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Health belief model analysis on the maternal through antenatal care as an effort to prevent mortality

Análisis del modelo de creencias en salud sobre la atención materna y prenatal como un esfuerzo para prevenir la mortalidad

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SUMMARY

Introduction: *The Health Belief Model (HBM) is a conceptual framework used to predict a person's health behavior, including maternal antenatal care (ANC). By consistently implementing ANC, we can reduce threats to the health of mothers, such as the risk of death. However, it's important to remember that maternal decision-making is a complex process influenced by various factors. Psychological factors such as perceived benefits, barriers, and cues to action play an essential role in shaping maternal behavior.* **Objective:** *This study explores the relationship between the HBM and maternal behavior in carrying out ANC to prevent maternal mortality.* **Methods:** *The research method used was an observational cross-sectional design. The study population included all women in the Dampek Public Health Center working area, with a study sample of 100 maternal. Purposive sampling techniques were used for sample selection. Data was collected in the period May-July 2023.* **Results:** *The results of statistical analysis using the linear regression coefficient test showed a p-value of 0.0001(< 0.05); there was a significant relationship between HBM variables, such as perceived susceptibility, perceived benefit, perceived barrier, cues to action, and self-efficacy, with the behavior of maternal in doing ANC. In addition, all HBM variables were related to the ANC behavior of maternal. However, partially, only perceived benefits, perceived barriers, and cues to action had a significant relationship with ANC behavior.* **Conclusion:** *The findings of this study are significant in that they underscore the potential of the Health Belief Model to reduce maternal mortality. By understanding the psychological factors behind maternal behavior following ANC, we can design interventions that address these factors, thereby increasing maternal participation in the ANC and significantly reducing maternal mortality.*

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RESUMEN

Introducción: *El modelo de creencias en salud (HBM) es un marco conceptual que se utiliza para predecir el comportamiento de salud de una persona, incluida la atención materna prenatal (ANC). Las amenazas a la salud de las madres, como el riesgo de muerte, pueden reducirse mediante la implementación coherente de la atención prenatal. Sin embargo, factores psicológicos como los beneficios percibidos, las barreras y las señales para la acción también desempeñan un papel esencial en la decisión de la madre de asistir regularmente a la atención prenatal.*

Objetivo: *Este estudio explora la relación entre el HBM y el comportamiento materno en la realización de atención prenatal para prevenir la mortalidad materna.* **Métodos:** *El método de investigación utilizado fue el diseño observacional transversal. La población de estudio incluyó a todas las mujeres del área de trabajo del Centro de Salud Pública de Dampek, con una muestra de estudio de 100 maternas. Para la selección de muestras se utilizan técnicas de muestreo intencional. Los datos fueron recolectados en el período mayo-julio de 2023.* **Resultados:** *Los resultados del análisis estadístico mediante la prueba de coeficiente de regresión lineal mostraron que un valor de p de 0,0001(< 0,05), hubo una relación significativa entre las variables de HBM, como la susceptibilidad percibida, beneficio percibido, barrera percibida, señales para la acción y autoeficacia, con el comportamiento de la madre al realizar la atención prenatal. Al mismo tiempo, todas las variables de HBM estaban relacionadas con el comportamiento de atención prenatal de la madre. Sin embargo, parcialmente, sólo los beneficios percibidos, las barreras percibidas y las señales para la acción tienen una relación significativa con el comportamiento del ANC.* **Conclusión:** *Es esencial comprender los factores psicológicos detrás del comportamiento materno después de la atención prenatal. La creencia en los beneficios, las percepciones de barreras y las señales para la acción alientan a las madres a tomar las medidas preventivas necesarias durante el embarazo para prevenir el riesgo de muerte materna. Por lo tanto, los programas de salud pública deben prestar atención a estos factores para aumentar la participación materna en la atención prenatal, reduciendo significativamente la mortalidad materna.*

INTRODUCTION

Maternal mortality is still a significant health problem. East Manggarai Regency is one of the districts in East Nusa Tenggara Province, showing the highest number of maternal deaths in 22 districts/cities in 2022. The death of the mother is a severe consequence of non-compliance with maternal antenatal care (ANC). The impact is not only limited to the mother but also endangers the life of the unborn fetus. This indicates the severity of the problem and the urgency to address it. Threats to the health of pregnant women, including the risk of death, are severe problems in ANC practices. ANC is recognized as an effective preventive measure against maternal health problems, including death, but is highly dependent on psychological factors such as perceptions of benefits, barriers, and cues to action that can influence pregnant women's decision to follow ANC consistently (1).

Antenatal care coverage (at least one visit) is the percentage of women aged 15 to 49 with a live birth in each period who received antenatal care provided by skilled health personnel (doctor, nurse, or midwife) at least once during pregnancy. Although the ANC has long been recognized as an effective practice for maintaining the health of pregnant women, there are still challenges in ensuring the consistent participation of all pregnant women. Such psychological factors are becoming increasingly recognized as the leading cause of non-compliance. Several factors affect antenatal care, such as *Knowledge*: The incomprehension of mothers and families on the importance of pregnancy controls impacts pregnant women who do not assist the health workers; *Economy*: The economic level will affect health; low-income families cannot provide funds for pregnancy control. Problems that arise in families with low economic levels are pregnant women lacking energy and protein due to the inability of their families to provide them with those needed during pregnancy. *Socio-Cultural*: The condition of the family environment that is not supportive will affect the mother in controlling her pregnancy. Family behavior that does not allow a woman to leave home to control her pregnancy is a culture that hinders the regularity of visits to control. *Geographic*: Geographical location is decisive for health services; in remote places, pregnant women find it difficult to control their pregnancy; this is because transportation is difficult to reach remote areas. *Attitude*: The response of pregnant women about pregnancy control is one factor that influences the regularity of ANC (2). The existence of a better attitude towards ANC reflects the concern of pregnant women for the fetuses' and their own health. *Information is the whole meaning*: good quality information from health workers is essential to inform pregnant women. Everyone should have access to information about their own healthcare. This approach is usually used to arouse public awareness of an innovation that affects behavior, usually through mass media. Mothers who have received information about antenatal care from health workers, mass media, and electronic media will increase their knowledge of the importance

of antenatal care to assist antenatal care visits regularly. *Support*: This means support and assistance. Support in determining one's attitude means help or support from the closest person to induce a repeated visit. The husband's social support that the wife highly expects includes the husband coveting the baby in the wife's womb, showing happiness at the baby's birth, paying attention to the wife's health, escorting and understanding his wife, avoiding hurting the wife, praying for the safety of the wife and waiting when the wife is in labor. In addition, pregnant women must believe in the requirement of ANC during pregnancy to prevent unwanted events, such as the death of the mother (3).

The Health Belief Model (HBM) is one of the most widely used theoretical frameworks to understand and predict health behaviors. HBM postulates that individual perception and health beliefs matter in taking desirable behaviors, in this case, adequate antenatal care services use and timeliness, and states that health-related behavior depends on the combination of several factors, namely, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. HBM is an effort to prevent maternal death by carrying out suitable antenatal care measures depending on the behavior of pregnant women in conducting pregnancy control visits. Preventive behavior in individuals is a form of healthy behavior that pregnant women must achieve to avoid unwanted events during pregnancy, childbirth, and postpartum. Every individual has decisions about what they choose, including pregnancy controls; their choices are also influenced by confidence in their health. It is generally believed that individuals will take action based on their health beliefs to prevent, reduce, and control health problems or related health behaviors. The primary constructs and assumptions of HBM include (1) perceived threat, which consists of (a) perceived vulnerability: one's subjective perception of the risk of contracting a disease and (b) perceived severity: one's sense of the seriousness of contracting a disease (2); perceived benefits: one's perception of the effectiveness of the various measures available to reduce the threat of disease (3); perceived barriers: one's beliefs about potential negative aspects of taking specific health measures; and (4) cues to act: internal or external cues that determine a person's readiness to act and trigger the decision-making process (4,5).

HBM explains the individual's perception of vulnerability and usefulness, which influences individual decisions about health. Each mother shares different perceptions in facing her pregnancy; the impact of this perception is the delay of mothers in seeking pregnancy services. HBM is also used to predict preventive behavior in the form of healthy behavior and is also a behavioral response to actions to be taken during pregnancy. HBM consists of several aspects of the theory that assume that for individuals to be motivated to take healthy steps and take healthy actions (perceived threat) influenced by (perceived susceptibility), individuals need to convince themselves that they are vulnerable / at risk of disease. Perceived severity is if a person suffers from a disease and believes the effects will be severe. Someone has to believe in that belief; it affects each other, so there will be an action. Then, individuals will carry out a healthy lifestyle and trusted behavior in this study, namely HBM pregnant women assisting ANC. Then, the perceived benefits and perceived barriers when assisting ANC, these obstacles can or may not be overcome. Further, the motivating factor or judgment about who and what things make him moved (cues to action) to do healthy behaviors is support from outside the self that affects (family, friends, mass media) and beliefs from within him with existing considerations whether there will be a success (self-efficacy) in doing these behaviors. Thus, self-efficacy is a person's belief in their ability to complete a task or achieve a goal. It encompasses their confidence in themselves to control their behavior, influence their environment, and stay motivated to pursue their goal. The HBM aspect influences an individual's decision to take action to make healthy behavior or not to perform ANC (6,7).

To determine the confidence of maternal assisting to ANC, a study was conducted on the Health Belief Model (HBM) of pregnant women in carrying out ANC as an effort to prevent maternal mortality in Satar Padut Village, Dampek Health Center Working Area, North Lamba Leda District, East Manggarai Regency. This study aimed to explore the relationship between the Health Belief Model (HBM) and the

behavior of pregnant women in assisting ANC in preventing maternal mortality. Through a better understanding of these psychological factors, it is hoped that strategies can be found to increase the participation of pregnant women in the ANC.

METHODS

This study used an observational approach with a cross-sectional design to explore the relationship between the Health Belief Model (HBM) and the behavior of pregnant women in antenatal care (ANC). The study population included all pregnant women in the working area of the Dampek Health Center. The study sample was 100 pregnant women using purposive sampling techniques. The primary research variable was the behavior of pregnant women in assisting ANC. Independent variables include Health Belief Model (HBM) factors, namely perceived susceptibility, perceived benefit, perceived barrier, cues to action, and self-efficacy. Data were collected through questionnaires developed based on HBM concepts and ANC practices. Before being used in research, these questionnaires have been tested for validity and reliability. Data were collected during the period May-July 2023. The research team visited the Dampek Health Center to collect data from respondents who met the inclusion criteria. Each respondent was asked to fill out a questionnaire with guidance from the research team. The collected data was analyzed using the linear regression coefficient test to evaluate the relationship between HBM variables and the ANC behavior of pregnant women. This analysis was carried out simultaneously and partially to determine the contribution of each HBM variable to ANC behavior using SPSS for Windows software version 23.0. The analysis results were presented descriptively and inferentially to describe the relationship between the variables studied. The study results were concluded by relating the findings to the research objectives. The practical implications of this research were discussed to guide the development of public health programs that are more effective in increasing maternal participation in the ANC and reducing maternal mortality.

RESULT

Table 1 shows that 70 respondents aged 20-35 years (70 %). More than 50 % of primary to secondary education (58 %); 91 % of pregnant were unemployed; gravida status is most Large Multiparous (52 %), gestational age mainly in the second trimester (48 %), and non-compliance with ANC < 4 times (67 %).

Table 1. Respondent Characteristics (n=100)

	Characteristic	f	%
Age	< 20 years; >35 years	30	30
	20 - 35 years	70	70
Education	Low Educated (Elementary -Junior High School)	58	58
	High Educated (High School-Bachelor)	42	42
Job Status	unemployment (Housewife	91	91
	employment (state/Private)	9	9
Status Gravida	Primigravida	14	14
	Multigravida	34	34
	Large Multipara	52	52
Gestational Age	Trimester 1	12	12
	Trimester 2	48	48
	Trimester 3	40	40
ANC	Disobedient (< 4 times)	67	67
	Compliant (> four times)	33	33

*ANC= Ante Natal Care

Table 2. Results of analysis of variance between HBM variables and behavior of Maternal in assisting ANC

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	786.622	1	786.622	23.245	0.0001[b]
	Residual	3 316.368	98	33.840		
	Total	4 102.990	99			

Table 2 shows that the results of the linear regression coefficient test indicate that there is a significant relationship between the HBM variable and the behavior of pregnant women in assisting ANC (p-value<0.0001), which means H0 rejected and Ha accepted, indicating that the HBM variable (Perceived benefit); Perceived Barrier; Cues to action and self-efficacy are jointly related to the behavior of pregnant women in assisting ANC.

Table 3. Results of partial regression analysis between HBM variables and pregnant women in assisting ANC

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
Perceived Susceptibility	-0.014	0.037	-0.034	-0.373	0.710
Perceived severity	-0.001	0.031	-0.003	-0.037	0.971
Perceived benefit	0.310	0.057	0.420	5.434	0.0001
Perceived Barrier	-0.172	0.041	-0.318	-4.216	0.0001
Cues to action	0.124	0.025	0.377	4.931	0.0001
Self-Efficacy	0.027	0.032	0.077	0.847	0.399

Table 3 shows the results of the partial regression coefficient test; not all HBM components are related to the behavior of pregnant women in assisting ANC (p-value of 0.0001). The related components are perceived benefit, perceived barrier, and cues to action, and unrelated components are perceived susceptibility, perceived severity, and self-efficacy.

DISCUSSION

The results of the present study show a significant relationship between the Health Belief Model (HBM) and the behavior of pregnant women in Antenatal Care (ANC). This suggests that factors such as belief in benefits, perceived barriers, and cues to action are essential in determining pregnant women's adherence to ANC. These results are consistent with the theoretical framework of HBM that emphasizes the role of individual perceptions of disease severity, susceptibility, benefits of preventive measures, perceived barriers, and other factors in shaping health behaviors. This finding aligns with a multiple logistic regression study, which showed that the HBM variable (OR 0.040) simultaneously influenced maternal adherence to K4 recommended visits. HBM is used to understand behavior and explain individual health behaviors in a health context. There are five main dimensions in HBM: perception of vulnerability, perception of severity, perceived benefits, perceived obstacles, and trigger or motivational efforts. Factors influencing belief in the benefits of antenatal care include accessibility, affordability, culture, and a woman's autonomy to attend care. Studies have shown that even when services are more accessible and affordable, women from marginalized populations may not always use them, suggesting additional barriers beyond physical access. According to HBM, health behaviors are influenced by several factors,

including individual beliefs about disease severity, personal susceptibility to illness, benefits from preventive measures, and barriers to adopting healthy behaviors. In the context of antenatal care, HBM can be a valuable tool to understand why pregnant women are not consistently assisting with the recommended prenatal care (8,9).

In addition, our results indicate that HBM variables are significantly related to ANC behavior (0.0001), namely Perceived Benefit, Perceived Barrier and Cues to Action. Meanwhile, HBM variables that are not associated with the behavior of pregnant women in assisting ANC are Perceived Susceptibility, Perceived Severity, and Self-Efficacy ($p > 0.05$). The review of each variable related to the behavior of pregnant women in assisting ANC is as follows: Perceived Benefit, based on the results of statistical analysis, the belief factor of perceived benefits is positively and significantly related to the behavior of pregnant women in assisting ANC. These results align with the concept that pregnant women know the benefits of antenatal care visits for well-being, both for the fetus and themselves. The research results show an effect of perceived benefits on the complete use of antenatal services (10). This suggests that the more pregnant women believe that ANC will provide significant benefits to their health and their unborn fetus, the higher their likelihood of attending ANC treatment regularly. Positive perceptions of the benefits of ANC can be a key driver for pregnant women to seek necessary medical care, thereby reducing the risk of complications during pregnancy and childbirth. It includes individual beliefs about the benefits they will get from certain actions to prevent or overcome a condition or disease. In this regard, the perceived benefits of ANC include pregnant women's understanding of how ANC can help identify pregnancy complications early, provide timely treatment, and improve maternal and fetal health. The perceived benefits also influence a person's decision to act or take action to minimize losses. The greater the perception of benefits, the more likely it is to follow the ANC regularly (11). Perceived barrier: The results of statistical tests show that perceived barrier factors are negatively and significantly related to pregnant women's behavior in ANC. This is in line with research, which states that two out of three pregnant women who experience obstacles tend not to assist antenatal care visits according to standards (12). That is, the higher the barriers felt by pregnant women, such as the cost of treatment, distance to health facilities, or fear of medical procedures, the lower their likelihood of attending the ANC regularly. These barriers can be a real barrier for pregnant women in seeking the necessary health care, thus increasing the risk of complications that may arise during pregnancy. It includes all factors or obstacles an individual considers a hindrance in certain preventive or health care measures. In the context of ANC, perceived barriers can consist of cost, accessibility of health facilities, lack of knowledge or information about ANC, concerns about stigmatization, or time constraints. The higher the perception of inhibition, the more likely the individual is to delay or avoid ANCs (13). Cauce to action is also related to the behavior of pregnant women in assisting ANC. The results of this study align with evidence showing that there is an influence of cues to act on the complete use of antenatal services and also stating that husband support affects K4 visits in pregnant women. These external or internal factors drive individuals to take certain health measures. In the case of ANC, triggering efforts can come from various sources, such as advice from health professionals, information from family or friends, personal experiences or events that remind us of the importance of ANC, or health promotion campaigns. Triggering efforts can increase an individual's motivation to take preventive action. Cue factors to act are also positively and significantly related to the behavior of pregnant women in assisting ANC. These results suggest that clear and robust cues, such as health awareness campaigns, information from health workers, or support from family and community, can increase the likelihood of pregnant women seeking ANC care regularly. These cues can encourage pregnant women to take proactive measures toward their health and that of the fetus (14-17). This suggests that beliefs about perceived benefits, barriers, and cues to action significantly influence pregnant women's ANC behavior. By controlling for other variables, the partial analysis revealed a more specific relationship between HBM variables and ANC behavior. Belief in benefits was partially positively associated with ANC behavior, suggesting that the stronger pregnant women's belief in the benefits of ANC, the more likely they

were to comply with ANC recommendations. Furthermore, HBM variables that are not related to the behavior of pregnant women in assisting ANC are Perceived Susceptibility, Perceived Severity, and Self-Efficacy ($p>0.05$). Perceived Susceptibility: The results show that the perceived susceptibility factor is not significantly related to the behavior of pregnant women in assisting ANC. The study results show that disease susceptibility has no significant relationship with disease prevention behavior. In line with the study's results based on Fisher's exact test, the perception of susceptibility to ANC regularity is 0.47, which means there is no relationship between the perception of vulnerability and antenatal examination during the COVID-19 pandemic. This shows that pregnant women's perceptions of risk or susceptibility to complications during pregnancy do not influence their decision to seek ANC care regularly. Although vulnerability can be an important factor in forming health behaviors, other factors may have a more dominant influence in this context. It may be that the expectant mother feels that she is naturally strong and healthy and that the risk of experiencing complications during pregnancy is low. In this case, although there is actual vulnerability if pregnant women do not feel the vulnerability, then this will not be a factor that influences ANC behavior. Perceived susceptibility refers to an individual's perception of the extent to which they feel vulnerable to a particular condition or disease. In the context of pregnant women, although in general, pregnant women do have a higher susceptibility to various pregnancy-related health problems, such as pre-eclampsia, anemia, or infection, this is not always a factor that encourages them to have ANC. The expectant mother may feel that she is naturally strong and healthy and that the risk of experiencing complications during pregnancy is low. In this case, although there is an actual vulnerability if the pregnant woman does not feel the vulnerability, then this will not be a factor influencing ANC behavior (18).

Perceived Severity (Perceived Danger or Pain): The results of statistical tests also show that the danger or pain factor felt is not significantly related to the behavior of pregnant women in assisting ANC. This result is in line with the results of previous research that pregnant women consider that pregnancy is expected, so they do not routinely assist ANC, and some even visit shamans. This is supported by data that as many as 67 % of pregnant women do not comply with ANC, as well as 58 % of those low education levels; this indicates that the severity felt by pregnant women to pregnancy complications or potential maternal death does not affect their decision to seek ANC care. Perceived severity refers to an individual's perception of the seriousness of a condition or disease, including the possible consequences if they do not take preventive or treatment measures. In the context of pregnant women, this includes their understanding of the risks and negative impacts that may occur if they do not get ANC regularly. Although most expectant mothers are aware that pregnancy carries certain risks to their health and the health of the fetus, their perception of the severity of possible complications may vary. For example, an expectant mother may feel that complications such as pre-eclampsia or premature birth will not happen to them or that the impact is not too severe. Even if pregnant women are aware of the risks, they may not feel they are severe enough to motivate them to take ANC regularly (19).

Self-Efficacy: Perceived self-confidence is also not significantly related to the behavior of pregnant women assisting ANC. According to Social Cognitive Theory, a sense of personal control facilitates behavioral change in health. From the theory above, it can be concluded that the higher a person's self-efficacy, the better the health behavior is shown; conversely, the lower a person's self-efficacy, the change in health behavior is not good or less good. This study is closely related to low self-confidence, supported by data that 91 % are housewives and low education 58 % (elementary-junior high); these all affect mothers' confidence in the importance of assisting ANC during pregnancy. The findings in this study align with the results showing that self-efficacy is not significantly related to maternal behavior in meeting the nutritional needs of their children or pregnant women who are doing ANC. This means that the respondent's self-efficiency does not affect his behavior when doing ANC. This suggests that pregnant women's confidence level in their ability to take ANC does not influence their decision to seek such care. Other factors such as knowledge, social support, or practical barriers may be more

important in influencing pregnant women's health care-seeking behavior. Self-efficacy refers to an individual's belief in their ability to perform a particular action or behavior to achieve a desired result. In the context of pregnant women, self-efficacy can relate to their belief in regularly accessing and following the ANC. However, self-efficacy can also be influenced by factors such as social support, knowledge, skills, and available resources. Therefore, it is important to pay attention to and understand the role of these three components in the context of efforts to increase the participation of pregnant women in ANCs (20,21). However, these variables are part of the HBM concept. This finding also provides a deeper understanding of the factors that influence the behavior of pregnant women in conducting ANC in the East Manggarai Regency. The clinical relevance of these findings is the importance of strengthening belief in the benefits of ANC, reducing perceived barriers, and increasing cues for action to improve ANC quality and reduce maternal mortality.

By understanding and digging deeper into each component of this HBM, we can design more effective and relevant interventions to improve health behaviors, including, in this case, the behavior of pregnant women following ANC as an effort to prevent maternal mortality. About self-efficacy in the context of HBM, interventions aimed at improving health behaviors, including adherence to ANC, can focus on strengthening individuals' confidence in their ability to overcome barriers that may arise and carry out the necessary actions to maintain their health and that of the conceived baby. This can be done through approaches that strengthen self-management skills and strategies, as well as provide the necessary support and encouragement to build positive self-efficacy, which in turn can help reduce maternal mortality as an effective strategy in increasing pregnant women's participation in ANC and ultimately improving maternal and infant health in East Manggarai District.

CONCLUSION

There is a significant relationship between HBM and the behavior of pregnant women in assisting ANC. Three of the six HBM factors influence the behavior of pregnant women in assisting ANC, namely perceived benefit, perceived barriers, and cues to action. Understanding the psychological factors behind pregnant women's behavior in participating in ANC is very important because preventive measures needed during pregnancy to prevent the risk of maternal death are necessary, such as public health programs that pay attention to these factors to increase pregnant women's participation in ANC, to reduce maternal mortality significantly.

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Ethical considerations

Health Polytechnic of the Ministry of Health Kupang, East Nusa Tenggara, Indonesia Ethics Committee approved this research protocol (No. LB.02.03/1/0143/2023). Informed consent was obtained from all participants.

Conflict of Interest

The authors state that they have no conflict of interest.

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