



## The Correlation Between Weight Gain and Diet With Gestational Hypertension at Montong Health Center, Tuban, East Java

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### ABSTRACT

**Introduction.** Hypertension in pregnant women can cause blood vessels to narrow so that the blood supply to the body's tissues decreases resulting in organs not functioning as they should. The consequences that can appear in the mother are respiratory disorders, HELLP syndrome, cardiovascular disorders, liver disorders, which can eventually result in maternal death. In the fetus, it can cause Intra Uterine Growth Retardation (IUGR), premature fetus, low birth weight and death. **Methods.** This was a correlational research with a cross sectional time approach. The population in this research was all TM II pregnant women at the Montong Health Center, which totals 40 respondents. The sample in this case was 36 respondents who met the inclusion criteria and exclusion criteria. The sampling technique used was simple random sampling. The bivariate analysis of the statistical test used was Spearman Test, then the data was analyzed using the SPSS program with an error level of 0.05. **Results.** There was a statistically significant moderate correlation between weight gain and gestational hypertension (Spearman's  $\rho = 0.448$ ,  $p = 0.006$ ) and a very strong and statistically significant correlation was found between dietary patterns and gestational hypertension (Spearman's  $\rho = 0.673$ ,  $p = 0.000$ ). **Conclusion.** Weight gain and diet are significant risk factors for gestational hypertension, and implementing daily digital lifestyle monitoring could be an innovative approach to prevent its occurrence during pregnancy.

### 1. Introduction

Hypertension is a significant global health issue, as it serves as a risk factor for several serious conditions such as heart disease, kidney failure, diabetes, and stroke, all of which can lead to increased mortality rates. Hypertension is a cardiovascular disorder characterized by elevated blood pressure beyond normal systolic levels. Pregnant women are particularly vulnerable to hypertension. One of the major causes of maternal mortality and morbidity, in addition to infections and bleeding, is hypertension during pregnancy. This condition can lead to complications in 2-3% of pregnancies.<sup>1</sup>

Hypertension, or high blood pressure, is defined as a condition where blood pressure exceeds 140 mmHg for systolic pressure or 90 mmHg for diastolic pressure in two separate measurements taken within two minutes. In pregnant women, hypertension can cause blood vessels to constrict, reducing blood flow to body tissues and impairing organ function. This can lead to various complications for the mother, such as respiratory issues, HELLP syndrome (a condition

involving hemolysis, elevated liver enzymes, and low platelet count), cardiovascular and liver disorders, and potentially, maternal death. For the fetus, it can result in Intrauterine Growth Retardation (IUGR), premature birth, low birth weight, and even stillbirth.<sup>2</sup>

According to the World Health Organization (2023), more than 30% of the adult population globally is affected by hypertension. In Indonesia, hypertension ranks as the third leading cause of death, following stroke and tuberculosis. The global prevalence of hypertensive disorders during pregnancy has increased from 16.30 to 18.08 million, marking a 10.92% rise between 1990 and 2019. Interestingly, Southeast Asia experienced a decrease in prevalence, from 1.6 million to 1.4 million, over the same period. Despite this global trend, Indonesia, as a developing country, continues to face the serious challenge of high maternal mortality rates. According to data from a multicenter study across 11 tertiary hospitals in Indonesia, the average prevalence of hypertension in pregnancy was 22.1%, based on

3,219 cases out of 17,771 deliveries. Another large-scale study, using national health data from 9,024 pregnant women across all provinces in Indonesia, found that the overall prevalence of hypertension during pregnancy was 6.18%, with West Java having the highest rate at 10.57%.<sup>3</sup> The Ministry of Health of the Republic of Indonesia reported that in 2020, 20.7% of pregnant women experienced hypertension, a rise from 19.3% in 2015, this shows a rising trend in gestational hypertension prevalence. Provincial data in Indonesia shows that South Kalimantan has the highest prevalence of hypertension in pregnant women at 44.1%, while Papua has the lowest at 19.7%. East Java province has a prevalence rate of 22.71%.<sup>3</sup> In Tuban Regency, hypertension among pregnant women ranks as the second most common health issue, after bleeding. According to data from the Tuban Health Office from 2022 to 2023, the Montong Health Center has the second-highest number of hypertension cases in pregnant women among the 33 Puskesmas in Tuban Regency. In 2023, the prevalence of hypertension among pregnant women at Montong Health Center was 20%. The breakdown by village is as follows: Talangkembar Village (10%), Tanggulangin Village (4.1%), Montong Sekar Village (2.3%), Guwoterus Village (1.2%), Ngulahan Village (1.2%), and Manjung Village (1.2%). The high incidence of hypertension at Montong Health Center prompted researchers to investigate the issue further in this area.

Hypertension is a common non-communicable disease that affects many women during pregnancy, occurring in about 5-10% of pregnancies. Early in pregnancy, blood pressure typically decreases as part of the body's adaptation process, but it usually rises again as the pregnancy progresses. When blood pressure exceeds the normal limit of 140/90 mmHg, it is considered gestational hypertension. This condition increases the risk of complications such as preterm birth, placental abruption, fetal growth restriction, and other health issues.<sup>4</sup>

Multiple risk factors, both modifiable and non-modifiable, contribute to the increasing prevalence of hypertension. These factors can be categorized into uncontrollable (major) and controllable (minor) risk factors. Factors beyond an individual's control, like genetic predisposition, sex, ethnicity, and age, contribute to risk. Conversely, risk factors that can be managed encompass conditions like obesity/excessive weight gain, a sedentary lifestyle, smoking, sodium sensitivity, inadequate potassium, alcohol intake, stress levels, and unhealthy eating habits (e.g., high fat consumption). One of the primary causes of hypertension is atherosclerosis, which occurs due to the accumulation of excess fat, leading to blockages in the blood vessels.<sup>5</sup>

Body weight gain during pregnancy can be monitored using the Body Mass Index (BMI), which serves as an indicator to assess the nutritional status

of pregnant women. A woman's nutritional status can be determined by her pre-pregnancy body weight and the weight gain during pregnancy. Typically, a weight gain of about 12.5 kg is expected throughout pregnancy, though this can vary depending on the woman's body size, pre-pregnancy weight, and the trimester of pregnancy. However, many pregnant women still experience excessive weight gain, which can lead to overweight or obesity.<sup>5</sup>

A healthy diet refers to balanced nutrition, which means meeting all nutritional needs in appropriate amounts. However, the importance of proper nutrition that aligns with the specific needs of pregnant women is not fully recognized by many people in Indonesia. During the first trimester, the nutritional needs of pregnant women are generally similar to those of other adult women maintaining their health. Nonetheless, attention to nutritional value remains crucial, especially with the growing prevalence of ready-to-eat foods and diets that often lack sufficient nutrients and variety, as well as the use of additives.<sup>(6)</sup> The aim of this study was to examine the relationship between weight gain, diet, and the occurrence of gestational hypertension in pregnant women at the Montong Tuban Health Center in East Java, Indonesia.

## 2. Methods

This research is a type of "non-experimental" study. It utilized a correlational design with a cross-sectional approach, aiming to determine the relationship between weight gain, diet, and the incidence of hypertension. Data was collected using a questionnaire as the research instrument.<sup>7</sup> A total of 40 respondents, representing all second-trimester pregnant women at the Montong Health Center, constituted the population for this research. Ensuring the sample accurately reflected the 40 second-trimester pregnant women at Montong Health Center was achieved by calculating the necessary minimum sample size with the Slovin formula. The Slovin formula is commonly used to calculate the sample size in a population when the exact number of the population is known. In this case, the formula was applied to calculate an adequate sample size that would provide reliable and valid results while maintaining a reasonable margin of error. Based on this calculation, 36 respondents were selected to participate in the study, ensuring that the sample was sufficiently large to draw meaningful conclusions. The sample for the study included 36 respondents, with the following inclusion criteria: pregnant women who either experienced hypertension or did not in their second trimester, pregnant women who agreed to participate, and those who were willing to follow the study from start to finish. Exclusion criteria included pregnant women who dropped out of the study and those who could not participate due to positive in hepatitis, HIV/AIDS, TORCH, pre-existing hypertension, diabetes, and preeclampsia. The

sampling technique used was simple random sampling.

In this study, the independent variables are weight gain and diet, while the dependent variable is the incidence of hypertension during pregnancy. Weight gain was measured as the difference between pre-pregnancy weight and current weight, and categorized based on the IOM-NRC 2009 BMI classification (underweight, normal, overweight/obese).<sup>8</sup> Diet refers to the management of food intake, including the amount and type of food, aimed at maintaining health, nutritional status, and preventing or aiding in the treatment of diseases. Hypertension in pregnancy is defined as a rise in blood pressure, with systolic pressure exceeding 140 mmHg or diastolic pressure exceeding 90 mmHg after 20 weeks of gestation.

The instrument used was a questionnaire on weight gain variables. Weight gain during pregnancy is the change in body weight resulting from the conversion of food intake into fat, particularly during the second trimester (TM 2). Indicators used to monitor this weight gain include height, pre-pregnancy weight, pre-pregnancy body mass index (BMI), and pregnancy weight. Based on BMI categories, pregnant women with underweight (BMI <18.5 kg/m<sup>2</sup>) should gain 5-9.1 kg with a rate of 0.23 kg per week; those with normal BMI (18.5-24.9 kg/m<sup>2</sup>) should gain 11.5-16 kg with a rate of 0.45 kg per week; those with overweight (BMI 25-29.9 kg/m<sup>2</sup>) should gain 7-11.5 kg with a rate of 0.27 kg per week; while women with obesity (BMI >30 kg/m<sup>2</sup>) should gain 5-9.1 kg with a rate of 0.23 kg per week. Weight gain was measured as the difference between pre-pregnancy weight and current weight, and categorized based on the IOM-NRC 2009 BMI classification (underweight, normal, overweight/obese).<sup>9</sup> Meanwhile, the diet variable uses questionnaires with good, sufficient, and less categories. In this system, there are two answer choices: "Correct," which is given a score of 1, and "Incorrect," which is given a score of 0, with a total of 10 statements to be answered. The minimum score that can be obtained is 0 (if all answers are incorrect), and the maximum score is 10 (if all answers are correct). To determine the minimum and maximum scores, the minimum score is calculated by multiplying the minimum score (0) by the number of statements (10), resulting in 0, while the maximum score is calculated by multiplying the maximum score (1) by the number of statements (10), resulting in 10. Afterward, the total score is divided into three categories: Good, Satisfactory, and Poor. The score range (R) is determined by subtracting the minimum score from the maximum score, which is 10 - 0, resulting in a range of 10. Then, the interval (I) for each category is calculated by dividing the range (R)

by the number of categories (3), which results in an interval of 3.33. Based on this calculation, the Good category covers scores between 7 and 10, the Sufficient category covers scores between 4 and 6, and the Less category covers scores between 0 and 3. Therefore, the obtained score can be classified into the Good, Sufficient, or Less category based on the calculated score range.

The instrument used was a validated and reliable 10-item questionnaire that have been tested for validity and realism so that it can be used for research. Validity and reliability tests were conducted to ensure that the 13 questions about dietary patterns during pregnancy accurately and consistently measure dietary habits. Validity was tested by correlating respondents' answers with relevant indicators, and the results showed that 10 out of 13 questions had a p-value smaller than 0.05, indicating good validity, while 3 questions were less valid. For reliability, the test used the Cronbach's Alpha coefficient, which resulted in a value of 0.85 for the 10 valid questions. Hypertension observation sheet with categories consisting of Non-hypertension and hypertension.<sup>7</sup> This study was carried out at the Montong Health Center from September to December 2024.

Univariate analysis is used to get a descriptive statistic, both independent variables, related variables (Dependent) and description of respondent characteristics, namely by making a frequency distribution table. Based on the table, the variables that are studied are then analyzed descriptively by describing them in detail.

Univariate analysis was performed to describe the distribution of each variable and respondent characteristics using frequency tables. Bivariate analysis was conducted using the Spearman correlation test to determine the relationship between the independent variables (weight gain and diet) and the dependent variable (hypertension incidence), as the data were on ordinal and nominal scales. Data were analyzed using SPSS software with a significance level of 0.05.<sup>7</sup> The implementation of this research adhered to ethical standards and has passed the ethics review conducted by the Institute for Health Research Ethics of the Nahdlatul Ulama Tuban Institute of Health Sciences. The ethics approval was granted under the reference number No. 213/LEPK/IIKNU/XI/2024.

### 3. Results

Regarding socio-demographic characteristics (Table 1), the majority of participants were aged between 25-30 years (63.9%), followed by those aged 31-35 years (27.8%). Most had completed senior high school (63.9%) and were primarily identified as housewives (55.6%), with a smaller group being self-employed (25.0%).

**Table 1. Socio-demographic characteristics of all second-trimester pregnant women at the Montong Health Center (n=36)**

Characteristic	Frequency	Percentage (%)
<b>Age Group</b>		
25-30 years	23	63,9
31-35 years old	10	27,8
>35 years old	3	8,3
<b>Education</b>		
Elementary	3	8,3
Junior	4	11,1
Senior	23	63,9
College	6	16,7
<b>Occupation</b>		
Housewife	20	55,6
Farmer	1	2,8
Self employed	9	25,0
Private	4	11,1
Civil Servant	2	5,6

**Table 2. Clinical characteristics of all second-trimester pregnant women at the Montong Health Center (n=36)**

Characteristic	Frequency	Percentage (%)
<b>Gravidity</b>		
Primigravida	8	22,2
Multigravida	28	77,8
<b>Weight Gain</b>		
Less	6	16,7
Normal	20	55,6
More	10	27,8
<b>Diet</b>		
Good	15	41,7
Sufficient	10	27,8
Less	11	30,6
<b>Incidence of Hypertension</b>		
Non-hypertension	18	50,0
Hypertension	18	50,0

**Table 3. Analysis of the correlation between weight gain and the incidence of gestational hypertension at the Montong Health Center in 2024**

Weight Gain	Incidence of Gestational Hypertension					
	No Hypertension		Hypertension		Total	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Less	3	50,0	3	50,0	6	100
Normal	15	75,0	5	25,0	20	100
More	0	0,0	10	100	10	100
Total	18	50,0	18	50,0	36	100

**Spearman's rho Test Asymp. Sign (2-sided) = 0.006**

**Table 4. Analysis of the Correlation between diet and the gestational hypertension at the Montong Health Center in 2024**

Weight Gain	Incidence of Gestational Hypertension					
	No Hypertension		Hypertension		Total	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Good	3	50,0	3	50,0	6	100
Sufficient	15	75,0	5	25,0	20	100
Less	0	0,0	10	100	10	100
Total	18	50,0	18	50,0	36	100

**Spearman's rho Test Asymp. Sign (2-sided) = 0.000**

Clinical characteristics (Table 2) revealed that most women were multigravida (77.8%). In terms of weight gain during pregnancy, the largest group experienced 'Normal' weight gain (55.6%), while 27.8% experienced 'More' than recommended gain, and 16.7% had 'Less'. Diet quality, as assessed by the questionnaire, showed that 41.7% had a 'Good' diet, 30.6% had a 'Less' (poor) diet, and 27.8% had a 'Sufficient' diet. These characteristics provide the baseline context for analyzing the factors associated with gestational hypertension in this research.

There was a statistically significant moderate correlation between weight gain and gestational hypertension (Spearman's  $\rho = 0.448$ ,  $p = 0.006$ ). All women with excessive weight gain developed hypertension (100%), compared to only 25% among those with normal weight gain. This shows that the value of  $\rho < \alpha$  ( $0.006 < 0.05$ ) showed that weight gain was a risk factor of gestational hypertension in at the Montong Health Center in 2024 with a low correlation strength ( $r = 0.4$ ).

Almost all respondents with a good diet did not experience hypertension, namely 14 people (93.3%), and a small proportion of respondents with a poor diet did not experience hypertension, namely 2 people (18.2%). The *Spearman's rho* showed a significance level of  $\alpha = 0.05$ , and further statistical analysis obtained  $p = 0.000$  and  $r = 0.673$  (0.7). This shows that the value of  $\rho < \alpha$  ( $0.000 < 0.05$ ) showed that diet play a role to the incidence of gestational hypertension at Montong Health Center in 2024 with a moderate correlation strength ( $r = 0.7$ ).

#### 4. Discussion

This finding agrees with earlier studies that showed gaining too much weight during pregnancy increases the risk of pregnancy-induced hypertension.<sup>9</sup> This study defined Gestational Weight Gain (GWG) as the total weight change during pregnancy, without differentiating between fluid retention (edema) and fat gain (adiposity). Although edema can occur in normal pregnancies, it's more prevalent in women with preeclampsia and can contribute to higher GWG measurements. Both excessive GWG and high pre-pregnancy BMI are known risk factors for hypertensive disorders of pregnancy (HDP). To understand GWG's specific role, we examined how excessive GWG impacted HDP risk across different pre-pregnancy BMI groups. Our results showed that the effect of excessive GWG (compared to IOM guidelines) on HDP rates varied depending on the woman's initial weight category.<sup>9</sup>

Excess adiposity may contribute to endothelial dysfunction and increased cardiac output, elevating blood pressure during pregnancy. Maternal obesity significantly increases the risk of both maternal and fetal health complications. It is associated with a higher likelihood of developing cardiometabolic diseases such as insulin resistance, gestational

diabetes, hypertension, dyslipidemia, and cardiovascular disease during pregnancy and postpartum. These conditions increase the risks of pre-eclampsia, gestational hypertension, preterm birth, emergency caesarean sections, and hemorrhage for the mother, while also heightening the risk of metabolic syndrome, type 2 diabetes, obesity, and cardiovascular disease for the offspring. This suggests an intergenerational transmission of metabolic dysfunction, creating a cycle of obesity and insulin resistance. Identifying obese women before pregnancy and providing pre-pregnancy medical counseling can help prevent these complications, improving both maternal and child health outcomes.<sup>10</sup>

Over one-third of women of reproductive age are obese, with a body mass index (BMI) of 30 kg/m<sup>2</sup> or higher, and another 25% are overweight, with a BMI between 25-29.9 kg/m<sup>2</sup>. Maternal obesity during pregnancy is linked to several adverse outcomes, such as gestational diabetes, hypertension, preeclampsia, macrosomia, and an increased likelihood of cesarean delivery. Specifically, preeclampsia contributes significantly to maternal morbidity and premature births. In addition to traditional cardiovascular risk factors like obesity and hypertension, emerging factors such as endothelial dysfunction and vascular stiffness are being recognized as independent risk factors for cardiovascular events in both pregnant and non-pregnant individuals.<sup>10</sup>

Arterial stiffness, which refers to the reduced ability of arteries to expand and contract in response to pressure changes, is a key marker of vascular dysfunction and is often measured by pulse wave velocity (PWV). PWV is considered the gold standard for non-invasive arterial stiffness measurement and is a significant predictor of cardiovascular diseases, including coronary artery disease and stroke. Elevated PWV is also linked to adverse pregnancy outcomes like hypertension and preeclampsia. Endothelial function can be assessed through flow-mediated dilation (FMD), which measures changes in arterial diameter in response to blood flow. Studies have shown that women with preeclampsia have impaired FMD before the onset of the condition and even years postpartum, highlighting the importance of vascular health monitoring in pregnancy.<sup>11</sup>

Hypertension is one of the non-communicable diseases that are experienced by many during pregnancy. Hypertension can cause blood vessels to narrow so that the blood supply to the body's tissues decreases resulting in organs not functioning as they should. The consequences that can appear in the mother are respiratory disorders, HELLP syndrome (hemolysis, elevated liver enzymes, low platelet cardiovascular, count), liver disorders, which can eventually result in maternal death. In the fetus, it can cause *Intra Uterine Growth Retardation* (IUGR),

premature fetuses, low birth weight and death.<sup>12</sup>

People with excess weight have to work harder to burn off the extra calories in their body. This process requires an adequate supply of oxygen in the blood, and as more calories are burned, the demand for oxygen increases. This leads to a higher blood supply, causing the heart to work harder. As a result, blood pressure in overweight individuals tends to be higher, particularly in pregnant women, which can lead to kidney and liver damage, leg and hand cramps, stroke, and complications during labor, such as prolonged or difficult delivery, or even the need for a cesarean section. Therefore, it can be concluded that obesity in pregnant women contributes to the risk of hypertension. It is essential for obese pregnant women to address the factors contributing to obesity and manage their weight both before and during pregnancy.<sup>13</sup>

Based on the results and existing theories, the researchers suggest that the number of respondents with abnormal weight gain who experience hypertension during pregnancy indicates that weight gain in pregnant women alone may not directly impact the health of the mother or the fetus. Additionally, there were respondents with normal or lower weight gain who still experienced hypertension, likely due to other factors such as diet, lifestyle, and a history of hypertension. This shows that even women with normal weight gain can still develop hypertension during pregnancy. Therefore, it is important to take preventive measures against abnormal weight gain to reduce the risk of hypertension during pregnancy, as it can have harmful effects on both the mother and the fetus. The researchers hope that pregnant women will be able to manage their nutritional intake effectively, preventing abnormal weight gain and lowering the risk of hypertension during pregnancy.<sup>14</sup>

This finding is in line with previous studies which demonstrated that consumption of additional salt in the diet, visible fat, and obesity was found to be associated with hypertensive disorders of pregnancy.<sup>9</sup> The common causes of maternal death include pregnancy-induced hypertension (PIH) or gestational hypertension, post-partum hemorrhage (PPH), and pulmonary embolism. PIH is the development of hypertension in pregnant women who have never been hypertensive before but develop new-onset hypertension after 20 weeks of gestation without other preeclampsia sign.

In addition to pharmacological treatments for pregnancy-induced hypertension (PIH), lifestyle and dietary modifications are widely recognized as cost-effective strategies with significant potential to prevent PIH. Effective interventions include weight loss, reduced salt intake, avoidance of alcohol, potassium supplementation, and alterations in dietary patterns. One of the most popular dietary plans for lowering blood pressure is the DASH

(Dietary Approaches to Stop Hypertension) diet, which emphasizes a high intake of fruits and vegetables while being low in saturated fats. Numerous randomized controlled trials have shown that the DASH diet consistently helps manage blood pressure in individuals with obesity, hypertension, and diabetes mellitus.<sup>9</sup>

The role of macronutrients like carbohydrates, proteins, and fats in improving lipid profiles and supporting weight loss. On the other hand, micronutrients such as sodium, which is essential for normal body functions, have been linked to hypertension when consumed excessively. A low-sodium DASH diet has been found to have more significant blood pressure-lowering effects compared to a high-sodium version. Studies also suggest that potassium supplementation can further reduce blood pressure in individuals on high-salt diets. Despite the proven benefits of such dietary approaches, cultural, societal, and commercial factors often present challenges for individuals trying to adopt the DASH diet for cardiovascular health.<sup>9</sup>

The gestational hypertension is strongly linked to the mother's diet. Consuming foods that contain preservatives or are not suitable for pregnant women can contribute to this issue. Diet is closely connected to a person's eating habits, including the frequency of meals and the types of food consumed. Ensuring that nutritional intake meets recommended guidelines is an important strategy to help counteract and prevent high blood pressure in pregnant women.<sup>2</sup>

A good diet always refers to balanced nutrition, which is the fulfillment of all nutrients according to needs and balanced. The importance of proper nutrition in accordance with the mothers' nutrient has not been fully realized by the Indonesian people. In the first trimester, the mothers' nutritional consumption in general are still the same as ordinary adult women who maintain their health. However, nutritional value must still be considered, considering the increasing proliferation of ready-to-eat foods and diets that tend to lack nutritional intake and variation as well as the use of additives.<sup>15</sup>

Based on the results and existing theories, the researchers conclude that diet related to gestational hypertension during pregnancy. One factor that can influence weight gain during pregnancy is the mother's education level. Higher education improves the ability to understand and apply nutritional information, leading to healthier behaviors and lifestyles. In this study, most respondents had completed high school, which is considered a good education level. Education can influence nutritional intake and BMI, education level affects information acceptance, contributing to better knowledge about nutritional needs.<sup>2</sup> The mother's education level can impact her efforts to address nutritional and health issues, with higher education leading to a more diverse diet to maintain health. The optimal age for



pregnancy is considered to be between 20 and 35 years old, as this period is when a woman's body is healthiest and safest for pregnancy and childbirth. Pregnant women aged 20 require more nutritional intake to support both their own growth and the development of the fetus. In contrast, women over 35 need more nutrients due to the declining function of their organs and to support the pregnancy. In this study, most respondents were between the ages of 25 and 30, making up 63.9% of the sample.<sup>6</sup> Job-related stress can also contribute to hypertension. Most respondents in this study were housewives, with some working as private employees, entrepreneurs, farmers, or civil servants. Excessive stress can trigger various health issues, including headaches and sleep difficulties. Other factors influencing hypertension during pregnancy include genetics, particularly a family history of hypertension. People with a family history of hypertension are more likely to experience it themselves. Family history of hypertension and heart disease increases the risk of hypertension by 2-5 times.<sup>4</sup> Based on these findings and theories, the researcher believes that hypertension during pregnancy can be prevented through regular check-ups from the first to the third trimester, as well as providing pregnant women with education on maternal and fetal health, enabling them to better manage their health and pregnancy.

The importance of maintaining a proper diet to ensure that pregnant women receive adequate nutrition, which can help prevent hypertension. It is evident that some pregnant women still exhibit poor eating habits, which contribute to the development of hypertension.<sup>13</sup> Diet plays a crucial role in the development of hypertension in pregnant women. In addition to being a major factor, an uncontrolled diet can increase the risk of health problems for both the mother and the fetus. On the other hand, mothers who maintain a healthy diet but still experience hypertension may be affected by other factors, such as a history of hypertension.<sup>14</sup>

To reduce these risk factors, pregnant women can consume antioxidants, potassium, protein, and magnesium regularly during pregnancy.<sup>18</sup> Foods containing potassium include tomatoes, bananas, apples, oranges and potatoes. While many contain antioxidants, namely soybeans and tempeh. Foods contain calcium and magnesium, namely milk and nuts, and green vegetables. It is hoped that pregnant women maintaining a good diet will have an impact on the blood pressure of pregnant women, so that the incidence of hypertension and the impact of hypertension in pregnancy can be resolved.<sup>19</sup> The limitation of this research is that it is secondary data collection and is not carried out longitudinally.

Pregnancy-related hypertension remains a significant health concern, with various factors influencing its occurrence, such as age, stress, genetics, and nutrition. Monitoring these factors

regularly can be key to preventing or managing hypertension during pregnancy. Traditionally, prenatal care involves routine visits to healthcare providers for assessments of maternal and fetal health. However, in the digital age, new tools and technologies can complement traditional practices, offering more frequent and accessible monitoring. One such innovation is the implementation of digital lifestyle tracking, which allows pregnant women to monitor their diet, physical activity, and weight gain regularly. Digital monitoring can provide valuable insights into a woman's health status, enabling early identification of potential issues, such as excessive weight gain or inadequate nutrition, which are risk factors for hypertension. By tracking these factors on a weekly basis, healthcare providers and pregnant women can make timely adjustments to the woman's lifestyle, ensuring a healthier pregnancy. This proactive approach could reduce the incidence of hypertension, improve maternal and fetal outcomes, and contribute to a more personalized and accessible model of prenatal care.<sup>20</sup> The researchers aim to explore the potential of this digital intervention as a preventive measure against pregnancy-related hypertension.

## **5. Conclusion**

Weight gain and diet were related to the incidence of gestational hypertension at Montong Health Center. We hope this research highlights the importance of monitoring and managing weight gain and diet during pregnancy, as well as regularly measuring blood pressure during Antenatal Care (ANC) visits. This can help identify and minimize the risk of increased blood pressure in pregnant women early on. The researchers also aim to inspire innovation in preventing pregnancy-related hypertension by implementing daily digital lifestyle monitoring to track diet and weight gain on a weekly basis throughout pregnancy.

## **6. Author Contribution**

N.M.H as first author conceptualized and responsibilities encompassed study conceptualization and design, research implementation, data acquisition and analysis, initial manuscript preparation, contribution to result interpretation, and intellectual revision of the manuscript. W.D.K assisted in the study design, provided critical review of the manuscript, and contributed to data analysis and interpretation.

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