# Development A Behavioral Model of Family Planning Participation Among Women Of Reproductive Age Based On Lawrence Green's Precede–Proceed Framework in Medan City, Indonesia

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***Abstract***

*Participation of women of reproductive age (WRA) in the family planning (FP) programme in Medan City is only 42.2%, far below the national contraceptive prevalence rate of 59.4%. Existing programmes have not been guided by a locally validated behavioural model. To develop a behavioural model of FP participation among WRA using Lawrence Green's PRECEDE–PROCEED framework. An analytical cross-sectional study was conducted in 2025 among 260 WRA attending 10 maternity clinics and 3 community health centres (puskesmas) in Medan City, selected by stratified random sampling with proportional allocation. Data were collected with a structured questionnaire measuring predisposing (education, knowledge, attitude, information-seeking behaviour, parity), enabling (income, access to health services, media exposure) and reinforcing (husband's support, health-worker support) factors. Bivariate analysis used the chi-square test with prevalence ratios (PR) and 95% confidence intervals (CI); variables with $p < 0.25$ entered a multiple logistic regression (forward stepwise Wald). Forty-two respondents (16.2%) did not participate in the FP programme. Eight of ten variables qualified for multivariable modelling. Four determinants remained significant in the final model: knowledge (AOR = 31.37; 95% CI 12.29–80.06), education (AOR = 17.66; 95% CI 8.03–38.85), husband's support (AOR = 9.52; 95% CI 4.42–20.50) and income (AOR = 2.83; 95% CI 1.20–6.66). Knowledge was the dominant predictor. A woman with poor knowledge, low education, an unsupportive husband and low income had a predicted probability of non-participation of 99.8%, compared with 0.9% for a woman with none of these characteristics. FP participation in Medan is determined by the interaction of predisposing, enabling and reinforcing factors. Interventions should combine contraceptive literacy education, couple-based counselling and economic empowerment of low-income households*

***Keywords: Contraceptive Behaviour; Family Planning; Logistic Regression; PRECEDE–PROCEED Model; Women of Reproductive Age***

## INTRODUCTION

The world population continues to grow rapidly, and Indonesia is projected to remain the fourth most populous country in 2025, with 285,721,236 inhabitants (United Nations, Department of Economic and Social Affairs, 2025). A fertility rate that remains high relative to mortality has made population growth a persistent obstacle to sustainable development. The Family Planning (*Keluarga Berencana*/KB) programme continues to serve as the principal instrument of the Indonesian government to regulate fertility while simultaneously improving maternal and child health.

Globally, 55% of women of reproductive age (WRA) between 15 and 49 years use a modern contraceptive method, though coverage varies widely across countries (World Health

Organizations, 2024). Approximately 218 million women in low- and middle-income countries still have an unmet need for family planning, contributing directly to unintended pregnancy and increasing maternal and neonatal risk (United Nations Population Fund, 2024). This gap constrains progress towards Sustainable Development Goal 3 (good health and well-being) and Goal 5 (gender equality). In South-East Asia, modern contraceptive use averages 62%, with Thailand at 77% and Vietnam at 73%, while Indonesia records 59% (Population Reference Bureau, 2024).

Within Indonesia, the national contraceptive prevalence rate is approximately 59.4%, dominated by injectables (35.3%) and oral pills (30.5%), while unmet need persists at 9.1% (Badan Kependudukan dan Keluarga Berencana Nasional, 2023). The situation in Medan City is more pronounced: only 42.2% of WRA participate in the FP programme, well below the national figure, and long-acting reversible contraceptives such as intrauterine devices and implants remain underutilized (Dinas Kesehatan Kota Medan, 2023). Medan combines high population density, marked ethnic and religious diversity, and wide variation in educational attainment, meaning that low participation cannot be attributed to service supply alone. Limited spousal motivation, difficulty in obtaining accurate information, and negative perceptions of contraceptive side effects have all been documented locally.

Lawrence Green's PRECEDE–PROCEED model offers a systematic framework for diagnosing health behaviours prior to intervention design. It explains health behaviour as the product of predisposing factors (knowledge, attitudes and beliefs), enabling factors (income, access, facilities and policy), and reinforcing factors (support from spouses, families and health workers). The model has been applied successfully to community health programme development in Indonesia, where education and family support consistently emerged as decisive (Harnanto et al., 2023). Nevertheless, most Indonesian studies of contraceptive use stop at reporting isolated bivariate associations; few translate those associations into a quantitative, locally calibrated predictive model that programme managers can use to identify high-risk women.

This study therefore addresses two key gaps. First, it applies the complete PRECEDE–PROCEED framework to family planning (FP) participation in a large, ethnically heterogeneous Indonesian city rather than in a rural or single-ethnic setting. Second, it translates the resulting determinants into a logistic regression–based behavioural model that yields an individual-predicted probabilities of non-participation. The objective is to identify the dominant predisposing, enabling and reinforcing determinants of FP participation among

women of reproductive age (WRA) in Medan City and to formulate a behavioural model that can guide targeted intervention.

## METHOD

An analytical observational study with a cross-sectional design was conducted between March and July 2025 in Medan City, North Sumatra, Indonesia. Thirteen facilities providing family planning services participated: 10 private maternity clinics/birthing homes and 3 community health centres (*puskesmas*), distributed across the northern, central and southern service zones of the city.

The source population comprised married women of reproductive age (15–49 years) who were patients or visitors at the participating facilities. Inclusion criteria included currently married, aged 15–49 years, not pregnant at the time of interview, and willing to provide written informed consent. Women with a medical contraindication to all contraceptive methods and those who had undergone hysterectomy were excluded.

The sample size was calculated using the formula for estimating a single population proportion, $n = Z^2_{1-\alpha/2} \times p(1 - p)/d^2$, with Z = 1.96 (95% confidence level), p = 0.422, the FP participation rate for Medan City reported by Dinas Kesehatan Kota Medan (2023), and an absolute precision d = 0.06. This yielded n = 260. All 260 slots were filled, giving a 100% response rate.

Respondents were selected through stratified random sampling. Each facility constituted one stratum, and the number of respondents per stratum was allocated proportionally to the facility's average monthly volume of WRA visits. Within each stratum, respondents were then drawn by simple random sampling from the daily visit register using a computer-generated random number sequence.

The dependent variable was participation in the family planning (FP) programme, defined as current use of any modern contraceptive method at the time of interview (coded as 0 = participating, 1 = not participating). Ten independent variables were mapped a priori onto the three PRECEDE–PROCEED domains. Predisposing factors included educational attainment (low = primary/junior secondary; high = senior secondary or above), knowledge of family planning, attitude towards contraception, information-seeking behaviour and parity (≤ 2 versus > 2 live births). Enabling factors comprised household income (low = below the 2025 Medan City minimum wage; high = at or above it), access to health services (accessible = travel time ≤ 30 minutes and affordable transport cost; not accessible = otherwise) and media exposure to family planning messages in the preceding six months. Reinforcing factors were

husband's support and health-worker support. Knowledge was classified as good when the respondent answered at least 75% of 20 items correctly, while attitude was considered positive when the total score was at or above the median of a 15-item Likert scale. Husband's and health-worker support were dichotomised at the median of their respective scales.

Data were collected through face-to-face interviews using a structured questionnaire developed from the PRECEDE–PROCEED framework and adapted from previously validated Indonesian instruments. The questionnaire was pre-tested on 30 women of reproductive age (WRA) at a non-study *puskesmas* in Medan. Content validity was assessed by three experts in public health and reproductive health. Construct validity was examined by Pearson product–moment correlation; all items exceeded the critical value of $r = 0.361$ ($df = 28$, $\alpha = 0.05$) and surpassed the accepted threshold of 0.70.

Data were analysed using SPSS version 26. Univariate analysis was conducted to describe frequency distributions. Bivariate analysis was examined with the chi-square test, and the strength of association was expressed as a prevalence ratio (PR) with a 95% confidence interval (CI), the appropriate effect measure for cross-sectional designs. Variables with $p < 0.25$ in bivariate analysis were retained as candidates for multivariable modelling. Multiple logistic regression with the forward stepwise (Wald) method was employed to construct the final behavioural model with reference categories coded as 0 and exposure categories 1. Because logistic regression estimates odds ratios, multivariable results are reported as adjusted odds ratios (AOR). Given the outcome prevalence of 16.2% will exceed the corresponding prevalence ratio and should be interpreted as measures of association rather than relative risk. Model calibration was assessed using the Hosmer–Lemeshow goodness-of-fit test, explanatory power with the Nagelkerke $R^2$, and discrimination with the area under the receiver operating characteristic (ROC) curve. Statistical significance was set at $p < 0.05$.

The study was conducted in accordance with the Declaration of Helsinki. All respondents received both verbal and written explanation of the study purpose, procedures, risks, and benefits, and provided written informed consent prior to enrolment. For respondents under 18 years of age, additional written consent was obtained from a parent or legal guardian. Participation was voluntary, with option to withdraw at any time without consequence for access to services. All data were anonymised and stored on a password-protected device accessible only to the research team.

## RESULTS

A total of 260 women of reproductive age (WRA) participated in the study. Forty-two respondents (16.2%) were not enrolled in the family planning (FP) programme, while 218 (83.8%) were current users of a modern contraceptive method. Respondent characteristics are presented in Table 1.

**Table 1. Distribution of respondent characteristics based on the PRECEDE–PROCEED domains (n = 260)**

| Variable | Category | *f* | % |
|---|---|---|---|
| ***Predisposing factors*** | | | |
| Education | Low | 61 | 23.5 |
| | High | 199 | 76.5 |
| Knowledge | Poor | 71 | 27.3 |
| | Good | 189 | 72.7 |
| Attitude | Negative | 105 | 40.4 |
| | Positive | 155 | 59.6 |
| Information-seeking behaviour | Never | 29 | 11.2 |
| | Sometimes | 167 | 64.2 |
| | Always | 64 | 24.6 |
| Parity | ≤ 2 | 183 | 70.4 |
| | > 2 | 77 | 29.6 |
| ***Enabling factors*** | | | |
| Household income | Low | 121 | 46.5 |
| | High | 139 | 53.5 |
| Access to health services | Not accessible | 59 | 22.7 |
| | Accessible | 201 | 77.3 |
| Media exposure | Not exposed | 126 | 48.5 |
| | Exposed | 134 | 51.5 |
| ***Reinforcing factors*** | | | |
| Husband’s support | Not supportive | 39 | 15.0 |
| | Supportive | 221 | 85.0 |
| Health-worker support | Not supportive | 53 | 20.4 |
| | Supportive | 207 | 79.6 |
| ***Outcome*** | | | |
| Participation in the FP programme | Not participating | 42 | 16.2 |
| | Participating | 218 | 83.8 |

**Bivariate analysis**

Table 2 presents the associations between each independent variable and participation in the family planning (FP). Eight of the ten variables were significantly associated with non-participation and also met the $p < 0.25$ threshold for inclusion in multivariable modelling: education, knowledge, attitude, husband's support, health-worker support, media exposure, household income and information-seeking behaviour. Two variables, access to health services ($p = 0.990$) and parity ($p = 0.695$), did not meet the criterion and were excluded from the model.

The largest crude effects were observed for knowledge and education. Half of the women with poor knowledge (36/71; 50.7%) were not participating, compared with only 3.2% of women with good knowledge, yielding a prevalence ratio (PR) of 15.97 (95% CI 7.03–36.27). Similarly, 50.8% of women with low education were not participating versus 5.5% of those with higher education (PR = 9.19; 95% CI 4.92–17.18). Women without spousal support were more than five times as likely not to participate (PR = 5.15; 95% CI 3.12–8.50). In addition, women who never sought information about family planning were markedly more likely not to participate than those who always did (PR = 13.68; 95% CI 5.05–34.70), whereas occasional information-seeking did not differ significantly from consistent information-seeking (PR = 1.34; 95% CI 0.46–3.92).

**Table 2. Association between predisposing, enabling and reinforcing factors and non-participation in the family planning programme, Medan City, 2025 (n = 260)**

| Variable | Not participating | | Participating | | Total | *p value* | PR (95% CI) | Cand. |
|---|---|---|---|---|---|---|---|---|
| | *f* | % | *f* | % | | | | |
| ***Education*** | | | | | | | | |
| Low | 31 | 50.8 | 30 | 49.2 | 61 | < 0.001 | 9.19 (4.92–17.18) | Yes |
| High (ref) | 11 | 5.5 | 188 | 94.5 | 199 | | 1 | |
| ***Knowledge*** | | | | | | | | |
| Poor | 36 | 50.7 | 35 | 49.3 | 71 | < 0.001 | 15.97 (7.03–36.27) | Yes |
| Good (ref) | 6 | 3.2 | 183 | 96.8 | 189 | | 1 | |
| ***Attitude*** | | | | | | | | |
| Negative | 25 | 23.8 | 80 | 76.2 | 105 | 0.010 | 2.17 (1.24–3.82) | Yes |
| Positive (ref) | 17 | 11.0 | 138 | 89.0 | 155 | | 1 | |
| ***Information-seeking behaviour*** | | | | | | | | |
| Never | 24 | 82.8 | 5 | 17.2 | 29 | < 0.001 | 13.68 (5.05–34.70) | Yes |
| Sometimes | 14 | 8.4 | 153 | 91.6 | 167 | | 1.34 (0.46–3.92) | |
| Always (ref) | 4 | 6.3 | 60 | 93.7 | 64 | | 1 | |

| Variable | Not participating | | Participating | | Total | *p value* | PR (95% CI) | Cand. |
|---|---|---|---|---|---|---|---|---|
| ***Parity*** | | | | | | | | |
| ≤ 2 | 28 | 15.3 | 155 | 84.7 | 183 | 0.695 | 0.84 (0.47–1.51) | No |
| > 2 (ref) | 14 | 18.2 | 63 | 81.8 | 77 | | 1 | |
| ***Household income*** | | | | | | | | |
| Low | 30 | 24.8 | 91 | 75.2 | 121 | < 0.001 | 2.87 (1.54–5.36) | Yes |
| High (ref) | 12 | 8.6 | 127 | 91.4 | 139 | | 1 | |
| ***Access to health services*** | | | | | | | | |
| Not accessible | 9 | 15.3 | 50 | 84.7 | 59 | 0.990 | 0.93 (0.47–1.83) | No |
| Accessible (ref) | 33 | 16.4 | 168 | 83.6 | 201 | | 1 | |
| ***Media exposure*** | | | | | | | | |
| Not exposed | 27 | 21.4 | 99 | 78.6 | 126 | 0.038 | 1.91 (1.07–3.43) | Yes |
| Exposed (ref) | 15 | 11.2 | 119 | 88.8 | 134 | | 1 | |
| ***Husband's support*** | | | | | | | | |
| Not supportive | 20 | 51.3 | 19 | 48.7 | 39 | < 0.001 | 5.15 (3.12–8.50) | Yes |
| Supportive (ref) | 22 | 10.0 | 199 | 90.0 | 221 | | 1 | |
| ***Health-worker support*** | | | | | | | | |
| Not supportive | 19 | 35.8 | 34 | 64.2 | 53 | < 0.001 | 3.23 (1.90–5.47) | Yes |
| Supportive (ref) | 23 | 11.1 | 184 | 88.9 | 207 | | 1 | |

## Multivariable analysis and model building

The eight candidate variables were entered into a multiple logistic regression using the forward stepwise (Wald) method. Variables were added sequentially according to the strength of their contribution, and those that did not reach $p < 0.05$ after adjustment were excluded. Table 3 summarises the modelling sequence, and Table 4 presents the final model.

**Table 3. Sequence of variable entry and exclusion in the forward stepwise (Wald) logistic regression**

| Step | Variable entered / excluded | *p value* |
|---|---|---|
| ***Variables entered*** | | |
| 1 | Knowledge (poor vs good) | < 0.001 |
| 2 | Education (low vs high) | < 0.001 |
| 3 | Husband's support (not supportive vs supportive) | < 0.001 |
| 4 | Household income (low vs high) | 0.017 |
| ***Variables not retained (p > 0.05 after adjustment)*** | | |
| – | Attitude (negative vs positive) | |
| – | Health-worker support (not supportive vs supportive) | |
| – | Media exposure (not exposed vs exposed) | |
| – | Information-seeking behaviour (never/sometimes vs always) | |

**Table 4. Final multiple logistic regression model of non-participation in the family planning programme among women of reproductive age in Medan City (n = 260)**

| Variable | Category | *B* | *p value* | AOR (95% CI) |
|---|---|---|---|---|
| Knowledge | Good (reference) | – | – | 1 |
| | Poor | 3.446 | < 0.001 | 31.37 (12.29–80.06) |
| Education | High (reference) | – | – | 1 |
| | Low | 2.871 | < 0.001 | 17.66 (8.03–38.85) |
| Husband's support | Supportive (reference) | – | – | 1 |
| | Not supportive | 2.254 | < 0.001 | 9.52 (4.42–20.50) |
| Household income | High (reference) | – | – | 1 |
| | Low | 2.355 | 0.017 | 2.83 (1.20–6.66) |
| Constant | | −4.685 | < 0.001 | 0.155 |

## The behavioural model

Four determinants remained significant after adjustment. Knowledge was the dominant predictor: women with poor knowledge had 31.37 times the adjusted odds of not participating in the family planning (FP) programme compared with those with good knowledge, followed by low education (AOR = 17.66), absence of husband's support (AOR = 9.52), and low household income (AOR = 2.83). Predicted probabilities for intermediate risk profiles are presented in Table 5, which illustrates the cumulative gradient of risk generated by the model.

**Table 5. Predicted probability of non-participation in the family planning programme for selected risk profiles**

| Risk profile | Number of risk factors | Logit | Predicted probability (%) |
|---|---|---|---|
| Good knowledge, high education, supportive husband, high income | 0 | −4.685 | 0.9 |
| Poor knowledge only | 1 | −1.239 | 22.5 |
| Poor knowledge + low education | 2 | 1.632 | 83.6 |
| Poor knowledge + low education + unsupportive husband | 3 | 3.886 | 98.0 |
| Poor knowledge + low education + unsupportive husband + low income | 4 | 6.241 | 99.8 |

## DISCUSSION

This study developed a behavioural model of family planning (FP) participation among women of reproductive age (WRA) in Medan City and identified four dominant determinants; knowledge, education, husband's support and household income, which map onto all three domains of the PRECEDE–PROCEED framework. The model is not merely descriptive: it translates these determinants into individual predicted probabilities, and the gradient shown in Table 5 demonstrates that risk accumulates multiplicatively rather than additively.

Knowledge emerged as the strongest determinant (AOR = 31.37). Adequate knowledge of contraceptive options, expected side effects, and the health benefits of birth spacing equips women the confidence to make autonomous reproductive decisions. Comparable findings have been reported in Ethiopia, where women with high levels of family planning were substantially more likely to use modern methods (Belachew et al., 2023), while low knowledge combined with limited education strongly predicted non-use across high-fertility sub-Saharan settings (Negash et al., 2022). Locally, knowledge has also been shown to influence uptake of intrauterine devices among Indonesian couples (Yulihah et al., 2023).

The magnitude of the effect observed in this study exceeds most published estimates. Two contextual explanations are plausible. First, in several communities in Medan family planning remains a sensitive topic, and misconceptions, such as the belief that contraception is religiously prohibited, continue to circulate; women with limited knowledge have few resources with which to challenge these beliefs. Second, women with poor knowledge often defer contraceptive decisions to husbands and older family members, so that a knowledge deficit is compounded by a decision-making deficit. From a PRECEDE–PROCEED perspective, this suggests that any intervention must begin by strengthening the predisposing domain before enabling or reinforcing strategies can take effect.

Low education independently increased the odds of non-participation almost eighteen-fold. Education operates upstream of knowledge by shaping the capacity to search for, comprehend and critically evaluate health information. This is consistent with evidence from Uganda, where socio-economic and educational inequities produced substantial differences in modern contraceptive use (Makumbi et al., 2023), and with multilevel analyses across sub-Saharan Africa showing that education and spousal communication were jointly decisive (Tesema et al., 2022). The persistence of education in the adjusted model, alongside knowledge, suggests that classroom-style counselling alone will not be sufficient for women with limited schooling; message format, literacy level and delivery channel need to be adapted accordingly.

Women without spousal support had 9.52 times the adjusted odds of non-participation. In Medan, as in many Indonesian settings, contraceptive decisions are made jointly within the household, with husbands frequently serving as the final decision-makers and the primary source of financing for services. Male involvement has consistently been shown to increase contraceptive uptake in Nigeria (Akande et al., 2025), and couple-based education programmes in Ethiopia have produced measurable gains in use (Yadassa et al., 2026). A systematic review of interventions engaging men and boys in low- and middle-income countries concluded that

partner involvement counselling is among the most effective components of complex family planning interventions (Aventin et al., 2023). Evidence from Indonesia points in the same direction (Rahmawani & Musniati, 2025). The practical implication is that family planning services in Medan should be reconfigured as couple-focused rather than women-only services.

Low household income remained significant (AOR = 2.83), although its effect was the weakest of the four determinants. Income enables access by covering transport, service fees and the out-of-pocket cost of methods not fully subsidised by the national health insurance scheme. Women in the lowest income quintiles in South-East Asia use contraception considerably less than the wealthiest quintiles (Rizkianti et al., 2024); household wealth disparities produce similar gradients in Ghana (Tampah-naah et al., 2023); and low socio-economic status is consistently associated with unmet need for modern contraception across low- and lower-middle-income countries (Anik et al., 2022). Comparable results have been reported for North Sumatra (Sari et al., 2024). The relatively modest adjusted effect in the present study suggests that, in an urban setting with reasonably good insurance coverage, economic barriers are secondary to informational and relational barriers, though they are not eliminated.

Attitude, health-worker support, media exposure and information-seeking behaviour were all significantly associated with participation at the bivariate level but did not remain in the final model. This outcome is theoretically coherent rather than contradictory: within the PRECEDE–PROCEED framework, these variables are largely mediated by knowledge and education. A positive attitude is shaped by knowledge and experience, while information-seeking behaviour is itself a function of literacy and education, so their explanatory contribution is absorbed once knowledge and education are included in the model. Nevertheless, attitude has nevertheless been shown to predict consistent contraceptive use in multi-country analyses (Dwomoh et al., 2022), high-quality counselling by providers sustains continuation in Ghana (Keogh et al., 2021), Indonesian evidence links provider support to continuity of use (Gusman et al., 2025), and media exposure predicts use in South Asia (Poudel et al., 2023). These variables therefore remain legitimate intervention levers, but they should be understood as operating through knowledge rather than independently of it.

Access to health services and parity were not associated with participation, even before adjustment. The absence of an access effect is plausible in a dense urban environment served by 13 facilities within short travel distances, and is consistent with Ethiopian evidence showing that accessibility alone does not determine use once community-based counselling is available (Gebremeskel et al., 2020). The null finding for parity echoes reports that, in urban populations

with good information access, parity influences the choice of contraceptive method more than the decision to use one at all (Fahlevie et al., 2022; Gebremeskel et al., 2020).

The model implies a sequenced intervention strategy. Because risk accumulates steeply, from 0.9% with no risk factors to 83.6% with two and 99.8% with four, identifying and prioritising women who carry multiple risk factors simultaneously would deliver the greatest programmatic return. Three components follow directly from the model: (i) contraceptive literacy education delivered in formats suited to women with limited schooling, including community-based sessions led by midwives and cadres; (ii) routine couple-based counselling that actively involves husbands in consultations; and (iii) linkage of low-income households to economic empowerment and insurance-enrolment schemes. Theoretically, the study demonstrates that the PRECEDE–PROCEED framework can be operationalised quantitatively in an Indonesian urban setting, producing both a screening tool and an explanatory account.

Several limitations should be acknowledged. First, the cross-sectional design establishes association rather than causation, and reverse causation cannot be excluded, women already using contraception may have accumulated knowledge through service contact. Second, the outcome was not rare (16.2%), so the adjusted odds ratios obtained from logistic regression overstate the corresponding prevalence ratios and should not be interpreted as relative risks; the crude prevalence ratios in Table 2 provide a more conservative estimate of effect size. Third, recruitment took place in health facilities, meaning that women who never attend any facility, plausibly those at highest risk of non-participation are under-represented, and the 42.2% city-wide participation figure is correspondingly higher in this sample. Fourth, exposure data were self-reported and subject to social desirability bias, particularly for husband's support. Finally, the wide confidence intervals around the knowledge and education estimates reflect small cell counts and indicate that the point estimates should be interpreted with caution; external validation in an independent sample is required before the model is used for individual-level screening.

## CONCLUSIONS

Participation of women of reproductive age in the family planning programme in Medan City is shaped by the interplay of predisposing, enabling and reinforcing factors rather than by any single cause. After statistical adjustment, four determinants remained significant: knowledge of family planning, educational attainment, husband's support and household income, with knowledge emerging as the strongest predictor. The behavioural model derived from these variables indicates that a woman with poor knowledge, low education, no spousal

support, and low income show a 99.8% probability of non-participation, compared with only 0.9% for a woman without these disadvantages.

These findings support a multidimensional intervention strategy for Medan City: enhancing contraceptive and reproductive literacy through community-based education tailored to low-literacy audiences, institutionalising couple-based counselling to routinely involve husbands in family planning consultations, and linking low-income households to economic empowerment initiatives and health-insurance enrolment. Health authorities may also apply the model as a simple screening instrument to identify women at high risk of non-participation during routine service encounters. Longitudinal and community-based studies are recommended to establish the temporal sequence of these determinants and to validate the model beyond health-facility settings.

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**CONFLICT OF INTEREST**

The authors declare that they have no conflicts of interest.

**AUTHOR CONTRIBUTIONS**

NYS conceived and designed the study, performed the statistical analysis, and drafted the manuscript. HS and SDBS coordinated data collection and contributed to the interpretation of results. DHL and YS contributed to the study design, critically revised the manuscript and supervised the research. All authors read and approved the final manuscript.

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