

Determinant factors of anemia in pregnancy based on health belief model: a correlational study

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ABSTRACT

Introduction: Pregnancy anemia is still a big problem worldwide. Health behavior can be influenced by perceptions of the importance of disease prevention. The theory of the Health Belief Model can study the relationship between prevention efforts and perceptions. The purpose was to analyze the relationship between perceived susceptibility, perceived severity, perceived benefit, perceived barrier, self-efficacy and cues to action with anemia prevention behaviors.

Methods: This study used a correlational design cross-sectional approach. The total samples were 104 pregnant women selected using purposive sampling. The independent variables in this study were perceived susceptibility, perceived severity, perceived benefit, perceived barrier, self-efficacy, and cues to action. The dependent variable in this study was anemia prevention behaviors. Data were collected at one obstetrical polyclinic in hospital and also home visits were conducted to respondents who did not come to the hospital. The instrument used questionnaires on perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, cues to action and anemia prevention behaviors.

Results: Perceived susceptibility ($p=0.023$ $r=0.223$), and cues to action ($p=0.037$ $r=0.204$) had a significant relationship with anemia prevention behaviors., while there was no relation between perceived severity ($p= 0.839$), perceived benefit ($p= 0.986$), perceived barrier ($p= 0.585$), and self-efficacy ($p=0.399$) with anemia prevention behaviors.

Conclusions: Health workers can increase the susceptibility and cues to action of pregnant women through health education about anemia prevention.

Keywords: anemia, health promotion, health belief model, maternal health, maternity nursing

Introduction

Anemia persists as a health problem for pregnant women around the world (Hasan et al., 2022). Anemia not only results in the death of the mother but also the fetus; therefore, a serious concern by all relevant parties is needed (Daru et al., 2018). Various efforts to prevent anemia in pregnant women have been carried out. The Indonesian government has pursued a prevention program by providing 90 iron supplements to pregnant women, but the incidence of anemia in pregnant women

is still high (Ministry of Health RI, 2016). The many causes of pregnancy anemia in women are due to differences in socioeconomic conditions, lifestyles, or health-seeking behaviors that come from various diverse cultures (Lin et al., 2018).

It is estimated that 40% of pregnant women worldwide suffer from anemia. The incidence of anemia pregnant women in Southeast Asia is as many as 48.7% or around 202 million people (WHO, 2016). This is also in line with pregnant women who experience anemia in

Indonesia; in 2013 there were 37.1% of pregnant women experienced anemia, and this increased in 2018 to 48.9%. There are still 70-80% of pregnant women in Indonesia who experience anemia during pregnancy (Kemenkes RI, [2018](#)). The incidence of anemia in pregnant women in South Kalimantan Province is based on data from the South Kalimantan Provincial Health Office (2016) as many as 21,141 people (27.43%) (Rizani & Yuliastuti, [2020](#)). According to patient registration data at Bontang Hospital from November 2018 to September 2019, there were 1127 pregnant women patients, with Hb levels <8gr/dl in 27 (2.3%) cases, Hb levels 8-8.9 gr/dl in 69 (6.1%) cases, Hb10-10.9gr/dl in 253 (22.4%) cases, Hb>11gr/dl in 611 (54.2%) cases. From the above data it can be seen that pregnant women with low Hb levels or anemia totaled 349 (30.8%) cases (RSUD Bontang, [2019](#)).

A pregnant woman's belief in her body condition affects her behavior in maintaining health. An individual will take precautions when one is considered susceptible to conditions that have serious consequences (Bazargani et al., [2022](#)). Many factors influence the behavior of pregnant women in preventing anemia, one of the examples is the perception that anemia is naturally experienced by women during pregnancy (Klankhajhon et al., [2021](#)), as well as dietary restrictions during pregnancy which affect the dieting behavior of pregnant women (Mariana et al., [2018](#)). The perception and behavior of pregnant women in preventing anemia can be seen from the theory of the Health Belief Model. At present, the factors related to the behavior of pregnant women in preventing anemia have not been resolved. Providing health information to pregnant women or those preparing for pregnancy is very important so that the women will understand more about anemia as well as nutritional benefits during pregnancy to prevent anemia (Triharini et al., [2018a](#)).

The Health Belief Model theory as a nursing theory can be used as a basic theory to assist patients' behavior to improve their health status. The advantage of the Health Belief Model theory is to describe individual beliefs about carrying out healthy living behaviors. The healthy behavior is in the form of preventive behavior and the use of health facilities (Becker et al., [1977](#)). This study aims to analyze the relationship between perceived susceptibility, perceived severity, perceived benefit, perceived barrier, self-efficacy, and cues to action with anemia prevention behaviors.

Materials and Methods

Research design

This study applied a descriptive correlational design with cross-sectional approach. The population of the study consisted of pregnant women that visited during the period from June to December 2020 at the obstetric polyclinic at Bontang Hospital, East Kalimantan, Indonesia.

Research subject

This study used purposive sampling, namely a sampling technique by selecting samples from the population according to the objectives or problems in research (Nursalam, [2016](#)). Sample size was based on Slovin's formula (Sugiyono, [2015](#)). The sample that met the criteria was 104 people. Drop out calculation was plus 10% of the total sample, where the drop out criterion is mothers who cannot complete filling out all the research questionnaires given. The inclusion criteria used were the following: pregnant women with the ability to read and write, and able to communicate well and pregnant women in the 1-3 trimesters that received iron supplements.

The exclusion criteria used were pregnant women who were in a state of sickness (experiencing mental disorders, complications of imminent abortion, preeclampsia, ectopic pregnancy, hyperemesis gravidarum, antepartum hemorrhage, placenta previa, complications of endocrine disease. The mothers who left the study during the research process were used as a dropout criterion.

Instruments

The instruments for collecting this data were in the form of a behavior questionnaire to prevent anemia in pregnant women by Rahmawaty ([2019](#)) which had its validity and reliability tested and a questionnaire that the researchers compiled themselves based on the opinions of experts and the conceptual framework of the Health Belief Model theory. The questionnaires used included the perceived susceptibility (4 items of confidentiality), perceived severity (5 items of statement), perceived benefits (7 items of statements), perceived barriers (5 items of statements), self-efficacy (3 items of statements), cues to action (6 items of statements) and anemia prevention behaviors (11 items) that researchers have tested for validity and reliability. The results of the validity test results were all declared valid, with the value of r count > from the value of r table, namely the lowest r count value of 0.502; this value was more than the r table value of 0.444. Reliability test results obtained Cronbach's alpha value =

0.927 which means the questionnaire used is very reliable.

Data collection

Before conducting the research, researchers conducted preliminary research to determine the incidence of anemia in pregnant women and to find out the problems experienced by clients. The research was carried out at the same time as the outpatient polyclinic service. Because of the current Covid pandemic, pregnant women cannot come every month for antenatal care, so researchers make visits to homes whose areas can be reached by researchers. Previously the researchers conducted health checks and conducted Rapid tests / PCR to ensure researchers were in good health. The data obtained from the hospital's medical record were managed by the researcher to determine which respondents were included in the inclusion and exclusion criteria. Collecting data from respondents at the obstetrical polyclinic at Taman Husada Bontang Hospital was in accordance with the control schedule, assistance in filling out the questionnaires assisted by obstetrical poly workers (officers in obstetrical polyclinics also follow the applicable health protocols), who have received information on the placement of attention with researchers. Researchers conducted home visits to respondents who did not come to the hospital to check themselves. Before visiting the house, the researcher contacted the respondent via WhatsApp, and via telephone to ask for permission. At the time of data collection, the researcher followed the applicable health protocol. The researcher provided an explanation, information, advantage or benefit and then asked for approval through informed consent, ensuring that the respondent understood the contents of the questions by supporting the respondent. This provides opportunity for respondents to ask questions if anything is unclear. During data collection, researchers did not experience unexpected events such as changes in the respondent's health status, for example increased blood pressure/dizziness/anxiety and so on.

Data analysis

Data analysis used univariate analysis and bivariate analysis. Univariate analysis was carried out on each variable from the research results. In general, this analysis produces the distribution and proportion of each variable, so that the variation of each variable in this study is known about the features of the respondents. This analysis is used to see the relationship of more than two independent variables and the dependent variable. Statistical test to see the

relationship between the independent and dependent variables used Spearman's rho correlation; is the data distribution is not normal with a significance level of $\alpha \leq 0.05$, the research hypothesis is accepted, if the significance level is $\alpha \geq 0.05$, then the research hypothesis is rejected.

Ethical consideration

This research has received an ethical certificate from the Ethics Commission (KEPK) of Airlangga University, Faculty of Nursing with No. 2144-KEPK, approval date 13 January 2021 and expiration date 13 January 2022. At the beginning of this study, participants fulfilled informed consent and demographic data. The researchers kept the data of each participant secret by using a code.

Results

Most of the respondents were in the age of 20-29 years (46.2%). Almost 48 (46%) of respondents had graduated from high school/ equivalent. In addition, as many as 63 respondents (65%) had a family income below the regional minimum wage, and 52 (50%) respondents worked as housewives. The highest number of children was two children with 47 (45.2%)

Table 1 Demographic characteristics of respondents (N=104)

Category	N	%
Age		
< 20 years	5	4.8
20 – 29	48	46.2
30 – 39	37	35.6
≥ 40	14	13.5
Education		
Elementary school	9	8.6
Middle school	13	12.5
High school	48	46
Undergraduate	34	32.6
Income (Rupiah)		
< 3.100.000	63	60.5
>3.100.000	41	39.4
Occupation		
Farmer	4	3.8
Entrepreneur	11	10.5
House wife	52	50
Civil servant	29	27.8
Non Permanent staff	8	7.6
Number of children		
1	23	22.1
2	47	45.2
3	26	25.0
>3	8	7.6
Pregnancy interval		
1 year	26	25
2 years	73	70.2
≥ 3 years	5	4.8
Number of pregnancies		
1	0	0
2	23	22.1
>2	81	77.8
Total	104	100

respondents, the highest pregnancy interval was two years, with 73 (70.2%) respondents. In addition, as many as 81 respondents (77.8%) had more than two pregnancies (Table 1).

Based on Table 2, it can be seen that there is a relationship between perceived susceptibility ($p=0.023$ $r=0.223$), and cues to action ($p=0.037$ $r=0.204$) with anemia prevention behaviors. While there was no relation between perceived severity ($p= 0.839$), perceived benefit ($p= 0.986$), perceived barrier ($p= 0.585$), and self-efficacy ($p=0.399$) with anemia prevention behaviors.

In the perceived susceptibility variable, the highest number is found in respondents with high perceived susceptibility and having sufficient anemia prevention behaviors, namely 72 respondents (69.3%). In the perceived severity variable, the highest number is found in respondents with high perceived severity and having sufficient anemia prevention behaviors, namely 49 respondents (47.1%). In the perceived benefits variable, the highest number is found in respondents with high perceived benefits and having sufficient anemia prevention behaviors, namely 52 respondents (50%). In the perceived barriers variable, the highest number is found in respondents with high perceived barriers and having sufficient anemia prevention behaviors, namely 52 respondents (47.1%). In the self-efficacy variable, the highest number is found in respondents with high self-efficacy and having sufficient anemia prevention behaviors, namely 49 respondents (50%). In the cues to action variable, the highest number is found in respondents with high cues to action and having sufficient anemia prevention behaviors, namely 75 respondents (72.1%).

Discussions

Most pregnant mothers feel vulnerable and have sufficient behavior in preventing anemia and some already have cues to action when considered vulnerable to a condition which has serious consequences. Perceived susceptibility is a personal risk perceived by individuals, which in this case is related to perceptions of health conditions (Lennon, 2016). Perceived susceptibility includes a person's acceptance and sensitivity to their health conditions. The main findings of this research show that perceived susceptibility and cues to action had a significant relationship with pregnant mothers' behavior in preventing anemia.

Respondents with high susceptibility factors tend to have sufficient preventive behavior. However, based on the results of the study, some respondents also fell into a moderate level of perceived susceptibility but had good behavior. In addition, due to the factor of ignorance, the mother was still willing to take preventive behaviors following recommendations from health workers. Some mothers also had a high perceived susceptibility but had poor preventive behavior.

Perceived severity of illness or health conditions can be considered a threat; therefore, the individual is willing to take preventive action, follow the screening, and control the existing illness (Glanz et al., 2002). Triharini et al. (2018b) revealed that maternal education can be an obstacle to maternal compliance in consuming nutritional needs during pregnancy.

Respondents with high perceived severity tend to have sufficient behavior. From a demographic point of view, some respondents already had high levels of education, but low family income made some of the mothers unable to carry out good behavior and fell into

Table 2 The relationship between the HBM factors and the behavior of pregnant women in preventing anemia (N=104)

Variable	Category	The behavior of pregnant women in preventing anemia						Spearman Rho Test	
		Good		Sufficient		Poor		p	r
		N	%	N	%	N	%		
Perceived susceptibility	High	2	1,9	72	69,2	6	5,8	0.023	0.223
	Moderate	1	1,0	12	11,5	6	5,8		
	Low	0	0,0	4	3,8	1	1,0		
Perceived severity	High	1	1,0	49	47,1	6	5,8	0.839	0.020
	Moderate	1	1,0	31	29,8	5	4,8		
	Low	1	1,0	8	7,7	2	1,9		
Perceived benefits	High	1	1,0	52	50,0	6	5,8	0.986	0.002
	Moderate	1	1,0	23	22,1	6	5,8		
	Low	1	1,0	13	12,5	1	1,0		
Perceived barriers	High	1	1,0	49	47,1	6	5,8	0.585	0.054
	Moderate	2	1,9	35	33,7	5	4,8		
	Low	0	0,0	4	3,8	2	1,9		
Self-efficacy	High	2	1,9	52	50,0	6	5,8	0.399	0.084
	Moderate	1	1,0	28	26,9	6	5,8		
	Low	0	0,0	8	7,7	1	1,0		
Cues to action	High	2	1,9	75	72,1	7	6,7	0.037	0.204
	Moderate	1	1,0	13	12,5	6	5,8		
	Low	0	0,0	0	0,0	0	0,0		

sufficient behavior in maintaining their health. Some respondents had low perceived severity and poor behavior, this was due to low educational factors which led to a lack of understanding regarding the severity of health conditions if mothers are suffering anemia. Some respondents also regarded that pregnancy anemia normally occurred in pregnant women, which meant the severity of anemia did not become a condition that increased maternal awareness.

The perceived severity of the mother related to anemia during pregnancy did not have an impact on pregnant women to increase their awareness status regarding health condition and the fetus. This was in line with research conducted by Amir and Djokusujono (2019) through a literature review study that found the perceived severity is not related to individual behavior in preventing anemia. This means the higher the severity felt by the mother, the less preventive behavior will be carried out. The high perceived severity does not change the behavior of the mother in preventing anemia in pregnancy; therefore, it does not increase the awareness of the mother to make preventive efforts. Likewise, if the mother has a low perceived severity, it is not an indication that the mother does not make preventive efforts.

Pregnant women with a high perceived benefit will have good anemia prevention behavior. Pregnant women that carry out anemia prevention depend on their belief in the impact of anemia and the success of its prevention efforts. Efforts to prevent anemia can be done by having a balanced diet, treating infectious diseases that can increase the risk of anemia, and being willing to take iron supplements (Parulian et al., 2016). Mothers' belief in the benefits of preventing anemia can occur by having support from family, social support (groups of pregnant women), and health workers (Triharini, et al., 2018b).

Efforts to prevent anemia during pregnancy were dominated by moderate to high perceived benefits with the mother's behavior in the sufficient category. Pregnant women understood and felt the impact of anemia; therefore, some women increased their willingness and preventive efforts. Although the perceived benefits of the respondents were high, it did not always lead to good behavior in preventing pregnancy anemia. On the other hand, if the perceived benefits of the respondent low, it did not mean that the respondent would have poor anemia prevention. This can be caused by low family income which was below the minimum regional wage. Even though the pregnant women already understood the benefits of this anemia

prevention behavior, they were unable to prepare a balanced diet (Khoramabadi et al., 2015).

This is in line with research conducted by Diddana et al. (2018) which states that the perceived benefit does not affect the behavior of pregnant women in preventing pregnancy anemia. Whether the benefit exists or nonexistent, it does not affect the mother's behavior in preventing anemia. According to Glanz et al. (2002), the perceived barriers are anything that hinders an individual from making certain behavior changes. The HBM theory, explains that everything that hinders can be seen in terms of costs, benefits, unsatisfactory and pleasant health services, and support from family and others. Based on the results of the study, the perceived barriers of the mothers were due to the lack of understanding about the benefits of iron supplements, nausea felt when consuming iron supplements, and occupied with activities which led to the absence of doing ANC examination, as well as the factor of income and support from the husband (family member). However, some of these barriers could be overcome by mothers so that they were able to carry out preventive efforts in a sufficient way.

Respondents with high perceived barrier perceptions were dominated by those who had sufficient anemia prevention behavior, not too good and not too poor. The respondents did not understand the benefits of preventive behavior, for example, the consumption of iron supplements regularly and ANC checks. Barriers can also occur due to demographic factors such as inadequate family income which causes respondents to be unable to prevent pregnancy anemia, by consuming balanced nutrition during pregnancy. Some respondents also had a good level of education and high income but did not have sufficient behavior for various reasons, such as not consuming the iron supplements because of the taste. However, it is not in line with the research conducted by Triharini et al., (2018b) who suggest that the perceived barrier by pregnant women has a significant correlation with the behavior of pregnant women in preventing pregnancy anemia).

According to the social cognitive theory (Bandura, 2010), a sense of personal control facilitates changes in health behavior. According to the theory, the higher the belief in one's self-efficacy, the better the health behavior is shown. On the contrary, the lower the confidence in one's own self-efficacy, the change in health behavior would be lower. Therefore, family support is very important for pregnant women to increase confidence (Mardhiah & Marlina, 2019). In an explanation of the results of a study, prevention of

anemia by providing iron supplements to mothers who were at high risk of suffering from anemia includes individuals from families with low socioeconomic conditions (Abdulsalam & Daniel, [2016](#)).

The absence of a significant relationship in this study was due to the number of respondents who believed in anemia prevention was dominated by the sufficient category, not all the respondents had good pregnancy anemia prevention behavior, and on the other hand, not all respondents with low self-efficacy had poor anemia prevention behavior. This was probably because the pregnant women did not feel confident enough about their own preventive behaviors such as buying and consuming healthy food, obeying the consumption of iron supplements, and carrying out routine ANC examinations. The low level of education also had an impact. Some respondents did not understand the benefits of consuming iron supplements. The low-income factor also caused uncertainty for nutritional intake during pregnancy. Belief in self-efficacy did not affect the mother's behavior in preventing pregnancy anemia. This is not in line with research conducted by Cal et al. (2020), which states that self-belief has a direct and significant relationship with the behavior of pregnant women in preventing anemia.

Cues to action is the perception of an individual's willingness to take preventive action through information from the media, health workers, or families who are also influenced by individual sociodemographic aspects (Darmawati et al., [2020](#)). Cues to action can be obtained from educational information provided by health workers either directly or through printed, electronic, or social media information. In addition, the information provided by the family can also increase the mother's willingness to increase prevention efforts against anemia (Heru et al., [2012](#)).

Respondents with high cues to action tend to have sufficient behavior. The reason was due to the majority of respondents had been provided with information from health workers. The existence of increasingly sophisticated technology has made accessing information easier from electronic media and mass media. Another explanation is that most of the mothers were multigravidas. Even so, some respondents had high cues to action but poor behavior caused by demographic factors, namely low education and lack of support from their families/ husbands. The results of this study were in line with research conducted by Salama ([2018](#)), which states that the higher the cues to action for a pregnant woman, the higher the preventive behavior that the mother does.

Perceived susceptibility has a relationship with maternal behavior in preventing anemia during pregnancy, because mothers who feel high susceptibility to a hazard will make better prevention efforts, especially in behavior to prevent anemia in pregnancy. Perceived severity is not related to maternal behavior in preventing anemia during pregnancy. Mothers feel that anemia during pregnancy is a natural thing for mothers to experience and does not have a serious effect on their health. Many or at least the perceived benefits by the mother during pregnancy are not related to the behavior of pregnant women in preventing anemia. Perceived barriers are also not related to the behavior of pregnant women in preventing anemia. The higher the perceived barriers, the worse the behavior of pregnant women in preventing anemia during pregnancy. The level of cues to action in a mother is not related to her behavior in preventing anemia during pregnancy. Cues to action in pregnant women has a relationship with the mother's behavior in preventing anemia during pregnancy, meaning that the higher the desire to act, the better the behavior of pregnant women in preventing anemia. This can happen because pregnant women can easily get information from the media, as well as health workers.

Consistent health counseling provided by health workers concerning pregnancy anemia leads to sufficient behavior and willingness to act. Cues to action have a significant relationship with the behavior of pregnant women in preventing pregnancy anemia. The higher the respondent's cues to action, the better the anemia prevention behavior is carried out. Conversely, the lower cues to action, then the lower the anemia prevention behavior of pregnant women (Darmawati et al., [2020](#)). It is expected to conduct further research by providing interventions, especially about anemia in pregnancy to improve maternal behavior in preventing anemia during pregnancy, which is based on the Health Belief Model. The limitation in this study is purposive sampling means the finding cannot be generalized and the self-reported questionnaire has several limitations to measure behavior.

Conclusions

Perceived susceptibility and cues to action have a relationship with maternal behavior in preventing anemia during pregnancy. Developments in health education should consistently be carried out to increase public awareness concerning good behavior in maintaining health. Providing health education is important regarding the compliance with routine ANC

check-ups, the benefits of iron supplements, and balanced nutrition for pregnant women during pregnancy. It is also important to provide a correct understanding regarding anemia and the impact of pregnancy anemia on mothers, in turn encouraging pregnant women to behave better in maintaining their health, especially in preventing pregnancy anemia from occurring. The education provided also should consider the mother's socioeconomic and demographic characteristics. It is important to carry out further research by providing interventions to audio-visual behavior groups, especially providing education about anemia in pregnancy to increase perceived susceptibility and cues to action, which is based on the Health Belief Model.

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