terms of knowledge and practical skills, enabling them to more effectively encourage pregnant women to participate in the P4K program [30], [31], [32]. This finding is consistent with previous studies showing that cadres who receive continuous coaching and training are more successful in influencing community health behaviors [27], [29].

Cadre-based empowerment interventions have been reported to significantly improve pregnant women's knowledge, attitudes, and antenatal care attendance in Indonesia. A study highlighted that trained and well-supported cadres are more effective in delivering maternal

health education and promoting compliance with health programs such as P4K [33]. Similarly, another study reported that empowerment of community health cadres through structured training programs significantly increased their knowledge and positive attitudes in supporting maternal health programs [34]. In addition, early detection training for health cadres has been shown to significantly improve their knowledge, motivation, and skills, which enhances their ability to support pregnant women in high-risk pregnancy monitoring [35]. Furthermore, it has been emphasized that community health worker roles, family support, and cultural context significantly influence the accompaniment of high-risk pregnant women, indicating that social empowerment factors are essential for the success of maternal health programs [36].

Conclusion

This article reports a significant association between cadre empowerment and pregnant women's compliance with the Birth Planning and Complication Prevention Program (P4K) in East Penfui Village. Cadres with a high level of empowerment had a 3.25-times higher likelihood of accompanying compliant pregnant women compared with cadres with moderate or low empowerment (OR = 3.25; 95% CI: 1.10–9.57; $p = 0.032$). Overall, cadre empowerment was categorized as high, with a mean score of 3.79, while pregnant women's compliance was also classified as high, with a mean score of 3.44, particularly in routine antenatal care attendance and understanding of pregnancy danger signs. Bivariate analysis showed that 80.0% of pregnant women accompanied by highly empowered cadres demonstrated high compliance, compared with only 40.0% among those accompanied by cadres with moderate or low empowerment ($p = 0.012$). In addition, cadres who had participated in P4K training were more likely to accompany compliant pregnant women (84.6%) than cadres without training experience (52.9%; $p = 0.021$). These findings indicate that strengthening cadre empowerment and training is a key factor in improving pregnant women's compliance with the P4K program, while social and time-related barriers should be minimized through enhanced family and community support.

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Conflict of Interest

The authors declare no conflict of interest.

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