

Determinants of the Use of Maternal and Child Health Services and Pregnancy Risk Prevention Behaviour among Pregnant Women in the Service Area of the Melonguane Community Health Centre, Talaud Islands Regency, North Sulawesi

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ABSTRACT

Maternal and child health service utilisation and pregnancy risk-prevention behaviour remain challenging in geographically isolated and border areas. These outcomes are interrelated because knowledge and attitudes may shape health decisions, while financial, geographical, and social resources determine the ability to translate decisions into action. Purpose: This study aimed to analyse the association of predisposing, enabling, and reinforcing factors with maternal and child health (MCH) service utilisation and pregnancy risk-prevention behaviour among pregnant women in the Melonguane Community Health Centre catchment area, Talaud Islands Regency. Method: An analytical cross-sectional study was conducted among 152 pregnant women from February to May 2026 using total sampling. Data were collected through interviewer-administered questionnaires. Associations were analysed using Chi-square or Fisher's Exact tests at $p < 0.05$. Multivariable regression was not performed. Results: Knowledge and positive attitudes were significantly associated with both outcomes ($p < 0.001$). JKN coverage, distance to the health centre, transport access, spousal support, and health education were also significantly associated with both outcomes, while household income and community health worker involvement were associated with MCH utilisation. Implications: Maternal health interventions should integrate health education, financial protection, improved geographical and transport access, and family- and community-based support. Conclusion: MCH service utilisation and pregnancy risk-prevention behaviour are associated with interacting individual, enabling, and reinforcing factors. Because the cross-sectional design cannot establish causality and bivariate analysis cannot identify



dominant determinants, future studies should use multivariable and longitudinal or intervention designs.

Keywords: *Maternal and Child Health Services, Pregnancy Risk-Prevention Behaviour, Pregnant Women, Andersen's Behavioural Model, Health Belief Model*

INTRODUCTION

Maternal and child health (MCH) is a major indicator of health-system performance and remains a global priority within the Sustainable Development Goals (SDGs), particularly SDG Target 3, which aims to reduce the maternal mortality ratio (MMR) to below 70 per 100,000 live births by 2030 (WHO, 2023). In 2023, approximately 260,000 maternal deaths were estimated worldwide, equivalent to around 712 deaths every day. Although global maternal mortality has declined substantially since 2000, considerable inequalities persist, particularly in developing countries and geographically isolated areas where access to essential maternal healthcare remains constrained (WHO et al., 2025). Consequently, the utilisation of maternal and child health (MCH) services, including antenatal care (ANC), skilled birth attendance, postnatal care (PNC), iron supplementation, and tetanus immunisation, remains an important component of maternal complication and mortality prevention (Titaley et al., 2025).

The Indonesian context demonstrates that achieving high coverage of individual maternal health services does not necessarily indicate continuity and completeness of maternal care. The 2023 Indonesia Health Survey (SKI) reported that coverage of the fourth antenatal visit (K4) was 68.1%, whereas completion of six antenatal visits (K6) was only 17.6%, despite skilled birth attendance reaching 96.1%. Similarly, the Indonesia Health Profile reported national K1–K6 antenatal care coverage of 74.4%, which remained below the 100% Minimum Service Standard (SPM) target (Kemenkes RI, 2023). Evidence from the 2023 Indonesia Health Survey further demonstrates that incomplete ANC is associated with regional disparities, socioeconomic conditions, and barriers to healthcare access, with eastern and geographically isolated regions experiencing greater disadvantages than areas with better infrastructure (Titaley et al., 2025). These findings indicate that maternal healthcare utilisation is not solely determined by individual willingness or knowledge but is also shaped by the resources and accessibility of the health system.

The relationship between individual characteristics, healthcare accessibility, social support, and maternal health outcomes can be understood through Andersen's Behavioural Model of Health Services Use. This model conceptualises healthcare utilisation as the result of interactions among predisposing factors, enabling factors, and reinforcing factors. Predisposing factors include age, education, occupation, parity, knowledge, and attitudes; enabling factors include health insurance, household income, distance to healthcare facilities, transportation, and availability of healthcare personnel; while reinforcing factors include family or spousal support, community health workers, village midwives, and health education (Li et al., 2023; Alkhawaldeh et al., 2023). The model is particularly relevant in geographically isolated settings because the intention or capacity of pregnant

women to seek care may be strengthened or constrained by resources and social support available in their environment. Evidence from Indonesia similarly indicates that socioeconomic status, health insurance, and geographical access are important determinants of inequalities in healthcare utilisation (Nabila et al., 2026).

These determinants may also operate through pregnancy risk-prevention behaviour. Knowledge and attitudes can influence how pregnant women perceive susceptibility to pregnancy complications, the severity of potential risks, the benefits of preventive action, and barriers to accessing care. Consistent with the Health Belief Model, these perceptions can encourage preventive actions such as attending ANC, recognising pregnancy danger signs, complying with health workers' recommendations, maintaining adequate nutrition, preparing for childbirth, and accepting referral when complications occur (Widyastuti et al., 2023). Health education and previous pregnancy experiences may function as cues to action that encourage pregnant women to recognise warning signs and seek care earlier (Mulyani et al., 2026). Conversely, inadequate knowledge of pregnancy danger signs has been associated with delays in appropriate health-seeking behaviour (Gesese et al., 2023), while recent evidence from developing countries indicates that knowledge and health-seeking behaviour remain heterogeneous across populations (Juniarti & Mumtazzah, 2026). The interaction between these factors is particularly important in island and border regions. Geographical distance, dependence on sea transportation, weather conditions, inter-island travel, and unequal distribution of health facilities and personnel can create structural barriers to continuity of maternal care. Indonesian evidence shows that perceived barriers to accessing healthcare, particularly distance to health facilities, are associated with increased risk of pregnancy complications because delays can interfere with early detection and management (Rizkianti et al., 2021). Similar challenges have been documented in eastern Indonesian island regions, where limitations in referral systems and transportation have hindered the delivery of maternal and newborn health services (UNICEF, 2017). Therefore, strengthening maternal health services in archipelagic areas requires approaches that address not only individual knowledge and attitudes but also financial protection, geographical accessibility, transportation, and community-based support (Setyaningtyas & Ayuningtyas, 2025).

These structural and behavioural problems are clearly relevant to the local context of the Melonguane Community Health Centre, Talaud Islands Regency, North Sulawesi. As an archipelagic and national border area, the service area of the Melonguane Community Health Centre is characterised by geographical barriers that may affect pregnant women's ability to access and continuously utilise maternal health services. The empirical conditions identified among pregnant women in the study area demonstrate that these barriers remain relevant despite relatively favourable levels of social and health-system support. Among the 152 pregnant women assessed, 42.8% lived more than 5 km from the community health centre and 36.2% reported difficult transportation access. Although 82.9% were covered by the National Health Insurance (JKN) scheme, 45.4% reported household income below the minimum wage. These conditions suggest that financial protection alone may not eliminate geographical and economic barriers to maternal healthcare utilisation.



The local situation is also reflected in the utilisation of MCH services and pregnancy risk-prevention behaviour. Although 71.1% of pregnant women demonstrated good utilisation of MCH services, 28.9% still showed inadequate utilisation. In particular, complete tetanus immunisation reached 69.1%, indicating that continuity of essential preventive maternal services remains an issue. Similarly, although 67.8% demonstrated good pregnancy risk-prevention behaviour, 32.2% remained in the inadequate category. This problem was particularly relevant to nutritional fulfilment and management of pregnancy risk factors, despite relatively favourable levels of recognition of pregnancy danger signs and willingness to follow referral recommendations. These local findings indicate that the problem in Melonguane is not simply the availability of maternal health services but the interaction between women's capacity to utilise services, their preventive behaviour, and the contextual resources that support or constrain both outcomes. The observed pattern further suggests a reciprocal relationship between individual and contextual determinants and maternal health outcomes. Pregnant women with adequate knowledge and positive attitudes may be more likely to utilise MCH services and adopt pregnancy risk-prevention behaviours. However, these individual capacities may not translate into optimal utilisation when distance and transportation constitute substantial barriers. Conversely, access to health insurance, supportive husbands, active community health workers, and exposure to health education may strengthen women's ability to convert knowledge and positive attitudes into health-related actions. The empirical analysis in the study supports this relationship: knowledge and attitudes were significantly associated with MCH service utilisation and pregnancy risk-prevention behaviour, while JKN coverage, household income, distance, transportation access, spousal support, community health worker involvement, and health education were also significantly associated with one or both outcomes ($p < 0.05$).

Previous studies have predominantly examined antenatal care utilisation or maternal preventive behaviour separately and have often been conducted in mainland or relatively accessible settings. Evidence simultaneously examining MCH service utilisation and pregnancy risk-prevention behaviour within an archipelagic and national-border setting remains limited. Although Andersen's model has been applied to explain maternal healthcare utilisation, the model also requires contextual adaptation to geographical, socioeconomic, and sociocultural conditions that characterise remote populations (Alkhawaldeh et al., 2023; Li et al., 2023). In addition, existing evidence on maternal healthcare inequalities in Indonesia has highlighted the importance of access and socioeconomic conditions, but empirical evidence specifically describing the simultaneous relationship between these determinants, MCH service utilisation, and pregnancy risk-prevention behaviour among pregnant women in the Melonguane Community Health Centre catchment area remains limited (Nabila et al., 2026; Titaley et al., 2025).

Therefore, the present study addresses this gap by simultaneously examining the association of predisposing, enabling, and reinforcing factors with two related maternal health outcomes: utilisation of MCH services and pregnancy risk-prevention behaviour among pregnant women in the Melonguane Community Health Centre catchment area. Rather than assuming that poor maternal health behaviour is primarily an individual problem, this study examines how individual

characteristics interact with healthcare accessibility, financial protection, transportation, and social support within an island-border context. The findings are expected to provide locally grounded evidence for strengthening integrated maternal health interventions through health education, improved accessibility, community support, and optimisation of existing maternal health services. Based on this rationale, this study aimed to analyse the determinants associated with the utilisation of maternal and child health services and pregnancy risk-prevention behaviour among pregnant women in the service area of the Melonguane Community Health Centre, Talaud Islands Regency, North Sulawesi. Specifically, the study examined the associations of predisposing, enabling, and reinforcing factors with both outcomes to identify factors that should receive priority in strengthening maternal health services in an archipelagic and border setting.

METHODS

This study employed an analytical observational design with a cross-sectional approach to analyse the relationship between predisposing factors, enabling factors and reinforcing factors with the utilisation of maternal and child health (MCH) services and risk-prevention behaviours during pregnancy. The conceptual framework of the study draws on Andersen's Behavioural Model of Health Services Use, which explains that the utilisation of health services is influenced by the interaction of predisposing factors, enabling factors and reinforcing factors. The study was conducted in the catchment area of the Melonguane Community Health Centre, Talaud Islands Regency, North Sulawesi Province, between February and May 2026.

The study population comprised all pregnant women residing in and/or registered in the pregnant women's cohort register within the Melonguane Community Health Centre's catchment area during the study period. Inclusion criteria included pregnant women in their first to third trimesters, residing in the study area, willing to participate as respondents, providing informed consent, and able to communicate verbally and take part in the interview process. Pregnant women who were unable to complete the questionnaire due to conditions hindering the communication process or the completion of the instrument, as well as those who were being referred or receiving care outside the Melonguane Community Health Centre's catchment area, were excluded from the study. Respondents were selected using total sampling, whereby all members of the population who met the inclusion criteria and did not meet the exclusion criteria were included as respondents. This technique was chosen because the entire population was accessible during the data collection period and it enabled the researchers to involve all pregnant women who met the study criteria. A total of 152 pregnant women were successfully interviewed and all questionnaires were deemed complete; consequently, all were included in the analysis.

The dependent variables of the study comprised the utilisation of maternal and child health (MCH) services and behaviours to prevent pregnancy-related risks. The utilisation of MCH services included the regularity of antenatal care (ANC) visits in accordance with the K1-K6 standards, the consumption of iron tablets as recommended, tetanus immunisation, preparation for childbirth with healthcare professionals, and adherence to postnatal visits. Meanwhile, pregnancy risk prevention behaviours include adherence to antenatal care, meeting nutritional needs during pregnancy, the



ability to recognise warning signs of pregnancy complications, efforts to avoid pregnancy risk factors, adherence to healthcare professionals' advice, preparedness for childbirth, and willingness to follow referrals where necessary. Independent variables were classified according to Andersen's Behavioural Model into three groups: predisposing factors, which include age, education, occupation, parity, knowledge and attitudes; enabling factors, comprising National Health Insurance (JKN) coverage, household income, distance from home to the community health centre (Puskesmas), and access to transport; and reinforcing factors, comprising support from a husband/family, the role of community health workers, the role of village midwives, and exposure to health education.

Primary data were collected using a structured questionnaire through face-to-face interviews with respondents. The instrument covered respondent characteristics, predisposing factors, enabling factors, reinforcing factors, utilisation of MCH services, and pregnancy risk prevention behaviours. The indicators for the utilisation of MCH services were developed based on those from the Indonesian Health Survey, whilst the instrument for pregnancy risk prevention behaviours was adapted from the Health Belief Model. Prior to its use in the main data collection, the instrument was pilot-tested on pregnant women outside the study area who shared similar characteristics to the study population. The validity of the instrument was assessed using Pearson's product-moment correlation, whilst internal reliability was assessed using Cronbach's Alpha, with a coefficient value of ≥ 0.60 as the threshold for acceptable reliability. Data collection was carried out by the researchers with the assistance of enumerators who had received training on interview procedures and the use of the instruments. Secondary data, in the form of a register of the cohort of pregnant women and reports on ANC and PNC coverage, were used as supporting data and to triangulate the primary data.

Data analysis was carried out in stages using univariate and bivariate analysis. Univariate analysis was used to describe the distribution of respondents' characteristics and each research variable in terms of frequencies and percentages. Bivariate analysis was carried out to test the relationship between each predisposing factor, supporting factor and reinforcing factor and the utilisation of MCH services as well as risk prevention behaviour during pregnancy. The chi-square test was used to test the relationship between categorical variables where the assumption of expected frequencies was met, whilst Fisher's Exact Test was used where there were fewer than five expected frequencies in the contingency table. The level of statistical significance was set at $p < 0.05$. The choice of these analyses was tailored to the cross-sectional design, the categorisation of the variables, and the statistical analyses actually carried out in the study. Consequently, this study did not employ multivariate logistic regression analysis, as the reported findings were limited to univariate and bivariate analyses.

The research was conducted after obtaining ethical approval from the relevant health research ethics committee. Prior to the interviews, each respondent was provided with an explanation of the objectives, benefits, procedures, potential risks, data confidentiality, and their right to refuse or withdraw from participation without any consequences for the healthcare services they receive. Respondents willing to participate provided informed consent prior to data collection.

The confidentiality of respondents' identities and information was safeguarded through anonymisation and restricted access to the research data. All research procedures were carried out in accordance with the principles of health research ethics and the Declaration of Helsinki.

RESULTS

1. Respondent Characteristics

A total of **152 pregnant women** were successfully interviewed and all questionnaires were deemed complete; consequently, all respondents were included in the analysis.

Table 1. Characteristics of Pregnant Women Respondents in the Service Area of the Melonguane Community Health Centre, Talaud Islands Regency, 2026 (n = 152)

Characteristics	n	%
Education		
Primary/Lower Secondary	39	25.7
Upper Secondary School	77	50.7
Higher education	36	23.7
Employment		
Not in employment/Housewives	96	63.2
In employment	56	36.8
Parity		
Primigravida	59	38.8
Multigravida	93	61.2
JKN coverage		
Yes	126	82.9
No	26	17.1
Household income		
< minimum wage	69	45.4
≥ minimum wage	83	54.6
Distance to the Community Health Centre		
≤5 km	87	57.2
>5 km	65	42.8
Transport links		
Easy	97	63.8
Difficult	55	36.2
Knowledge of pregnancy		
Good	98	64.5
Poor	54	35.5
Attitudes towards maternal and child health services		
Positive	104	68.4
Negative	48	31.6



Husband's support		
Good	111	73.0
Insufficient	41	27.0
Role of health workers		
Active	101	66.4
Less active	51	33.6
Exposure to health education		
Ever	118	77.6
Never	34	22.4

A total of 152 pregnant women took part and all the data could be analysed. The respondents were predominantly pregnant women with secondary education, who were unemployed or housewives, and multiparous women, indicating that the majority had previous pregnancy experience as one of the factors shaping their health behaviour. In terms of supporting factors, the majority had National Health Insurance (JKN) and relatively adequate geographical and transport access, although some still faced economic constraints, lived further away, and experienced transport difficulties. Regarding predisposing and reinforcing factors, the majority of respondents possessed good knowledge, positive attitudes, adequate spousal support, an active role played by healthcare workers, and had previously received health education. However, there were still groups with insufficient knowledge and attitudes, as well as limitations in social support, the role of healthcare workers, and exposure to health education, indicating that support for health-related behaviour is not yet evenly distributed.

2. Utilisation of Maternal and Child Health Services and Behaviours to Prevent Pregnancy-Related Risks

Table 2. Distribution of Utilisation of Maternal and Child Health Services and Pregnancy Risk Prevention Behaviours among Pregnant Women (n = 152)

Utilisation of MCH Services	n	%
Good	108	71.1
Poor	44	28.9
Components of Child Health Service Utilisation		
ANC in accordance with standards (K1–K6)	112	73.7
Consumption of iron tablets as recommended	117	77.0
Full tetanus immunisation	105	69.1
Preparation for childbirth with healthcare professionals	114	75.0
Adherence to postnatal check-ups	81	75.7
Pregnancy risk prevention behaviour		
Good	103	67.8
Inadequate	49	32.2
Behavioural Prevention Components		

Recognising warning signs of pregnancy	116	76.3
Meeting nutritional needs during pregnancy	111	73.0
Avoiding pregnancy risk factors	109	71.7
Following healthcare professionals' advice	118	77.6
Willing to be referred if necessary	121	79.6

In general, the uptake of MCH services and preventive behaviour regarding pregnancy risks is relatively good, but is not yet consistent across all components. In terms of MCH uptake, tetanus immunisation is the component with the lowest coverage, whilst antenatal care (ANC) visits, the consumption of iron tablets, preparation for childbirth, and postnatal check-ups show better outcomes. This indicates that the optimisation of services depends not only on attendance but also on the completeness of each component of maternal care, particularly immunisation.

Preventive behaviours also show a relatively positive pattern, particularly in recognising warning signs, following health workers' advice, and willingness to accept referrals. However, meeting nutritional needs and efforts to avoid risk factors still require strengthening. These findings suggest that respondents are better able to follow healthcare workers' instructions than to maintain preventative behaviours that require consistency and self-management; therefore, health education needs to emphasise the sustained adoption of preventative behaviours.

3. Bivariate Analysis

Table 3. Relationship between predisposing factors, enabling factors and reinforcing factors and the utilisation of maternal and child health services among pregnant women in the Melonguane Community Health Centre catchment area (n = 152)

Variable	Good Utilisation of MCH Services n (%)	Inadequate Utilisation of MCH Services n (%)	p-value
Knowledge			
Good	84 (85.7)	14 (14.3)	<0.001
Poor	24 (44.4)	30 (55.6)	
Attitude			
Positive	84 (80.8)	20 (19.2)	<0.001
Negative	24 (50.0)	24 (50.0)	
JKN coverage			
Yes	95 (75.4)	31 (24.6)	0.022
No	13 (50.0)	13 (50.0)	
Distance to the Community Health Centre			
≤5 km	74 (85.1)	13 (14.9)	<0.001
>5 km	34 (52.3)	31 (47.7)	
Transport access			



Easy	80 (82.5)	17 (17.5)	<0.001
Difficult	28 (50.9)	27 (49.1)	
Husband's support			
Good	87 (78.4)	24 (21.6)	0.001
Insufficient	21 (51.2)	20 (48.8)	
Role of community health workers			
Active	79 (78.2)	22 (21.8)	0.003
Less active	29 (56.9)	22 (43.1)	
Health education			
Ever	91 (77.1)	27 (22.9)	0.002
Never	17 (50.0)	17 (50.0)	

The results of the bivariate analysis showed that knowledge, attitudes, JKN enrolment, distance to the community health centre, access to transport, spousal support, the role of community health workers, and exposure to health education were significantly associated with the utilisation of MCH services. Knowledge and attitudes showed a consistent pattern: pregnant women with good knowledge and positive attitudes tended to make better use of services, whilst insufficient knowledge and negative attitudes were more commonly found among those with inadequate utilisation ($p < 0.001$).

Enrolment in the National Health Insurance (JKN) scheme was also associated with better service utilisation, highlighting the importance of financial protection in supporting access to maternal services. Geographical and transport barriers showed a similar pattern; shorter distances and easier access to transport were associated with more optimal service utilisation ($p < 0.001$). These findings confirm that access to services is influenced not only by financial capacity but also by the physical ease of reaching healthcare facilities.

Spousal support, the active role of community health workers, and exposure to health education were also associated with better utilisation of MCH services. This suggests that the utilisation of services is not merely an individual decision, but is also influenced by family and community support in providing information, reminding mothers of service schedules, and helping to overcome barriers to access. As the study employed a cross-sectional design, all these findings indicate an association and cannot be interpreted as a cause-and-effect relationship.

Table 4. Relationship between predisposing factors, supporting factors and reinforcing factors and risk prevention behaviour regarding pregnancy among pregnant women (n = 152)

Variable	Good Behaviour n (%)	Inadequate Behaviour n (%)	p-value
Knowledge			
Good	82 (83.7)	16 (16.3)	<0.001
Poor	21 (38.9)	33 (61.1)	
Attitude			

Positive	82 (78.8)	22 (21.2)	<0.001
Negative	21 (43.8)	27 (56.2)	
JKN			
Yes	91 (72.2)	35 (27.8)	0.024
No	12 (46.2)	14 (53.8)	
Distance to the Community Health Centre			
≤5 km	70 (80.5)	17 (19.5)	<0.001
>5 km	33 (50.8)	32 (49.2)	
Transport access			
Easy	76 (78.4)	21 (21.6)	<0.001
Difficult	27 (49.1)	28 (50.9)	
Husband's support			
Good	84 (75.7)	27 (24.3)	0.001
Insufficient	19 (46.3)	22 (53.7)	
Health education			
Ever	87 (73.7)	31 (26.3)	0.004
Never	16 (47.1)	18 (52.9)	

The results of the bivariate analysis showed that knowledge, attitudes, JKN enrolment, distance to the community health centre, access to transport, spousal support and exposure to health education were significantly associated with risk-preventive behaviour during pregnancy. Respondents with good knowledge and positive attitudes tended to demonstrate better preventive behaviour, whilst insufficient knowledge and negative attitudes were more frequently found in the category of inadequate behaviour ($p < 0.001$). The consistency of this pattern highlights the importance of predisposing factors in shaping preventive behaviour during pregnancy.

Enrolment in the National Health Insurance (JKN) scheme was also associated with better preventive behaviour. Similarly, a shorter distance and easier transport access to the Community Health Centre (Puskesmas) are very significantly associated with better preventative behaviour. These findings suggest that preventative behaviour is influenced not only by individual characteristics but also by opportunities to access healthcare services, information, monitoring and ongoing support. Geographical barriers have the potential to limit the adoption of preventative behaviour even when mothers possess adequate knowledge.

Spousal support and exposure to health education are also significantly associated with preventive behaviour. Pregnant women who receive spousal support and health education tend to exhibit better preventive behaviour. These findings confirm that health information acts as a reinforcing factor by increasing knowledge and providing guidance, whilst spousal support helps to sustain the adoption of preventive behaviour in everyday life.



DISCUSSION

1. Predisposing Factors: Knowledge and Attitudes as Foundations of Maternal Health Behaviour

The findings demonstrate that knowledge and attitudes were consistently associated with both maternal and child health (MCH) service utilisation and pregnancy risk-prevention behaviour. Pregnant women with good knowledge and positive attitudes were more likely to demonstrate appropriate utilisation of MCH services and preventive behaviours than those with poorer knowledge and less favourable attitudes. This pattern indicates that maternal health behaviour in the Melonguane Community Health Centre catchment area is partly shaped by women's cognitive understanding and perceptions of pregnancy-related risks.

These findings are consistent with the Health Belief Model (HBM), which proposes that preventive behaviour is influenced by an individual's perceptions of susceptibility, severity, benefits, barriers, and cues to action. Among pregnant women, adequate knowledge can facilitate recognition of pregnancy complications and strengthen perceptions of the importance of preventive care, while positive attitudes can support the translation of these perceptions into health-related actions. Widyastuti et al. (2023) similarly demonstrated the relevance of the HBM in explaining preventive behaviour among pregnant women. Mulyani et al. (2026) further emphasised that healthy behaviour during pregnancy is shaped by an interaction between individual cognition, previous experiences, social influences, and the healthcare environment.

The association between knowledge and health-seeking behaviour is also supported by Gesese et al. (2023), who reported that knowledge of pregnancy danger signs was associated with health-seeking action among pregnant women. Juniarti and Mumtazzah (2026) likewise identified substantial variation in knowledge and health-seeking behaviour among pregnant women in developing-country settings. Therefore, the present findings suggest that strengthening maternal health literacy remains relevant in Melonguane, particularly because appropriate preventive behaviour requires women not only to receive information but also to recognise its relevance to their own pregnancy.

From the perspective of Andersen's Behavioural Model of Health Services Use, knowledge and attitudes function as predisposing characteristics that shape an individual's propensity to utilise healthcare services. Alkhawaldeh et al. (2023) demonstrated that Andersen's model provides a comprehensive framework for understanding healthcare utilisation through the interaction of predisposing, enabling, and reinforcing factors. Li et al. (2023) similarly found that maternal healthcare utilisation is influenced by individual characteristics as well as contextual resources. The consistency of the present findings with these theoretical propositions strengthens the relevance of Andersen's model for understanding maternal healthcare utilisation in an archipelagic setting.

The relatively favourable level of knowledge and attitudes among respondents should, however, be interpreted within the characteristics of the study population. Because this study used total sampling, all pregnant women who met the eligibility criteria and were accessible within the Melonguane Community Health Centre catchment area during the study period were included. Thus, the observed distribution represents the eligible population available during February–May 2026 rather than a probability sample drawn from a wider population. The relatively high

proportion of respondents with good knowledge and positive attitudes may therefore reflect the specific service and educational environment of this population. Health education delivered by healthcare workers, village midwives, and community health workers may have contributed to this pattern, although the cross-sectional design does not permit a causal conclusion.

2. Enabling Factors: Health Insurance and Geographical Accessibility

The findings further indicate that enabling factors, particularly JKN coverage, distance to the Community Health Centre, and transport accessibility, were associated with MCH service utilisation and pregnancy risk-prevention behaviour. The consistent pattern indicates that having knowledge and positive attitudes alone may not be sufficient to produce optimal maternal health practices when women face financial or geographical barriers to accessing healthcare.

The association between JKN coverage and maternal healthcare utilisation is consistent with Rahmawati and Hsieh (2024), who reported that the implementation of universal health insurance in Indonesia was associated with increased utilisation of maternal health services, particularly among disadvantaged populations and less-developed regions. These findings suggest that financial protection can reduce one important barrier to healthcare access. Nevertheless, health insurance does not directly eliminate physical barriers to healthcare facilities.

Distance and transportation emerged as particularly important contextual factors in the present study. Pregnant women living farther from the Community Health Centre or experiencing transportation difficulties were more frequently found among those with inadequate MCH utilisation and inadequate pregnancy risk-prevention behaviour. This finding is consistent with Rizkianti et al. (2021), who identified perceived barriers to healthcare access, including geographical barriers, as factors associated with pregnancy complications in Indonesia. In geographically dispersed settings, the ability to reach healthcare facilities in a timely manner becomes particularly important because delays can affect antenatal monitoring, identification of danger signs, and access to referral services.

The findings are also consistent with Setyaningtyas and Ayuningtyas (2025), who highlighted the structural challenges faced by archipelagic regions, including transportation limitations, unequal distribution of healthcare personnel, and difficulties in accessing primary healthcare services. UNICEF (2017) similarly documented challenges in maternal and newborn healthcare delivery in Eastern Indonesia, particularly regarding transportation and referral systems. These findings provide contextual support for interpreting the present results not merely as individual failures to seek care, but as manifestations of the interaction between individual capacity and the accessibility of the health system.

This interpretation is directly compatible with Andersen's Behavioural Model, in which enabling resources determine whether individuals who are predisposed to use healthcare services are actually able to obtain them. In the Melonguane context, JKN may facilitate financial access, while transportation and geographical proximity determine physical access. The simultaneous presence of these factors suggests that maternal health interventions in island settings should not



focus exclusively on increasing demand for services. They should also strengthen the practical ability of pregnant women to reach and continuously use those services.

The total-sampling approach strengthens the contextual relevance of this interpretation because the study did not select respondents based on a probability mechanism that could disproportionately represent particular socioeconomic or geographical groups. Instead, all eligible pregnant women available in the defined catchment population during the study period were included. Consequently, the findings provide a comprehensive description of the associations observed within the accessible study population. However, generalisation to pregnant women outside the Melonguane Community Health Centre catchment area should remain cautious because the study was conducted in one geographically specific island-border setting.

3. Reinforcing Factors: Spousal Support and Health Education

The study also found significant associations between spousal support and exposure to health education and both maternal health outcomes. Pregnant women receiving stronger support from their husbands were more likely to demonstrate appropriate MCH service utilisation and pregnancy risk-prevention behaviour. Similarly, respondents who had received health education tended to demonstrate more favourable outcomes.

These findings indicate that maternal healthcare decisions are not exclusively individual decisions. Spousal support may facilitate attendance at health services, provide practical assistance, reinforce recommendations from healthcare professionals, and encourage adherence to preventive practices. Health education, meanwhile, can provide information and cues that support recognition of pregnancy risks and appropriate responses to those risks.

The findings are consistent with Andersen's Behavioural Model, in which social and community resources operate as reinforcing factors that facilitate healthcare utilisation. Li et al. (2023) demonstrated the importance of social and healthcare-system support in maternal healthcare utilisation in Papua New Guinea, a context that shares several geographical characteristics with island regions. Adnani et al. (2025) likewise showed that healthcare professionals and community-based support mechanisms contribute to continuity of antenatal, intranatal, and postnatal care among Indonesian women.

The role of health education can also be interpreted through the Health Belief Model. Health education may function as a cue to action by increasing awareness of pregnancy risks, clarifying the benefits of preventive care, and encouraging timely healthcare-seeking. Mulyani et al. (2026) emphasised the importance of multiple behavioural and contextual determinants in shaping healthy behaviour during pregnancy. Thus, the association observed in this study supports the proposition that information becomes more meaningful when it is reinforced through interpersonal support and opportunities to act upon that information.

The importance of these reinforcing factors may be particularly pronounced in an archipelagic environment. Where distance and transportation can limit routine access to health facilities, husbands, community health workers, and health education may provide practical and social mechanisms that help pregnant women maintain contact with the healthcare system. Such

support may include reminders about appointments, assistance in arranging transportation, accompaniment during healthcare visits, and facilitation of referral when complications are suspected.

Nevertheless, these interpretations should remain within the limits of the study design. Because the study was cross-sectional, the observed associations cannot establish whether stronger spousal support or greater exposure to health education preceded better utilisation and preventive behaviour. It is also possible that women who were already more engaged with healthcare services were more likely to receive health education or report stronger social support. Longitudinal research is therefore required to clarify the temporal relationships between reinforcing factors and maternal health behaviour.

4. Interrelationship Between Individual, Enabling, and Reinforcing Factors

Taken together, the findings indicate that MCH service utilisation and pregnancy risk-prevention behaviour are associated with overlapping individual, structural, and social determinants. Knowledge and attitudes represent the individual predisposition to engage in healthy behaviour; JKN, geographical accessibility, and transportation represent the resources required to act on that predisposition; while spousal support and health education provide social reinforcement that can sustain health-related actions.

This integrated pattern supports Andersen's Behavioural Model, which conceptualises healthcare utilisation as the result of interactions among predisposing, enabling, and reinforcing conditions. Alkhawaldeh et al. (2023) highlighted the usefulness of this model for understanding healthcare utilisation across different contexts, while Li et al. (2023) demonstrated its applicability to maternal healthcare utilisation in a geographically challenging setting. The present findings extend this perspective by demonstrating that similar categories of determinants are also associated with pregnancy risk-prevention behaviour.

The findings are also compatible with the Health Belief Model because knowledge and attitudes may shape how pregnant women perceive pregnancy risks and the benefits of preventive action, while health education can function as a cue to action. However, the present findings indicate that cognitive readiness does not operate independently of structural conditions. A woman may understand the importance of ANC, immunisation, nutrition, or referral, but geographical distance and transportation difficulties can still constrain her ability to act consistently on that knowledge.

This interaction is particularly important because the overall utilisation of MCH services and pregnancy risk-prevention behaviour was relatively good, yet not all components were equally achieved. Tetanus immunisation showed the lowest level among the assessed MCH service components, while nutritional fulfilment and avoidance of pregnancy risk factors remained areas requiring further strengthening. This suggests that maternal health programmes should move beyond measuring overall service attendance and pay greater attention to the completeness and continuity of individual preventive components.



5. Implications for Maternal Health Services in Archipelagic and Border Settings

The findings have several practical implications for the Melonguane Community Health Centre and similar healthcare settings. First, health education should continue to strengthen maternal knowledge and positive attitudes, but should be designed around actionable information, including pregnancy danger signs, nutritional practices, immunisation, ANC continuity, and appropriate referral behaviour. Second, financial protection through JKN should be maintained while simultaneously addressing geographical and transportation barriers.

Third, community-based approaches should be strengthened through active involvement of husbands, community health workers, and village midwives. An integrated outreach model could combine maternal health education, monitoring of ANC and immunisation, identification of pregnancy risks, husband involvement, and referral preparedness within the same community-based activity. Such an approach is consistent with evidence from Indonesia and other geographically challenging settings showing that continuity of maternal healthcare requires interaction between formal health services and community-level support (Adnani et al., 2025; Li et al., 2023).

The findings also support the need for interventions that are sensitive to the geographical characteristics of island and border communities. Setyaningtyas and Ayuningtyas (2025) emphasised strengthening access to primary healthcare in archipelagic areas, including improvements in referral systems and the use of telemedicine. These approaches may complement, rather than replace, improvements in transportation and community-based maternal health services.

CONCLUSIONS

The utilisation of maternal and child health services and the prevention of pregnancy risks among pregnant women in the working area of Puskesmas Melonguane are related to the interaction of predisposing, enabling, and reinforcing factors. Knowledge and attitudes are important factors at the individual level, while JKN, economic conditions, distance, transportation access, spousal support, the role of cadres, and health education also shape opportunities and support in utilising services and implementing preventive behaviours.

This study has limitations due to its cross-sectional design, so the relationships found cannot be interpreted as cause-and-effect relationships. Additionally, the analysis is still limited to bivariate analysis, so it has not yet been able to determine the most dominant factors for each outcome. Therefore, future research needs to use multivariate analysis, particularly logistic regression, as well as longitudinal or intervention designs to more robustly test temporal relationships and intervention effectiveness. Based on these findings, strengthening maternal services in island regions should be directed towards an integrated approach that includes health education, improved geographical and transportation access, financial protection, and enhanced support from husbands and health cadres.

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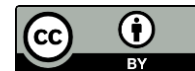
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