RESEARCH PAPER

Determinants Of Preeclampsia Incidence In Wajo Regency

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ABSTRACT

Background. Preeclampsia is one of the main causes of maternal morbidity and mortality in developing countries, including Indonesia. Various risk factors such as maternal age, education, parity, pregnancy distance, nutritional status, and history of chronic diseases need to be analyzed to understand the determinants of preeclampsia more comprehensively.

Purpose. This study aims to analyze the risk factors associated with the incidence of preeclampsia in pregnant women in the third trimester.

Method. The research with a quantitative approach design with a case control design study was conducted at the Tempe and Salewangeng Health Centers, Wajo Regency. The sample withdrawal technique uses the purposive sampling technique. Data were obtained through KIA books, maternal cohorts, and questionnaires, then analyzed bivariately using odds ratio (OR) and multivariate tests with binary logistics.

Results. The results of the bivariate analysis showed that parity (OR=5,667), history of hypertension (OR=1138,500), and history of diabetes mellitus (OR=08,903) had a risk with the incidence of preeclampsia, while age, education, gestational age, gestational distance and nutritional status had an OR value of <1 and showed no significant difference in risk between the groups compared. Multivariate analysis identified a history of hypertension as the most dominant risk factor (OR=1307,750; 95% CI: 100,286–17053,253; p<0.001).

Conclusion. History of hypertension was the main determinant of preeclampsia in the study population, while other factors such as parity, pregnancy distance, and diabetes mellitus had a weaker role after being controlled. These findings emphasize the importance of screening for hypertension history and preventive interventions in an effort to reduce the incidence of preeclampsia

Keywords: *preeclampsia, risk factors, parity, pregnancy spacing, hypertension, diabetes mellitus*

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INTRODUCTION

Preeclampsia is a significant pregnancy disorder and a high risk to the health of the mother and fetus, which is typically characterized by increased blood pressure and proteinuria after 20 weeks of gestation. This condition is not just an obstetric problem, but also reflects broader socioeconomic and health inequalities, especially in developing countries such as Indonesia, where the incidence of preeclampsia is closely correlated with high maternal mortality rates. Studies show that preeclampsia is still one of the leading causes of maternal mortality globally, so effective public health strategies are needed to identify and reduce various risk factors, such as maternal age, parity, education level, distance between pregnancies, and a history of hypertension and diabetes (Dewi et al., 2023; Miele et al., 2021). The definition of preeclampsia according to the American College of Obstetricians and Gynecologists (ACOG) emphasizes the presence of high blood pressure and proteinuria, or new hypertension accompanied by symptoms such as impaired kidney function or vision (Meazaw et al., 2020). These clinical signs generally appear after 20 weeks of gestation, which underscores the importance of regular pregnancy checkups in detecting this potentially dangerous condition. The increase in cases of hypertensive disorders in pregnancy, especially preeclampsia, has been confirmed by various studies, including in Indonesia, which show an increasing trend in incidence from year to year (Hillesund et al., 2018).

Globally, preeclampsia, which is a significant cause of maternal morbidity and mortality, has a prevalence of about 2% to 15% in pregnancy, with variations influenced by geographical and socioeconomic factors (Chang et al., 2023). In Indonesia, preeclampsia accounts for a sizable

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portion of maternal mortality, with estimates suggesting that this condition is one of the main causes, thus representing a serious public health challenge (Umiastuti et al., 2024). A recent study in Wajo Regency, South Sulawesi shows a preeclampsia incidence rate that ranges from 3% to 10%, thus confirming the importance of a more targeted health service strategy in this region.

The main risk factors in the development of preeclampsia include maternal age, education level, parity, and the distance between pregnancies. The age of the mother is an important factor, where mothers under the age of 20 or over 35 years have a higher risk of preeclampsia. In addition, parity and distance between pregnancies are also closely related to the likelihood of preeclampsia, which shows the importance of pregnancy planning and reproductive health education (Salih et al., 2023). Maternal education levels also have an effect, where mothers with low levels of education tend to have a poor understanding of good pregnancy care, increasing the risk of complications such as preeclampsia (Miele et al., 2021).

A history of hypertension and diabetes in pregnant women is also a significant risk factor. Mothers with a history of hypertension or diabetes are more susceptible to preeclampsia because this condition can worsen the progression of the disease. Therefore, the treatment of a previous history of the disease through rigorous medical examination and routine antenatal care is very important in the prevention and management of preeclampsia (Hamsir et al., 2022). In addition to the factors that have been mentioned, the socioeconomic condition of the mother also has a significant role in influencing the risk of preeclampsia. Mothers with low economic status often face difficulties in accessing adequate health services, including antenatal screening and timely treatment. Inequality of access to health facilities, especially in remote areas, contributes to an increase in the incidence of preeclampsia and other complications during pregnancy (Wenang et al., 2023). In addition, the economic pressures that pregnant women face can reduce their ability to manage personal health and follow the medical advice given, which in turn worsens the prognosis of preeclampsia (Bigdeli et al., 2021).

Research also shows that lifestyle changes, including unhealthy diets, high stress levels, and lack of physical activity, further exacerbate the impact of preeclampsia. Modern lifestyles that tend to rely more on fast food and lack of awareness of the importance of physical activity can exacerbate risk factors such as obesity and hypertension, which are known to be closely related to preeclampsia (Baroutis, 2025; Rivero et al., 2024). Therefore, approaches that involve healthy lifestyle changes, including health education on nutritious diets, stress management, and encouragement to be physically active, can be an important strategy in preventing and managing preeclampsia among pregnant women, especially those in high-risk groups. By considering various factors that affect the incidence of preeclampsia, both from demographic, socioeconomic, and maternal health aspects, this study aims to identify the main determinants that contribute to the increase in the incidence of preeclampsia in Wajo Regency. Through a deeper understanding of these risk factors, it is hoped that targeted recommendations can be produced for the prevention and treatment of preeclampsia, as well as improving the quality of health services for pregnant women in the region.

Problem Formulation

Based on the purpose of the study to analyze various risk factors that affect the incidence of preeclampsia in pregnant women, the problem formulation can be formulated as follows:

Is maternal age a risk factor for preeclampsia in pregnant women?

Is the mother's education level a risk factor for the occurrence of preeclampsia in pregnant women?

Is parity (number of pregnancies) a risk factor for preeclampsia?

Is the distance between pregnancies a risk factor for preeclampsia?

Is gestational age a risk factor for the occurrence of preeclampsia?

Is the nutritional status of pregnant women a risk factor for preeclampsia?

Is a history of hypertension a risk factor for the occurrence of preeclampsia?

Is a history of diabetes mellitus a risk factor for the occurrence of preeclampsia?

RESEARCH OBJECTIVES

General Objectives of Research Topic 1

Analyzing the determinants of the incidence of preeclampsia in pregnant women

Special Objectives of Research Topic 1

Analyze the magnitude of the risk of maternal age to the occurrence of preeclampsia in pregnant women

To analyze the magnitude of the risk of education level to the incidence of preeclampsia in pregnant women

Analyzing the magnitude of the risk of parity to the incidence of preeclampsia in pregnant women

To analyze the magnitude of the risk of pregnancy distance to the incidence of preeclampsia in pregnant women

To analyse the magnitude of the risk of gestational age towards the occurrence of preeclampsia in pregnant women

To analyze the magnitude of the risk of nutritional status to the incidence of preeclampsia in pregnant women

To analyze the magnitude of the risk of a history of hypertension to the incidence of preeclampsia in pregnant women

To analyse the magnitude of the risk of a history of diabetes mellitus on the incidence of preeclampsia in pregnant women

2. LITERATURE REVIEW

Mother's Age

The mother's age is a long-known risk factor for preeclampsia. Many studies confirm that older maternal age (≥ 35 years) significantly increases the incidence of preeclampsia. For example, Tyas et al. showed that mothers over 35 years of age had a 4.5 times higher risk of

developing preeclampsia compared to those aged 25–29 years (Tyas et al., 2020). Furthermore, research shows that women over the age of 40 have a 7.46 times higher risk of developing this condition compared to younger women (Tyas et al., 2020). Increased risk in older mothers is often associated with physiological changes, including reduced placental efficiency and a high prevalence of comorbidities that can worsen the likelihood of developing hypertensive disorders (Ammar et al., 2024).

The link between older maternal age and preeclampsia is also reinforced by epidemiological findings suggesting that advanced maternal age correlates with a range of adverse pregnancy outcomes, including preterm birth and increased neonatal intensive care rates for conditions associated with prematurity and low birth weight (Orugbo & Atoe, 2022). Maternal age also affects preeclampsia diagnostic parameters, particularly serum biomarkers, which differ in each age group and may require specific clinical thresholds based on age (Rezk et al., 2023). In addition, younger mothers (especially under 25 years old) also face an increased risk of pregnancy complications, including severe forms of preeclampsia. The data show that although the risk decreases in older mothers over 40, this confirms the dual nature of the maternal age factor—that both age extremes present their own challenges and risks (Sheen et al., 2019). Therefore, considering the age of the mother in the context of preeclampsia requires an understanding of the combined effects of various factors that can affect maternal and child health.

Education

Maternal education is an important aspect that affects the incidence of preeclampsia. Studies have shown that low levels of education are closely related to an increased incidence of preeclampsia, as women with low education often have limited access to quality antenatal care and inadequate knowledge of essential health practices during pregnancy (Shan et al., 2018). Research shows that women living in rural areas, who generally have lower educational backgrounds, show a higher susceptibility to severe types of preeclampsia (Shan et al., 2018).

Maternal education directly affects health literacy, shaping their understanding and ability to access and utilize the health care system, which can make them more vulnerable to conditions such as preeclampsia. In addition, education gaps also contribute to disparities in health outcomes, especially in areas with low socioeconomic conditions, where barriers to access to health services hinder the early detection and treatment of hypertension during pregnancy (Shan et al., 2018). In areas with low maternal education levels, there has been a significant increase in severe cases of preeclampsia, which underscores the need for targeted educational interventions to improve maternal health literacy (Sutan et al., 2022). The educational context also interacts with factors such as socioeconomic status and access to health services, which further exacerbates the risk of preeclampsia. Studies show that the influence of maternal education on pregnancy outcomes can be mediated by access to health services, indicating that educational interventions can play an important role in improving maternal health (Lihme et al., 2023). Improving maternal health education can be one of the important steps to reduce the risk of preeclampsia, especially in areas with limited resources.

Parity

Parity, or the number of pregnancies a woman has had, also appears as a significant risk factor for preeclampsia. Evidence suggests that nulipara women, i.e. those who are pregnant for the first time, have a higher risk of developing preeclampsia compared to multipara women (Ernawati et al., 2018). In particular, nuliparity is associated with angiogenic imbalances during pregnancy, which increases susceptibility to hypertensive disorders such as preeclampsia due to the absence of the physiological adaptation process typically experienced by multipararacial women. The incidence of preeclampsia varies not only based on the number of previous births, but also between early-onset and late-onset forms of preeclampsia. Research shows that nulipara women are more likely to experience early-onset preeclampsia, which is generally associated with poorer maternal and fetal outcomes (Pralampito et al., 2021). The physiological demands on the mother's body that have never adapted to vascular and metabolic changes during pregnancy can make them susceptible to more severe manifestations of preeclampsia, making it difficult to manage them (Mid, 2023). In addition, parity interacts with maternal age and education level factors in influencing susceptibility to preeclampsia. For example, complications of preeclampsia in multipara women can provide important insights for management strategies in pregnancy (Lisonkova et al., 2021). Monitoring parity with other demographic factors can help in the development of more appropriate clinical practices, especially to create individualized care pathways for pregnant women.

Pregnancy Distance

A large number of studies emphasize the relationship between too short and too long intervals between pregnancies and the incidence of preeclampsia, which suggests important implications of pregnancy timing. Short intervals between pregnancies (less than 18 months) are consistently associated with adverse maternal outcomes, including an increased risk of preeclampsia. This risk is even higher in older women, where studies show that more than 20% of the gap between pregnancies in women aged 35 years or shorter than 12 months, is associated with an increased risk of hypertensive disorders in pregnancy, including preeclampsia (Schummers et al., 2018). In addition, systematic reviews show that short intervals between pregnancies can lead to obstetric complications such as premature birth and small babies for gestational age, further worsening maternal health (Barbosa et al., 2020). The underlying mechanism may involve a lack of recovery time and maternal physiological adjustment between pregnancies, thus generating cumulative physiological stress that increases susceptibility to hypertensive disorders

(Singh et al., 2023). In contrast, the interval between pregnancies that are too long (more than 60 months) also shows a negative correlation with maternal health. Specifically, research shows that distances that are too long are associated with an increased risk of preeclampsia, reflecting a similar pattern with distances that are too short. For example, Ragnarsdóttir et al. reported that women who had a long pregnancy interval after the first pregnancy had an increased incidence of preeclampsia compared to women with optimal distance (Ragnarsdóttir et al., 2024). Similar findings were also expressed by Hutcheon et al., who showed that spacing between pregnancies of more than five years was associated with a higher risk of developing preeclampsia, supporting the argument that both extremes of pregnancy spacing carry risks (Schummers et al., 2018).

Gestational Age

Gestational age is an important factor that affects the risk of developing preeclampsia, with a clear difference between early-onset and late-onset preeclampsia. Early-onset preeclampsia, which occurs before 34 weeks, is characterized by a more severe clinical course and is associated with adverse outcomes in both the mother and the newborn (Zheng et al., 2022). For example, younger women, particularly adolescents, show different rates of preeclampsia incidence than older women, with some studies showing an increased risk in nulipara adolescents (Abdollahpour et al., 2024). In addition, the association between low birth weight and hypertensive disorders, including preeclampsia, suggests that complications can arise during the critical period of fetal development (Tsujimoto et al., 2021).

The link between gestational age and the appearance of hypertensive disorders in pregnancy is strengthened by the understanding that as gestational age increases, the mechanisms underlying hypertensive disorders also develop. According to Zheng et al., preeclampsia that occurs at less than 37 weeks gestational age is of particular concern due to the immaturity of the neonatal organ system and the increased risk of perinatal complications (Cruz et al., 2020). In addition, the management of the time of delivery in women diagnosed with preeclampsia can have a significant impact on maternal and fetal output, so timely intervention based on gestational age should be a key pillar in prenatal care (Chappell et al., 2019).

Nutrisi (Overweight/ Underweight)

Nutritional interventions before and during pregnancy have been associated with varying risks of preeclampsia. For example, a systematic review showed that a diet rich in fruits and vegetables significantly lowered the incidence of Hypertensive Disorders in Pregnancy (HDP), including preeclampsia (Tesfa et al., 2020). Similarly, adherence to the Mediterranean diet has been shown to be associated with a reduced risk of gestational diabetes mellitus (DMG) and hypertension, which may ultimately also lower the risk of preeclampsia (Hart, 2023). In contrast, a diet high in refined carbohydrates and sugars is associated with an increased risk factor for DMG, which can further increase the risk of preeclampsia (Miele et al., 2021). In addition, adequate intake of micronutrients such as vitamins D and E, as well as various mineral supplements, has been shown to have a protective effect against preeclampsia (Dahma et al., 2023). Low maternal vitamin D levels are associated with a high incidence of complications, including preeclampsia, so increasing vitamin D levels can be a preventive approach (Ciebiera et al., 2021). In addition, certain fats in the diet, such as omega-3 fatty acids, play an important role in maintaining placental health and are inversely related to risk factors for preeclampsia and DMG (Devarshi et al., 2019).

History of Hypertension

A history of hypertension is one of the most significant risk factors for the occurrence of preeclampsia. Women with chronic hypertension have a much higher risk of developing preeclampsia compared to those with normal blood pressure (Tsujimoto et al., 2021). The pathophysiological mechanisms linking chronic hypertension to preeclampsia include vascular and inflammatory changes that can trigger abnormal placenta, which further worsens hypertension through endothelial dysfunction (Doorn et al., 2021). This underscores the importance of preconception counseling for women with a history of hypertension, as well as the need for early intervention to control blood pressure before and during pregnancy (Khadari et al., 2025). In addition, understanding the implications of treating chronic hypertension in pregnant women can affect the outcome of preeclampsia. Research shows that effective blood pressure control throughout pregnancy can not only prevent the progression to preeclampsia, but also lower the number of adverse outcomes associated with both conditions (Behrens et al., 2019). Therefore, early identification of women at risk due to a history of hypertension allows the implementation of proactive management strategies that can significantly reduce the incidence of preeclampsia.

Diabetes Melitus

Pregnant women with a history of diabetes mellitus, both pregestational and gestational, have a much higher risk of developing preeclampsia. Research shows that women with type 1 or type 2 diabetes have about four times the risk of developing preeclampsia than those without diabetes (Callesen et al., 2023). Further, prepregnancy diabetes has been associated with a four-fold increased risk of preeclampsia in certain populations, confirming the impact of chronic hyperglycemia on vascular health during pregnancy (Birhanu et al., 2020). The association between diabetes and preeclampsia suggests the presence of similar pathophysiological mechanisms, including inflammatory pathways and oxidative stress. Increased levels of vascular endothelial growth factor (VEGF) and changes in angiogenesis are common in both gestational and preeclampsia diabetes, suggesting a shared mechanism that worsens maternal and fetal health outcomes during pregnancy (Bolatai et al., 2022). In addition, women with a

history of DMG are more at risk of developing type 2 diabetes after pregnancy, which confirms the existence of long-term consequences of metabolic dysfunction that begins during gestation (Wambua et al., 2024).
The conceptual framework of this research is as follows:

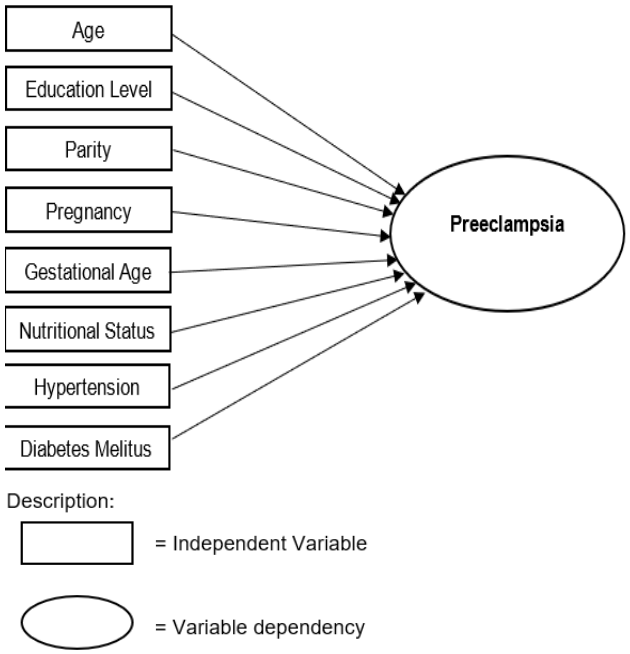

Figure 2.1 Research Concept Framework Topic 1

RESEARCH METHODS

Research Design

The design of this study uses a quantitative approach with a case control study design. This design was chosen because it is suitable for researching risk factors related to the incidence of preeclampsia, where the study subjects were grouped into two groups, namely the case group (pregnant women with moderate risk of preeclampsia) and the control group (pregnant women without the risk of preeclampsia). Through this approach, researchers can trace and compare exposure to various risk factors, such as maternal age, parity, history of hypertension and history of preeclampsia. Thus, the difference in the distribution of risk factors between the case and control groups can be analyzed to determine the extent to which these variables play a role as determinants of preeclampsia incidence.
In the initial stage, screening of pregnant women in the third trimester was carried out to identify groups with moderate risk of preeclampsia and groups without risk. This process was carried out by utilizing maternal choir books and KIA books as basic data sources, then continued with the distribution of questionnaires to identify risk factors. The research subjects came from two locations, namely the Salewangeng Health Center and the Tempe Health Center, each of which was divided into case and control groups according to the screening results. Variables screened included parity, age, history of preeclampsia, and history of hypertension. The results of the screening are then used as a basis for grouping subjects into case groups and control groups for further analysis.

Research Location and Time

This research was carried out at the Tempe Health Center and the Salewangeng Health Center in Wajo Regency. The research period will be held in August-September 2024.

Population and Sample

Populasi
The population in this study is all pregnant women in the third trimester who were recorded at the Tempe Health Center as a control group and the Salewangeng Health Center as a case group in Wajo Regency
Sample
Observation Unit:
Pregnant women at the Tempe Health Center and the Salewangeng Health Center in Wajo Regency are divided into 2 groups, namely;
Group 1 (Salewangeng Health Center): If pregnant women have risk factors for moderate preeclampsia according to (KIA Book, Mother's Choir, Questionnaire) and pregnant women who do not have risk.
Group II Tempe Health Center: If pregnant women have risk factors for preeclampsia according to (KIA Book, Mother Cohort, Questionnaire) and pregnant women who do not have risk.
Unit of Analysis:
Variabel :
Age
Education
Jobs
Parity
Riwayat Preeklampsia
History of Hypertension
Nutritional Intake of Pregnant Women
Weight (Obesity)

Large Sample
The determination of the sample size in this study using the sample size in the Lemeshow formula for control case research using OR and P2 values (the proportion exposed in the comparison group) was 50% at a significance level of 0.05. The minimum sample size estimated based on the Lemeshow formula is:
The sample size required for double-sided testing is obtained by the formula (Lemeshow, 1997) as follows:

$$n = \frac{(Z_{1-\frac{\alpha}{2}}\sqrt{2\bar{P}(1-\bar{P})} + Z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)})^2}{(P_1-P_2)^2}$$

$$n = \frac{(1.96\sqrt{2(0.3345)(1-0.3345)} + 2.33\sqrt{0.169(1-0.169)+0.500(1-0.500)})^2}{(0.169-0.500)^2}$$

$$n = 70$$

α = 5% confidence level (1.96)
β = research power 1% (2.33)
P_1 = proportion of samples that have a family history of hypertension in the non-preeclampsia group
P_2 = the proportion of the sample that has a family history of hypertension in the prepreeclampsia group
So based on the above calculation is 70 samples, so the total number of case groups and control groups is 140.

Table 2.1 Minimum sample size of each research variable

Variabel	P1	P2	n
Hypertension	16.9	50.0	70
Paritas	20.0	31.3	544
Changing Spouses	10.8	28.1	188
Alcohol	3.1	12.5	295
Activities	24.6	50.0	129
ANC	4.6	40.6	45
Childbirth	87.7	50.0	51
Analgesics	41.5	96.9	21
Baby Weight	7.7	40.6	96
Contraception	12.3	21.9	561

Source : (Fondjo et al., 2022)

4)Sample Drawing Technique

Sample extraction in the study was carried out by non-probability sampling through purposive sampling techniques, with the following criteria:

A)Kriteria Inklusi

1. Pregnant women at the Tempe Health Center and the Salewangeng Health Center in Wajo Regency.
2. The data is recorded in complete medical records/ Mother's status card
3. Willing to be a research sample

B)Exclusion Criteria

1. The mother is domiciled outside the Wajo Regency area
2. Mothers who have a history of preeclampsia
3. Incomplete data

DATA COLLECTION

Data collection in phase 1 was carried out using a questionnaire compiled by the researcher as a research instrument. This questionnaire contains structured written questions given to the selected sample to explore respondents' responses regarding the determinants of risk factors for preeclampsia in pregnant women, such as age, parity, disease history, nutritional status, and environmental exposure. In its implementation, data collection is assisted by four midwives who have received training on interview techniques and questionnaire filling procedures, so that the data collection process can run uniformly and minimize interviewer bias.

Before being used in the main study, this questionnaire instrument first went through a validity and reliability test. Validity tests are performed to ensure each question item actually measures the variables being studied, using item correlation analysis against the total score so that insignificant items can be corrected or eliminated. Meanwhile, a reliability test was carried out to determine the consistency of respondents' answers, which was measured through the Cronbach Alpha coefficient. The instrument is said to be reliable if the coefficient value exceeds 0.7, which indicates that the questionnaire is consistent and trustworthy. Thus, the research instruments used have met the requirements for validity and reliability, so that the data obtained can be scientifically accounted for in explaining the risk factors for preeclampsia in pregnant women.

DATA ANALYSIS

Univariate Analysis

Univariate analysis was carried out to describe the characteristics of each research variable in a descriptive manner. The variables analyzed included determinant variables, variables of pregnant women with risk factors, and variables of pregnant women without risk factors.

Bivariate analysis

Bivariate analysis was carried out to determine the relationship between determinant variables and the incidence of pregnant women and risk factors. This analysis is complemented by the calculation of the Odds Ratio (OR) to assess the magnitude of the risk. The OR value is used to describe the chances of pregnant women with risk factors in the exposed group compared to the unexposed group.

Multivariate Analysis

Multivariate analysis was performed using binary logistic regression to identify the determinant variables that had the most influence on the incidence of pregnant women with risk factors after being controlled by other variables. The results of the analysis are presented in the form of odds ratio (OR), 95% confidence interval (CI), and p-value.

Research Ethics and Quality Control

Research ethics refers to the International Ethical Guidelines of the WHO in 1993, for biomedical research involving humans as research subjects. The conditions contained in the ethics of this research are as follows:

The subjects included in the study were volunteers.

If in the assessment, if this research is continued will have a detrimental impact on the subjects included in the research, then this research must be stopped.

Research with human subjects must prioritize the welfare of the research subject rather than the interests of science and society.

Respect the integrity of the rights of the research subject, be careful and minimize the impact of the research on the subject's personality, which is related to the physical integrity of the subject.

Provide clear information to the research subject about the objectives, methods, expected benefits, possible inconveniences during the study including the duration of time wasted during the interview, provide the subject with information about the subject's freedom not to participate in the study, as well as be free to revoke consent to participate at any time.

Obtain informed consent of the subject which is freely given in written form.

In publishing research results, it is mandatory to maintain the accuracy of the research results.

This research was carried out after obtaining an Ethical Approval Recommendation.

Quality control is carried out to obtain measurement results that are truly close to the actual state. Before the

questionnaire was used, the validity and reliability of the questionnaire were tested on 106 respondents, the validity and reliability test was carried out so that the questionnaire was valid and reliable when used. The validity test in this study used the Pearson product moment test, with a table r value of 0.300. If the value of r is calculated >r of the table, then the statement is said to be valid. As for the instrument reliability test in this study, Cronbach's Alpha formula was used. The criteria for determining the reliability of an instrument by looking at the value of the reliable coefficient. If Cronbach's Alpha > 0.60 then the statement is said to be reliable.

Hypothesis

1. Maternal age is a risk factor for preeclampsia in pregnant women
2. Education level is a risk factor for preeclampsia in pregnant women
3. Parity is a risk factor for preeclampsia in pregnant women
4. Pregnancy distance is a risk factor for preeclampsia in pregnant women
5. Gestational age is a risk factor for preeclampsia in pregnant women
6. Nutritional status is a risk factor for preeclampsia in pregnant women
7. History of Hypertension is a risk factor for the occurrence of preeclampsia in pregnant women
8. History of diabetes mellitus is a risk factor for preeclampsia in pregnant women

Research Flow

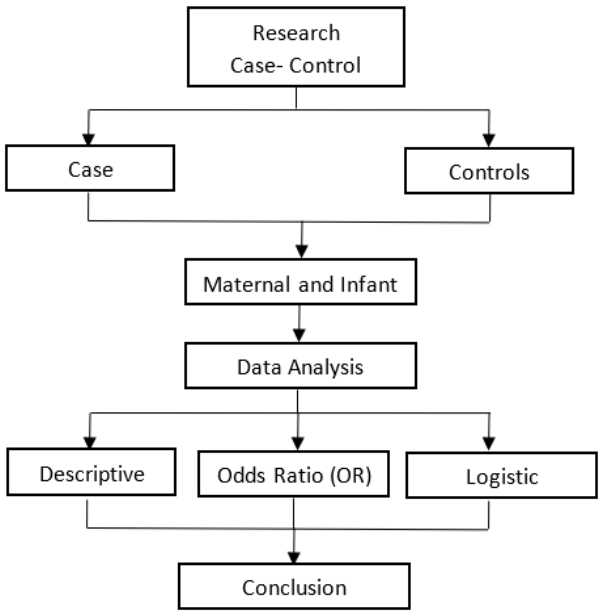

Figure 2.2 Topic 1 Research Flow

4. RESULTS

In this study, the analysis was carried out in two stages, namely bivariate analysis to see the relationship of each independent variable to the incidence of preeclampsia, and multivariate analysis with binary logistics to find out the dominant risk factors that affect after being controlled by other variables. Bivariate analysis was used to assess the significance of the relationship between maternal characteristic variables (age, education, parity, pregnancy distance, gestational age, nutritional status) and disease history (hypertension, diabetes mellitus) and the incidence of preeclampsia. Furthermore, variables that had a p< value of 0.25 in the bivariate analysis were entered into a binary logistics model to determine independent risk factors. The results of this analysis are expected to provide a comprehensive picture of the factors that most affect the incidence of preeclampsia in the study population, so that it can be the basis for more effective prevention and intervention efforts.

Univariate Analysis

Table 2.2 Characteristics of Research Respondents

Features		Tempe Health Center		Salewangeng Health Center	
		n	%	n	%
Mother's Age	<21 Years	11	15,7	15	21,4
	21-35 Years	30	42,9	31	44,3
	>35 Years	29	41,4	24	34,3
Education	SD	7	10	7	10
	SMP	28	40	24	34,3
	SMA	29	41,9	33	47,1
	PT	6	8,6	6	8,6
Paritas	Primipara	19	27,1	20	28,6
	Multipara	28	40	28	40
	Large	23	32,9	22	31,4
Pregnancy Distance	Have never been pregnant	18	25,7	21	30
	<2 Years	18	25,7	16	22,9
	>2 Years	34	48,6	33	47,1
Gestational Age	28-32 Weeks	29	41,4	20	28,6
	32-36 Weeks	31	44,3	41	58,6
	>36 Weeks	10	14,3	9	12,9
History of ANC	Check	70	100	70	100
	Not checking	0	0	0	0
Nutrition	Enough	66	94,3	65	92,9
	Not Enough	4	5,7	5	7,1
Metabolic Diseases	Hypertension	29	41,4	33	47,1
	Diabetes	1	1,4	0	0
	Both	6	8,6	2	2,9
	Not experiencing	34	48,6	35	50
Preeclampsia	Ya	35	50	35	50
	No	35	50	35	50

Based on the Topic 1 Research Respondent Characteristics Table, most of the respondents at the Tempe Health Center and the Salewangeng Health Center are in the age group of 21–35 years, which is the safe reproductive age. The proportion of respondents with the age of >35 years was also quite large, while the age group of <21 years was the smallest proportion in both study sites. Judging from the level of education, the majority of respondents have

secondary education, especially high school, followed by junior high school, while respondents with a college education are the group with the lowest proportion. Based on parity, respondents were dominated by multipara, followed by grandemultipara and primipara, with a relatively similar distribution between the two health centers. The pregnancy gap of respondents was mostly in the >2-year category, while respondents who had never been pregnant and who had a gestational distance of <2 years showed a smaller proportion. Judging from the gestational age, the majority of respondents were at 32–36 weeks gestation, although at the Tempe Health Center the distribution of gestational age was relatively balanced between the categories of 28–32 weeks and 32–36 weeks. All respondents at the two health centers were recorded to have conducted antenatal care (ANC) examinations. In terms of nutritional status, most of the respondents are in the category of sufficient nutrition. Based on a history of metabolic disease, almost half of the respondents had no history of metabolic disease, with hypertension being the most common metabolic disease, while the incidence of diabetes mellitus was relatively low. The distribution of preeclampsia incidence showed the same proportion between respondents who experienced and did not experience preeclampsia in both health centers

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Bivariate Analysis

Table 2.3 Relationship between risk factor characteristics and the incidence of preeclampsia in pregnant women

Research Variables	Category	Preeclampsia				OR
		Ya		No		
		n	%	n	%	
Age	< 21 and > 35 years old	36	51.4	43	61,4	0.665
	21-35 years old	34	48,6	27	38,6	
Education	Elementary School	28	40,0	35	50,0	0.667
	High School	42	60,0	35	50,0	
Paritas	Nuliparous	34	48,6	10	14,3	5.667
	Multipara	36	51,4	60	85,7	
Distance	< 2 yrs	30	42,9	48	68,6	0.344
	> 2 yrs	40	57,1	22	31,4	
Umur_Hamil	> 32 weeks	43	61,4	45	64,3	0.885
	< 32 weeks	27	38,6	25	35,7	
Nutrition	Less	3	4,3	6	8,6	0.478
	Enough	67	95,7	64	91,4	
Hypertension	Ya	69	98,6	4	5,7	1138.500
	No	1	1,4	66	94,3	
DM	Ya	8	11,4	1	1,4	8.903
	No	62	88,6	69	98,6	

Based on the results of statistical analysis using the Chi-Square test in Table 2.1, it is known that there are several variables related to the incidence of preeclampsia in pregnant women. The parity variables, hypertension, and diabetes mellitus (DM) showed a meaningful association with the incidence of preeclampsia. Pregnant women with nulipara status have a higher risk of developing preeclampsia than multipara, with an Odds Ratio (OR) value of 5.667, which indicates that nulipara is at about 5.7 times the risk of developing preeclampsia compared to multipara. The hypertension variable showed a very strong association with the incidence of preeclampsia, with an OR of 1138,500, indicating that pregnant women with a history of hypertension had a very high risk of developing preeclampsia compared to mothers without hypertension. In addition, pregnant women with diabetes mellitus also had a greater risk of developing preeclampsia, with an OR of 8,903, compared to pregnant women who did not suffer from DM. Meanwhile, the variables of maternal age, education level, gestational distance, gestational age, and nutritional status did not show a statistically significant association with the incidence of preeclampsia, as the OR value was close to 1 and did not show a significant difference in risk between the groups compared.

Multivariate Analysis

Table 2.4 Results of the Logistic Binary Test Risk Factors for Preeclampsia in Ibu Hamil

	B	S.E.	Forest	df	Value p	OR	95% C.I.for OR	
							Lower	Upper
Paritas	0.808	0.993	0.662	1	0.416	2.244	0.320	15.721
Distance	-1.697	1.146	2.192	1	0.139	0.183	0.019	1.732
Hypertension	7.176	1.310	29.996	1	0.000	1307.750	100.286	17053.253
DM	1.385	2.478	0.313	1	0.576	3.996	0.031	513.878
Constant	-4.011	2.639	2.310	1	0.129	0.018		

* Binary Logistics Test

Multivariate analysis using binary logistics showed that history of hypertension was the dominant risk factor for the incidence of preeclampsia with a p< value of 0.001 and an odds ratio (OR) of 1307.750 (CI 95%: 100.286–17053.253). This indicates that pregnant women with a history of hypertension have more than a thousand times the risk of developing preeclampsia compared to mothers without a history of hypertension. Meanwhile, the parity variable (p = 0.416; OR = 2,244; CI 95%: 0.320–15.721), pregnancy distance (p = 0.139; OR = 0.183; 95% CI: 0.019–1.732), and history of DM (p = 0.576; OR = 3,996; CI 95%: 0.031–513.878) showed no significance in binary models. Although some of these variables were shown to be significant in bivariate analysis, the effect did not persist after multivariate analysis, meaning that these variables were not independent risk factors for the occurrence of preeclampsia in this study.

4.2 DISCUSSION

4.2.1 Age to the incidence of preecampsia in pregnant women

The incidence of preeclampsia is more common in the extreme maternal age group, namely <21 years and >35 years, with a proportion of 51.4%, compared to the age group of 21–35 years of 48.6%. However, these differences are not statistically significant. This empirical pattern is conceptually in line with the long-established epidemiological framework, that the relationship between maternal age and obstetric risk is non-linear, where the risk tends to increase at extreme ages. However, the absence of statistically significant differences suggests that in this sample, the effect estimates only show directional trends without sufficient statistical evidence to differentiate the risks between age groups based on the significance limits used. This condition is commonly found when the actual effects are relatively small, heterogeneous between populations or parity, or influenced by confounding factors in the form of different distribution of comorbidities between age groups. The findings are consistent with the literature reporting that the risk of preeclampsia varies according to the age of the mother and is influenced by the complexity of the clinical and obstetric profiles (Radoń-Pokracka et al., 2019).

The higher proportion of preeclampsia in the advanced maternal age group (AMA) has a strong biological and clinical basis. Various large-scale observational studies and systematic reviews show that AMA is generally defined as the age of >35 years, particularly at the age of ≥40 years in relation to an increased risk of hypertensive disorders in pregnancy, including preeclampsia. A study of nullipara single pregnancies reported that women aged >35 years had a significantly higher risk of preeclampsia and gestational hypertension than younger age groups (Kahveci et al., 2018). Similar findings were reported in a multicenter study in Japan that showed an increased risk of preeclampsia, including severe preeclampsia, as the mother ages, especially at a very advanced age (Ogawa et al., 2017). The uneven distribution of comorbidities between age groups can affect the results of the analysis, especially if these factors are not fully controlled in statistical models. Thus, the findings of the tendency to increase the proportion of preeclampsia at extreme ages remain in line with the existing scientific framework, although they do not reach statistical significance, and reflect the complexity of the relationship between maternal age and preeclampsia risk (Rydahl et al., 2019).

Education on the incidence of preeclampsia in pregnant women

The descriptive distribution showed that the proportion of preeclampsia incidence was greater in mothers with secondary–higher education (SMA–Tertiary), which was 60.0%, compared to mothers with elementary–junior high education (SD–SMP) of 40.0%. However, the results of the inferential test showed that education level was not significantly related to the incidence of preeclampsia. This condition, namely the existence of a descriptive difference in proportion that is not followed by statistical significance, is a methodologically acceptable finding. A pvalue greater than the conventional significance limit (0.05) indicates that the available statistical evidence is not yet sufficient to reject the null hypothesis, so the observed differences cannot be ascertained to reflect a systematic relationship, but may still be due to random variation. This interpretive approach is in line with empirical research practices that conclude that there is no meaningful relationship when the p value exceeds 0.05 (Olaivar & Loayon, 2022).

Another consideration to consider is that the influence of education level on health outcomes is not always consistent and can differ between populations and research contexts. Education is a social indicator whose effect on health is often mediated by other factors, such as socioeconomic conditions, access to health services, and health behavior. Some studies have shown that the relationship between education and health risk factors can be heterogeneous and not always significant. For example, research on cardiovascular and metabolic risk factors reported that the association between education and certain health outcomes varied between subgroups, so education did not always play a strong and consistent predictor (Cho et al., 2020). In addition, other studies reported the absence of significant differences based on education on related risk factors, such as obesity, in specific populations, suggesting that educational grades to health may not appear in certain contexts (Eshtiaghi et al., 2022). In line with this, some clinical studies also reported descriptive differences based

on education level that were not followed by statistical significance (Zhou et al., 2022).

Parity on the incidence of preeclampsia in pregnant women

The complexity of the relationship between parity and the risk of preeclampsia has produced diverse findings in various studies. With *odds ratio* (OR) of 2.244 and a p-value of 0.416, the results of this study show that parity is not a significant factor in predicting preeclampsia in the binary model used. Although these findings suggest parity may not play a major role, a number of other studies have shown different results, requiring further explanation of the causative factors and comparisons of consistent and inconsistent findings. Research on the effect of parity on preeclampsia has indeed produced mixed results. For example, Das et al. (2019) reported that high parity may be a risk factor for preeclampsia, with a direct link between a greater number of births and an increased risk, especially in mothers with chronic hypertension during pregnancy (Das et al., 2019). These results are in line with the research of Khan et al. (2022) who found that complications such as hypertension are more common in women with high parity, thus associating them with preeclampsia (Khan et al., 2022). Morikawa et al. (2021) also suggested that the onset of hypertension or proteinuria can be an early sign of preeclampsia, and women with high parity may be more susceptible due to the accumulated cardiovascular risk from repeated pregnancies (Morikawa et al., 2021).

On the other hand, Sale's (2021) research stated that parity does not have a significant effect on the severity of preeclampsia (Sale, 2021). In several studies focusing on maternal and infant outcomes, Abdulrahman et al. (2020) reported that nuliparity (first pregnancy) actually increased the risk of preeclampsia, in line with the assumption that first pregnancies have different biological challenges (Abdulrahman et al., 2020). However, this contradicts other findings that suggest that women who have multipartum (have given birth before) have a lower risk due to immunological adaptations from previous pregnancies. Inconsistencies in results were also seen in the study of Pogačnik et al. (2018) that examined the interaction between gestational diabetes and parity, and found that increased parity does not necessarily mean an increased risk of preeclampsia (Pogačnik et al., 2018). This suggests that differences in physiological and metabolic responses between populations may influence the relationship. The literature also views the role of parity as part of a broader health pathway that affects maternal and child health. Overall, there is an important difference between parity as a single risk factor and parity that interacts with other variables such as maternal age, BMI, genetic factors, and lifestyle. Older maternal age, especially if accompanied by high parity, has been widely reported as a factor that worsens the risk of preeclampsia. Therefore, medical professionals are advised not to only categorize risks based on parity, but also to consider interactions with other risk factors when planning prevention and intervention strategies (Nieto et al., 2019).

Pregnancy Distance to the Incidence of Preeclampsia in Pregnant Women

A number of studies have shown that known risk factors have a much greater contribution to the incidence of preeclampsia than pregnancy spacing. For example, Chen et al. highlight that maternal conditions such as obesity, advanced maternal age, and metabolic health factors often associated with pregnancy history have a greater influence on the risk of preeclampsia than the pregnancy itself (Chen et al., 2019). In addition, factors such as maternal hypertension and a history of adverse pregnancy outcomes are consistently identified as important determinants of preeclampsia (Gunderson et al., 2025). Although pregnancy spacing is sometimes included in preeclampsia risk assessments, the absence of significant associations suggests a complex interaction of maternal health variables that is more influential in this context.

Large-scale cohort studies, such as those conducted by Yang et al., have validated maternal age, body mass index (BMI), parity, and the presence of diabetes as recognized clinical risk factors for preeclampsia (Yang et al., 2021). Although pregnancy spacing was considered in the multifactorial analysis, the results did not reach the level of significance needed to be classified as a major risk factor. This is in line with the finding that although univariate analysis may initially show a correlation, the relationship declines significantly after other maternal variables are included in the model (Molina-Pérez et al., 2021). Overall, the findings of these studies imply that the time between pregnancies may not independently contribute to the risk of preeclampsia if more influential maternal health factors are taken into account. Therefore, it is crucial to integrate maternal health parameters into pregnancy management strategies, rather than focusing solely on setting pregnancy spacing.

Gestational age on the incidence of preeclampsia in pregnant women

As many as 61.4% of the incidence of preeclampsia occurred at >32 weeks of gestation, and the proportion of pregnancies with an age of >32 weeks was relatively balanced between the groups with and without preeclampsia. When a primary exposure, in this case the gestational age category, is similarly distributed across the compared, statistical tests will generally produce insignificant p-values because the data do not show a strong separation based on group membership. These findings are in line with the general principles of comparison between groups and statistical inference in clinical research, where the p-value reflects the strength of the evidence on the equality of distribution between groups. Therefore, the combination of high p-values and relatively coherently balanced gestational age proportions >32 weeks suggests that there is no meaningful relationship between the gestational age grouping used in this study and preeclampsia status (Rahman et al., 2024).

This is due to the fact that many studies examine gestational age in relation to disease severity, maternal and neonatal outcomes, or time of onset, rather than as a consistently distinguishable predictor of cases and controls across all samples (Geetanjaly et al., 2020). In addition, some studies explicitly report the absence of a significant association between gestational age and certain parameters associated with preeclampsia. For example, studies evaluating placental parameters in relation to the severity of preeclampsia reported the absence of a meaningful association between gestational age and some measures of placental volume in the context of the study (Haggag et al., 2022). Although the findings relate to the correlation of gestational age to placental parameters and severity, rather than directly to case status, these results suggest that gestational age does not necessarily play a statistically significant differential variable across comparisons related to preeclampsia. Thus, the insignificance of the gestational age relationship in this dataset can be viewed as a reasonable finding, especially when the distribution of gestational age is relatively similar between groups (Haggag et al., 2022).

Nutrition against the incidence of preeclampsia in pregnant women

From an analytical point of view, the absence of a statistically significant relationship suggests that nutritional status, as defined in this study, cannot be considered a major determinant of the incidence of preeclampsia in the sample studied. The high proportion of preeclampsia incidence in individuals with nutritional status is sufficient to suggest that most of the study subjects are in the category of adequate nutritional status. This indicates that the distribution of nutritional status is relatively similar between the preeclampsia and non-preeclampsia groups in this dataset. Reporting of proportions of nutritional status like this is a common practice in observational and cross-sectional studies that assess nutritional status categories. This reasoning is in line with Esem's findings in pregnant women, where the insignificant association indicates that nutritional status is not a dominant factor in determining the outcomes studied (Esem, 2023). The literature also shows that insignificant findings related to nutritional status are not uncommon and can be found in a variety of outputs and populations, such as hydration status in martial artists, age of aging in adolescents, and relationships with other health indicators (Anggita & Anwar, 2023; Permatasari et al., 2023). Therefore, the results of this study can be understood in the context of broader empirical evidence, where nutritional status can play an important role in certain situations, but is not always predictive of all health outcomes.

Given that preeclampsia research generally evaluates maternal characteristics within a comparative observational framework, such as a case-control study or cross-section, descriptive reporting of nutritional status accompanied by the acknowledgment of the absence of statistical evidence of the relationship is an appropriate approach. This practice is in line with the research of Henri et al., which assessed various maternal variables in the preeclampsia and non-preeclampsia groups, although some variables did not show significant differences depending on the characteristics of the sample and the measurement method (Henri et al., 2020). In this study, the combination of a high proportion of good nutritional status (95.7%) and insignificant statistical test results supported the conclusion that nutritional status was relatively evenly distributed between groups and was not significantly associated with the incidence of preeclampsia (Padilla-Cáceres et al., 2024).

History of Hypertension Incidence of Preeclampsia in Pregnant Women

Hypertension is widely recognized as an important risk factor for the occurrence of preeclampsia, especially in pregnant women. This relationship has been proven by various recent studies showing that a history of chronic hypertension significantly increases the likelihood of preeclampsia (Mareg et al., 2020; Mirabedini et al., 2022). Specifically, one study found that women with a personal history of hypertension had a higher prevalence of preeclampsia, with an adjusted odds ratio of 7.1 (95% CI: 2.6–19.3, p=0.001) ((S & Ningrum, 2024). This confirms the strong link between hypertension and the development of preeclampsia, which is a hypertensive disorder in pregnancy that can cause serious complications for both mother and fetus. The implications are very important, given that women with a previous history of hypertension have a much greater chance of experiencing these pregnancy complications. Various studies support these findings, suggesting that chronic hypertension is a consistent risk factor for preeclampsia in various populations (Fikadu et al., 2021; Kivioja et al., 2022). Women with a personal history of hypertension have been shown to have a much higher risk of preeclampsia compared to those who are normotensive (Wu et al., 2021). This correlation highlights the potential for the implementation of targeted prevention strategies, where women with a history of hypertension can benefit from close monitoring and interventions during pregnancy to reduce the risk of preeclampsia.

In addition to personal history, genetic predisposition to hypertension is also increasingly recognized as a contributing factor to the development of preeclampsia. Kivioja et al. noted that women with genetic susceptibility to high blood pressure have a greater risk of developing preeclampsia (Kivioja et al., 2022). Factors such as a family history of hypertension also reinforce this risk, confirming the multifactorial nature of the etiology of preeclampsia. Research shows that a family history of hypertension from the mother's side can significantly increase the risk of preeclampsia (Fikadu et al., 2021). In addition to personal history and genetic factors, other clinical factors also play a role in increasing the risk of preeclampsia in women with a history of hypertension. According to Yushida and Zahara's research, various maternal and clinical risk factors—including weight gain during pregnancy and multiple pregnancies—interact with chronic conditions such as hypertension in influencing the likelihood of preeclampsia

(Yushida & Zahara, 2020). Furthermore, studies show that women with chronic hypertension who experience preeclampsia often have a more severe health profile, thus complicating the health conditions of the mother and baby (Becker et al., 2018).

Based on these findings, an emphasis on routine screening and early identification of at-risk populations is critical. This proactive approach can include lifestyle modifications and pharmacological interventions such as the administration of low-dose aspirin, which has been shown to reduce the risk in pregnant women with high blood pressure (Hauspurg et al., 2018). The prevalence of chronic hypertension and its derivatives in pregnancy demands a tailored obstetric approach, focusing not only on identification but also on management to improve pregnancy outcomes. Furthermore, the implications of these findings go beyond the gestation period itself. Women who experience preeclampsia are at higher risk of developing cardiovascular disease and chronic hypertension later in life, as documented in the literature (Nyfløt et al., 2018). The link between hypertensive disorders in pregnancy and future health risks makes it important for health professionals to recognize and follow up on these patients after childbirth. Longitudinal studies show that the management of hypertension both during pregnancy and postpartum is essential to reduce the cardiovascular risks associated with preeclampsia and chronic hypertension (Bohîlţea et al., 2020). The strong association between a history of hypertension and preeclampsia confirms the need for ongoing research and clinical strategies directed specifically at women with the history. This relationship requires health professionals to prioritize preventive care and tailored management plans for these vulnerable populations, potentially resulting in significant improvements in maternal and fetal health, and minimizing the long-term impact of hypertension disorders on pregnancy.

DM on the incidence of preeclampsia in pregnant women

The findings showed that a history of diabetes mellitus did not show statistical significance in the binary model related to the risk of preeclampsia in pregnant women ($p = 0.576$; OR = 3,996; 95% CI: 0.031–513,878). This may indicate the absence of a direct correlation between pre-existing diabetes and the onset of preeclampsia, or it may reflect the presence of confounding factors that obscure the relationship. It is important to discuss the multifactorial nature of diabetes mellitus and its potential role in the etiology of preeclampsia. Diabetes mellitus, specifically gestational diabetes (GDM), has been documented as a comorbid condition that can complicate pregnancy. However, the exact mechanism by which diabetes affects preeclampsia is still being studied. Pankiewicz et al. noted that the incidence of preeclampsia in women with various forms of diabetes, including gestational and pregestational diabetes, is significantly higher than in the general population, with rates reaching 15–20% in people with type 1 diabetes (Pankiewicz et al., 2022). However, the study shows that the relationship is not entirely simple, as reflected in the insignificance of binary analysis results.

Several other studies show a different perspective. For example, Mareg et al. reported that mothers without a family history of diabetes mellitus had a significantly lower risk of preeclampsia than those with such a history, indicating that hereditary factors may mediate the risk of preeclampsia associated with diabetes mellitus (Mareg et al., 2020). This complicates the direct relationship between diabetes and preeclampsia outcomes. Furthermore, Mirabedini et al. stated that the contribution of diabetes to the risk of preeclampsia is still unclear, with their study showing no significant difference in the incidence of preeclampsia between women with diabetes and those without diabetes in the population studied (Mirabedini et al., 2022). These findings confirm the need for more comprehensive data that consider fundamental factors such as family history, age, ethnic background, and the presence of other comorbidities that may influence the development of preeclampsia. In addition, chronic systemic conditions in particular those that trigger inflammation and endothelial dysfunction (which are common in diabetes and preeclampsia) may be the underlying mechanisms linking these two health conditions. Research shows that women who experience preeclampsia often have altered metabolic responses, which may not always be directly visible when assessing personal or family history related to diabetes (Jacobsen et al., 2022).

5. Conclusions and Suggestions

The conclusions of this study are:

The age of the mother has no significant association with the incidence of preeclampsia

Education level does not show a significant association with the incidence of preeclampsia

Parity was a risk factor for preeclampsia incidence (OR = 2,244)

Pregnancy distance is a protective factor with the incidence of preeclampsia (OR = 0.183)

Gestational age is not significantly associated with the incidence of preeclampsia

Nutritional status has no significant association with the incidence of preeclampsia

History of hypertension is a risk factor with the incidence of preeclampsia (OR = 1307,750)

History of diabetes mellitus (DM) is a risk factor for the occurrence of preeclampsia (OR = 3,996)

Based on the results of the research and the conclusions that have been obtained, the suggestions are as follows:

The Wajo Regency Health Office is advised to strengthen maternal health policies and programs by focusing on efforts to prevent and control preeclampsia through early detection of key risk factors, especially a history of hypertension and diabetes mellitus. Strengthening the integrated screening system in antenatal care (ANC) services, increasing the capacity of human resources, and the sustainable use of maternal health surveillance data is

expected to reduce the risk of preeclampsia in Wajo Regency.

Health service facilities, especially health centers and first-level health facilities, are expected to optimize the implementation of comprehensive ANC services by improving the quality of pregnancy examinations, monitoring pregnant women with risk parity, and implementing appropriate and fast referrals to pregnant women with high risk factors. In addition, recording and reporting of risk factors for pregnant women needs to be carried out systematically as a basis for clinical decision-making and planning for maternal health programs.

Health care workers, particularly midwives and physicians, are advised to increase clinical vigilance of pregnant women with a history of hypertension and diabetes mellitus even though some other factors, such as age, education level, nutritional status, and gestational age, do not show a significant association with the incidence of preeclampsia. Health education and counseling for pregnant women needs to be focused on controlling blood pressure and blood sugar levels, as well as the importance of setting the ideal pregnancy distance as an effort to prevent pregnancy complications.

The public and pregnant women are expected to increase awareness of the importance of routine and quality pregnancy checkups, as well as play an active role in maintaining health during pregnancy. Pregnancy planning by paying attention to safe pregnancy distances, compliance with the recommendations of health workers, and openness in conveying disease history to health workers are important steps in reducing the risk of preeclampsia.

Researchers are further advised to develop studies with a stronger design, such as cohort or longitudinal studies, to strengthen the causal relationship between determinant factors and the incidence of preeclampsia. In addition, the addition of other variables that have not been studied, such as genetic factors, ANC adherence, psychosocial stress, and quality of health services, is expected to provide a more comprehensive picture of the factors that influence the incidence of preeclampsia.

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