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Relationship between Antenatal Care History, Anemia, Exclusive Breastfeeding, and Mother's Diet Pattern Towards The Nutritional Status of Children Aged 2-5 Years

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ABSTRACT

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Background: The first thousand days of life are a golden period for the growth and development of children and are closely related to pregnant women starting from the level of adequacy of nutritional intake of pregnant women, health status and antenatal care in pregnant women, exclusive breastfeeding, birth weight of babies, immunization and provision of complementary foods (MPASI). ANC visits according to government recommendations, are also important to monitor the health of the mother and fetus as early as possible. **Purpose:** This study seeks to describe and relate the maternal antenatal care history, anemia during pregnancy, maternal diet, and exclusive breastfeeding to the nutritional status of children in 2021-2023 in Ciranggem Village, Sumedang Regency. **Method:** The type of research used is analytical observational research with a cross-sectional approach, and the sampling technique is total sampling. **Result:** It was found that ANC services, exclusive breastfeeding, and maternal diet in Ciranggem Village were 73.3%. Mothers who had a history of anemia were 26.7%. The nutritional status of children in Ciranggem Village was found to be Normal 66.7% (20 people), Stunting 20% (6 people), Underweight 10% (3 people), and Overweight 3.3% (1 person). **Conclusion:** by obtaining data analysis results with a p-value <0.05, which shows a relationship between the history of Antenatal Care (ANC), Exclusive Breastfeeding, anemia, dietary patterns in pregnant women, with the nutritional status of children in Ciranggem Village.

Keywords

Antenatal Care

Exclusive Breastfeeding,

Child nutrition

Stunting

Maternal health

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Introduction

The first thousand days of life or window of opportunity is a golden period for the growth and development of children, starting from the time of conception until the age of 2 years. The first thousand days of life are closely related to pregnant women starting from the level of adequacy of nutritional intake of pregnant women, health status, and antenatal care in pregnant women, while at the stage of children aged 0-24 months including exclusive breastfeeding, birth weight of babies, immunization and provision of complementary foods (MPASI) [1]. According to WHO (World Health Organization) 2018, around 86% of women worldwide access antenatal care at least once during their pregnancy. According to WHO in 2020, 89% of pregnant women access antenatal care services with health workers once [1]. However, this percentage varies by region. In developing countries, the percentage drops to around 68%. Southeast Asia has the lowest ANC attendance rate, with 54% of women attending at least one ANC visit [2]. Globally, the World Health Organization (WHO) underscores the first 1,000 days of life, including pregnancy through the first two years post-birth, as a vital period for establishing a child's lifelong health trajectory. Inadequate maternal nutrition and poor access to quality antenatal care can compromise fetal growth and increase the risk of stunting and other forms of malnutrition in early childhood. The WHO recommends a minimum of eight ANC visits during pregnancy to ensure timely screening, health education, and nutritional interventions, yet many women in Indonesia fail to meet this standard, particularly in rural and underserved communities (WHO, 2016; Indonesian Ministry of Health, 2021). The number of antenatal care (ANC) visits in Indonesia in the last three years (2019-2021) has shown an increase. In 2019, ANC coverage reached 92.7%, while in 2021 it increased

to 95.2%. There was also an increase in the coverage of the first ANC in the first trimester (2019: 72.3%, 2021: 81.3%) and the coverage of the fourth visit (2019: 61.4%, 2021: 70.0%). In 2020, the coverage of ANC visits in Indonesia showed a high figure, with the first visit reaching 96.84% and the fourth visit 90.18%. However, in 2021, although the figure remained high, there was a slight decline, with the first visit reaching 94.71% and the fourth visit 86.85%. In November 2023, 19,929 pregnant women visited the Sumedang health center for ANC services. ANC visits according to government recommendations, are important to monitor the health of the mother and fetus as early as possible. In addition, this visit helps prepare for the optimal labor process, postpartum period, and lactation for the mother [3]. The minimum standard ANC frequency is as follows: trimester 1 has 2 visits, trimester 2 has 1 visit, and trimester 3 has 2 visits [4].

Poor ANC services can trigger LBW; the weight and length of the BBL body are a reflection of the mother's health condition during pregnancy, such as nutritional status [5]. Parameters for assessing the nutritional status of pregnant women include anthropometry, LILA, hemoglobin (Hb), and diet. The Hb level of pregnant women <10 mg/dl is classified as anemia [6]. Pregnancy with complications of anemia can cause problems in babies, such as LBW, stunting, and infant death, while the impact of anemia on the health of pregnant women is the risk of bleeding before and during childbirth, and maternal death. Thus, it can increase the percentage of maternal mortality rates and infant mortality rates. Anemia in pregnant women inhibits the transportation of food and O₂ to the fetus through the placenta, resulting in impaired fetal growth and development [6].

Nutrition during childhood has a big influence on growth and development, even when you are still in the womb, nutrition plays an important role. If a pregnant mother gets adequate food, the baby she is carrying will be born with a normal birth weight. Meanwhile, mothers who are malnourished will give birth to babies with low birth weight [7]. The most important nutrition that is first obtained when a baby is born is breast milk. Breast milk is the most ideal food both physiologically and biologically that must be given to babies in their early life. This is because in addition to containing quite high nutritional value, breast milk also contains immune substances that will protect against various types of diseases that can inhibit the growth of the baby. [8].

Breastfeeding begins when the baby is born for 6 months, without adding and/or replacing it with other foods or drinks [9]. Exclusive breastfeeding in Indonesia is still far from expectations. Nationally, the coverage of babies receiving exclusive breastfeeding in 2017 was 61.33%. However, this figure has not reached the target coverage of exclusive breastfeeding set by the government, which is 80% (Ministry of Health, 2018) [10]. Therefore, researchers want to know whether there is a relationship between the history of maternal ANC and

exclusive breastfeeding on the nutritional status of children, especially in Ciranggem Village, Sumedang Regency, West Java

Literature Review

A. Antenatal Care (ANC)

Antenatal Care (ANC) is a health service by professional personnel for mothers during their pregnancy which is carried out by the established antenatal care standards. Pregnant women are recommended to visit health services twice in the first trimester, once in the second trimester, and three times in the third trimester. The aim of Antenatal Care is for pregnant women to receive care during pregnancy including pregnancy check-ups, education and high-risk detection, so that if there are any findings that are not good, preventive and curative efforts can be taken immediately [10].

B. Anemia in Pregnant Women

Anemia is a condition in which the number of erythrocytes or the capability and capacity of erythrocytes in transporting oxygen is inadequate to meet the physiological needs of the body which can be caused by decreased production of erythrocytes and/or hemoglobin (WHO, 2021:1). Anemia in pregnancy is a condition of anemia that occurs during pregnancy characterized by hemoglobin (Hb) levels <11 g/dl in the first and third trimesters, while in the second trimester, the hemoglobin level is <10.5 g/dl or the hematocrit level is <33% [11]. According to the severity of the disease, anemia is divided into 3 based on the hemoglobin levels in the blood, namely (WHO, 2011:3):

1. Mild: Hemoglobin levels 10-10.9 g/dl
2. Moderate: Hemoglobin levels 7-9.9 g/dl
3. Severe: Hemoglobin levels <7 g/dl

In severe anemia conditions, immediate medical attention is required, while if Hb <4 g/dl is found, it indicates an emergency condition that is at risk of causing congestive heart failure, sepsis, and even death.

C. Pregnant Women's Diet

Eating patterns are a way or effort to regulate the amount and type of food with descriptive information including maintaining health, nutritional status, preventing or helping to cure diseases [12]. Eating patterns are defined as characteristics of repeated activities of eating by individuals or everyone eating to meet food needs [13].

In general, eating patterns have 3 (three) components consisting of: type, frequency, and amount of food.

- a. Type of food

Type of food is a type of staple food eaten every day consisting of staple foods, animal side dishes, vegetable side dishes, vegetables, and fruits consumed every day. Staple foods are the main food source in Indonesia which is consumed by every person or group of people consisting of rice, corn, sago, tubers, and flour.

b. Frequency of eating

Frequency of eating is several times a day including breakfast, lunch, dinner and snacks [14]. While according to frequency of eating is repeatedly eating a day with a total of three times breakfast, lunch, and dinner.

c. Number of meals

The number of meals is the amount of food eaten by each person or each individual in a group.

D. Child Nutritional Status

Nutritional status is a measure of success in fulfilling nutrition for children indicated by the child's weight and height. This condition is influenced by the balance between nutrient intake from food and the nutritional needs required by the body for metabolism. The condition of the body as a result of the use, absorption, and use of food. Food that meets the body's nutritional needs generally leads to good nutritional status. It is better if the lack or excess of essential nutrients in food for a long period is called malnutrition or lack. Manifestations or manifestations of poor nutrition can be in the form of malnutrition and overnutrition [15]. Nutritional status is a measure of success in fulfilling nutrition for children indicated by the child's weight and height. Nutritional status is also defined as a health status resulting from a balance between nutrient needs and inputs [16].

Below is an adaptation of the UNICEF framework to reflect the specific maternal factors investigated in this research—namely antenatal care (ANC) history, maternal anemia, exclusive breastfeeding, and maternal diet pattern—and their influence on the nutritional status of children aged 2–5 year

1. Basic Causes:

- Socio-economic status
- Maternal education
- Access to healthcare services

2. Underlying Causes (Household & Maternal Level):

- **Maternal Diet Pattern:** Reflects the quality and diversity of maternal food intake during and after pregnancy, which influences maternal nutritional reserves, breastfeeding quality, and family dietary practices.

- **Maternal Anemia:** A biomedical condition reducing maternal oxygen-carrying capacity, often linked to iron deficiency, which can impair fetal development, reduce birth weight, and hinder effective breastfeeding.
- **Antenatal Care (ANC) History:** Frequency and quality of ANC visits affect early detection and management of nutritional risks during pregnancy, influencing both maternal and fetal health.
- **Exclusive Breastfeeding Practice:** Exclusive breastfeeding in the first 6 months provides essential nutrients and immune protection, laying the foundation for adequate growth and development.

3. Immediate Causes (Child Level):

- Inadequate dietary intake and disease in the post-weaning period (age 6–59 months) mediated by:
 - Suboptimal maternal feeding practices
 - Poor household food diversity
 - Infections or recurrent illnesses linked to early nutritional deficits

4. Outcome:

- **Child Nutritional Status (Aged 2–5 Years):** Measured via indicators such as weight-for-age, height-for-age (stunting), and weight-for-height (wasting), reflecting cumulative exposure to risks over time.

Material And Methods

Based on the research objectives to find a description and relationship between Maternal Antenatal Care History, Anemia in Pregnancy, Maternal Diet and Exclusive Breastfeeding on Children's Nutritional Status in 2021-2023 in Ciranggem Village, Sumedang Regency, the type of research used is an observational analytical study with a Cross Sectional approach. Based on Politano et al., 2020[17], correlational research must use a minimum sample of 30 subjects. Therefore, the sample taken in the study was 30 respondents. The study was conducted at the Posyandu of Ciranggem Village, Sumedang Regency, West Java. The study was conducted from November 2023 to December 08, 2023. The population in this study was the total number of mothers who already had children aged 2-5 years who were registered and actively carrying out control activities at the Ciranggem Village Posyandu during pregnancy in 2021-2023. The sample was taken using a total sampling technique of 30 people and met the inclusion and exclusion criteria. Data processing will be done using SPSS Statistics Version 27 software (IBM, New York). Chi-square (χ^2) is used to analyze whether or not there is a relationship between the independent variables and the dependent variables. The confidence interval (CI) is set at 95%. A P value of less than 0.05 indicates statistically significant data.

Results

A. Univariate Analysis Results

Table 1 below is the result of research using univariate analysis with 30 respondents, consisting of Data on the distribution of antenatal care (ANC) history, data on the distribution of anemia history in pregnant women, data on the distribution of exclusive breastfeeding, and data on the distribution of mothers' dietary patterns. The results showed that most respondents, namely 22 mothers (73.3%), were in the group with a history of ANC fulfilled, namely ≥ 6 times during pregnancy. Meanwhile, respondents who did not have a history of ANC fulfilled were 8 mothers (26.7%) during pregnancy. In terms of anemia history in pregnant women, the data shows that mothers who have Hb levels < 12 are 9 out of 30 respondents, or 26.7 percent, while the remainder have Hb levels > 12 , as many as 21 out of 30 respondents, or 73.3 percent. For the provision of Exclusive Breastfeeding, the data is dominated by mothers who provide Exclusive Breastfeeding, namely 22 out of 30 respondents or 73.3 percent, while for Eating Patterns, data was obtained that most pregnant women have a diet that meets standards, namely 22 out of 30 respondents or 73.3 percent.

Table 1. Univariate Analysis Results

Description	Frequency	Percentage
Antenatal Care History		
Fulfilled	22	73.3
Not Fulfilled	8	26.7
Hb Level		
< 12	9	30.0
≥ 12	21	70.0
Exclusive Breastfeeding		
Yes	22	73.3
No	8	26.7
Nutritional Needs		
Fulfilled	22	73.3
Not Fulfilled	8	26.7

Table 2 provides an overview of the nutritional status of children in Ciranggem Village in 2021-2023, out of 30 children, 20 (66.7%) had normal nutritional status; 1 (3.3%) child was overweight; 3 (10%) children were underweight; and 6 (20%) children experienced stunting.

Table 2. Children's Nutritional Needs

Nutrition Needs	Frequency	Percentage
Normal	20	66.7
Overweight	1	3.3
Underweight	3	10
Stunting	6	20

B. Bivariate Analysis Results

Table 3 shows the relationship between Antenatal Care (ANC) history in pregnant women and children's nutritional status. The relationship between Antenatal Care (ANC) history and child nutritional status can be seen in Table 3. Based on data processing using Chi-square, it was found that there was a relationship between ANC history during the mother's pregnancy and the child's nutritional status ($p < 0.05$). Based on the results of the study, 19 mothers who had a history of Antenatal Care (ANC) ≥ 6 had a child with underweight and 1 child with overweight. In 8 mothers who had a history of ANC < 6 during pregnancy, there was an underweight nutritional status in 1 child, a stunting nutritional status in 6 children, and an underweight and stunting nutritional status in 1 child. large thus, the relationship between Antenatal Care history during the mother's pregnancy and the child's nutritional status was significant. These results show a relationship between Antenatal Care history during the mother's pregnancy and the incidence of the child's nutritional status.

Table 3. Relationship between Antenatal Care (ANC) History in Pregnant Women and Child Nutritional Status

Child Nutritional Status	Maternal ANC history		Total	P-Value
	< 6	≥ 6		
Normal and Overweight	1	19	20	0.001
Underweight dan Stunting	8	2	10	
Total	9	21	30	

Antenatal care (ANC) examinations are very necessary to optimize the mental and physical health of both the mother and the baby. The use of ANC, especially for the mother, is so that the mother can face childbirth, the postpartum period, preparation for breastfeeding, and the return to normal reproductive health [18]. ANC services are preventive services to monitor the mother's health and prevent complications for the mother and fetus. Efforts that must be made are to ensure that pregnant women are healthy until delivery, if there are physical or psychological abnormalities, they can be identified immediately, and pregnant women can give birth without complications [19]. The frequency of ANC examinations is at least 6 times during the pregnancy period. The examination includes anamnesis, monitoring the mother and fetus, recognizing high-risk pregnancies, immunization, advice, and counseling, recording accurate data at each visit [20]. Based on the studies that have been conducted, it is seen that pregnancy checks are related to various factors. Attitude and knowledge have a significant relationship to the completeness of pregnancy checks (ANC 2-1-3), especially the attitude factor [21]. The awareness and willingness of pregnant women to carry out regular pregnancy checks is a manifestation of healthy behavior. Healthy behavior is influenced by the knowledge, attitude and motivation factors of individuals to take action. If someone has

knowledge about what will be done, then they will have a positive attitude and motivation to do it [22].

The reluctance of pregnant women to have regular check-ups is caused by low public awareness of the importance of regular pregnancy check-ups and economic factors [23]. Some reasons that often make regular check-ups not carried out are not having time because they have to work and take care of children, not having any complaints about their pregnancy, not knowing how to have a check-up and being lazy. Meanwhile, economic factors are complex factors that have a major influence on various aspects of life, which have an impact on how a person behaves [24]. Nutritional intake greatly determines the health of pregnant women and the fetus they are carrying. Nutritional needs during pregnancy will increase by 15% compared to the needs of normal women. This increase in nutrition is needed for the growth of the uterus, breasts (mamae), blood volume, placenta, water needs and fetal growth by 40% and the remaining 60% is used for the growth of the mother [25]. Through education or knowledge, every pregnant woman can train her thinking skills so that it is easier to solve the problems faced. The results of this study are also in accordance with the theory that anemia is influenced by poor nutritional status. A woman who experiences poor nutritional status LILA <23.5 cm who loses iron and is anemic [26].

Table 4 shows the relationship between the History of Anemia in Pregnant Women and the Child Nutritional Status. The relationship between the condition of pregnant women experiencing anemia and the nutritional status of children was obtained from the results of the analysis using Chi-square, it was found that there was a relationship between pregnant women experiencing anemia and the nutritional status of children $p = 0.001$, ($p < 0.05$). Based on Mutiarasari 2019 [5], the Hb level required for pregnant women during pregnancy is $> 12\text{g} / \text{dL} - 15\text{g} / \text{dL}$. The results of the study showed that 10 pregnant women with Hb levels ≤ 12 provided good nutritional status for their children. Meanwhile, in the condition of pregnant women with Hb levels ≤ 12 , it caused a nutritional status of children with underweight conditions of 2 children with normal and overweight conditions, underweight conditions of 2 children, stunting conditions of 6 children, and underweight conditions accompanied by stunting of 1 child.

Table 4. Relationship between History of Anemia in Pregnant Women and Child Nutritional Status

Child Nutritional Status	Mother's Hb history		Total	P-Value
	≤ 12	> 12		
Normal and Overweight	2	18	20	0.001
Underweight dan Stunting	8	2	10	
Total	10	20	30	

[27]The increase in blood volume begins in the first trimester by 15% compared to the pre-pregnancy condition. Then there will be a very rapid increase in the second trimester. During pregnancy, 1000 mg of iron is needed. As much as 300 mg of iron will be actively sent to the fetus and placenta [25]. In general, there are three causes of iron deficiency anemia in pregnant women, namely, low iron (Fe) reserves in women during menstruation and previous childbirth, lack of iron intake from food consumed, and disturbed eating patterns in pregnant women due to nausea felt during pregnancy [28]. Physiological needs that occur during pregnancy will increase along with increasing gestational age, if this condition is not balanced with adequate iron consumption, it can cause anemia in pregnant women. Anemia that occurs during pregnancy causes the flow of iron and oxygen to the fetus to decrease. Iron is a micro component that plays a role in the formation of hemoglobin which functions as a carrier of oxygen throughout the body. The small flow of iron causes the fetal body's metabolic process to not be carried out perfectly. The metabolic process is needed to obtain bone mineral density during fetal growth which begins in the 1-13th week of pregnancy/first trimester [29]. Iron deficiency during this period will increase the risk of prematurity, low birth weight (LBW), and low birth length [30]

Table 5 shows that the observed variable is Exclusive Breastfeeding while the observed independent variable is the child's nutritional status. The results of the analysis show that the p-value = 0.001 (p-value <0.05) which statistically means that there is a relationship between the history of Exclusive Breastfeeding and the child's nutritional status.

Table 5. Relationship between Exclusive Breastfeeding History and Child Nutritional Status

Child Nutritional Status	Exclusive Breastfeeding		Total	P-Value
	≤ 12	> 12		
Normal and Overweight	20	2	22	0.001
Underweight dan Stunting	2	6	8	
Total	22	8	30	

Exclusive breastfeeding provision while the independent variable observed is the child's nutritional status. The results of the analysis show that the p value = 0.001 which statistically means that there is a relationship between the history of exclusive breastfeeding and the child's nutritional status. This is in line with the research conducted by Syahlis Irwandi entitled "The Relationship between Exclusive Breastfeeding and Stunting at the Hinai Kiri Health Center, Secanggang District, Langkat Regency" obtained a p value of 0.001 which means that there is a relationship between exclusive breastfeeding and nutritional status. Stunting is caused by multidimensional factors and is not only caused by poor nutrition experienced by pregnant women or toddlers. Several factors that cause stunting can be described, namely the situation of the mother/prospective mother, the situation of the toddler, the socio-economic

situation and the sanitation situation and access to drinking water [31]. Breast milk is milk produced by the mother and contains all the nutrients needed by the child for the child's growth and development needs [32]. Exclusive breastfeeding is when the child is only given breast milk, without additional fluids such as formula milk, orange juice, honey, tea, water and without additional solid foods such as bananas, papaya, milk porridge, biscuits, rice porridge and porridge, for 6 months. Children who receive exclusive breastfeeding are children who only receive breast milk so that no other fluids or solids are given, even water with the exception of oral rehydration, or vitamin drops/syrups, minerals or medicines. The United Nation Children's Fund (UNICEF) and the World Health Organization (WHO) recommend that children should only be breastfed for at least six months. Solid foods should be given after the child is 6 months old, and breastfeeding should be continued until the child is two years old [33].

The results of the study also showed that there were toddlers who were exclusively breastfed and experienced stunting as many as 1 (3.3%) respondents. Stunting is caused by multidimensional factors and is not only caused by poor nutrition experienced by pregnant women or toddlers. Several factors that cause stunting can be described as the situation of the mother/prospective mother, the situation of the toddler, the socio-economic situation and the sanitation situation and access to drinking water [34]. One factor in the situation of toddlers is LBW, namely a baby's birth weight of less than 2500 grams. LBW is closely related to fetal mortality and morbidity. This condition can inhibit growth and cognitive development, vulnerability to chronic diseases in the future [35].

Table 6 shows data that there are 22 mothers whose nutritional needs are met and 8 mothers whose nutrition is not met. Chi-square analysis revealed a significant association ($p = 0.001$); thus the relationship between maternal nutritional needs and child nutritional status is significant. These results show a relationship between maternal nutritional needs and the incidence of child nutritional status.

Table 6. Relationship between Maternal Dietary History and Child Nutritional Status

Child Nutritional Status	Nutritional Needs		Total	P-Value
	Fulfilled	Not Fulfilled		
Normal and Overweight	21	1	22	0.001
Underweight dan Stunting	1	7	8	
Total	22	8	30	

The measurement of children's nutritional status aims to assess the nutritional status of children and predict long-term infant health [36]. Body weight and height are one of the predictors for determining the nutritional status of children as normal, underweight,

overweight or stunted [37]. As an indicator of nutritional status, body weight provides a picture of the current state which can increase and decrease every day. Body weight is very easily affected by sudden conditions such as food and drink consumption, excretion of metabolic substances and disease [38]. Many factors affect the birth weight of babies, one of which is the nutritional status of pregnant women, which determines the intake obtained by the baby in the womb. Adequate nutritional status before pregnancy can be assessed using the Body Mass Index (BMI). Nutritional status before and during pregnancy has a major effect on the intake and growth of the fetus in the womb. The fetus' nutritional needs occur very rapidly in the third trimester where fetal cellular hypertrophy begins, if the mother's nutrition intake is lacking, it can affect the outcome of the baby's weight. Women who have unmet nutritional status or are classified as thin during pregnancy are at risk of giving birth to babies with low birth weight [39]

Conclusion

This study highlights the multifactorial relationship between maternal health factors—namely antenatal care (ANC) history, maternal anemia, exclusive breastfeeding practices, and maternal dietary patterns—and the nutritional status of children aged 2–5 years. In line with the adapted UNICEF conceptual framework, the findings affirm that child nutrition is not the result of isolated variables but rather a product of intersecting biological, behavioral, and social determinants rooted in maternal conditions and caregiving practices. The observed associations underscore the critical role of integrated maternal health interventions that span the prenatal to postnatal continuum. Poor ANC attendance, maternal anemia, suboptimal breastfeeding, and inadequate maternal diets were all found to significantly contribute to the risk of undernutrition in early childhood. These findings are consistent with WHO and Indonesian government priorities that advocate for a life-course approach to maternal and child health, particularly within the first 1,000 days and extending beyond.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Relationship between Antenatal Care History, Anemia, Exclusive Breastfeeding, and Mother's Diet Pattern Towards The Nutritional Status of Children Aged 2-5 Years

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ABSTRACT

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Background: The first thousand days of life are a golden period for the growth and development of children and are closely related to pregnant women starting from the level of adequacy of nutritional intake of pregnant women, health status and antenatal care in pregnant women, exclusive breastfeeding, birth weight of babies, immunization and provision of complementary foods (MPASI). ANC visits according to government recommendations, are also important to monitor the health of the mother and fetus as early as possible. **Purpose:** This study seeks to describe and relate the maternal antenatal care history, anemia during pregnancy, maternal diet, and exclusive breastfeeding to the nutritional status of children in 2021-2023 in Ciranggem Village, Sumedang Regency. **Method:** The type of research used is analytical observational research with a cross-sectional approach, and the sampling technique is total sampling. **Result:** It was found that ANC services, exclusive breastfeeding, and maternal diet in Ciranggem Village were 73.3%. Mothers who had a history of anemia were 26.7%. The nutritional status of children in Ciranggem Village was found to be Normal 66.7% (20 people), Stunting 20% (6 people), Underweight 10% (3 people), and Overweight 3.3% (1 person). **Conclusion:** by obtaining data analysis results with a p-value <0.05, which shows a relationship between the history of Antenatal Care (ANC), Exclusive Breastfeeding, anemia, dietary patterns in pregnant women, with the nutritional status of children in Ciranggem Village.

Keywords

Antenatal Care
Exclusive Breastfeeding,
Child nutrition
Stunting
Maternal health

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Introduction

The first thousand days of life or window of opportunity is a golden period for the growth and development of children, starting from the time of conception until the age of 2 years. The first thousand days of life are closely related to pregnant women starting from the level of adequacy of nutritional intake of pregnant women, health status, and antenatal care in pregnant women, while at the stage of children aged 0-24 months including exclusive breastfeeding, birth weight of babies, immunization and provision of complementary foods (MPASI) [1]. According to WHO (World Health Organization) 2018, around 86% of women worldwide access antenatal care at least once during their pregnancy. According to WHO in 2020, 89% of pregnant women access antenatal care services with health workers once [1]. However, this percentage varies by region. In developing countries, the percentage drops to around 68%. Southeast Asia has the lowest ANC attendance rate, with 54% of women attending at least one ANC visit [2]. Globally, the World Health Organization (WHO) underscores the first 1,000 days of life, including pregnancy through the first two years post-birth, as a vital period for establishing a child's lifelong health trajectory. Inadequate maternal nutrition and poor access to quality antenatal care can compromise fetal growth and increase the risk of stunting and other forms of malnutrition in early childhood. The WHO recommends a minimum of eight ANC visits during pregnancy to ensure timely screening, health education, and nutritional interventions, yet many women in Indonesia fail to meet this standard, particularly in rural and underserved communities (WHO, 2016; Indonesian Ministry of Health, 2021). The number of antenatal care (ANC) visits in Indonesia in the last three years (2019-2021) has shown an increase. In 2019, ANC coverage reached 92.7%, while in 2021 it increased

to 95.2%. There was also an increase in the coverage of the first ANC in the first trimester (2019: 72.3%, 2021: 81.3%) and the coverage of the fourth visit (2019: 61.4%, 2021: 70.0%). In 2020, the coverage of ANC visits in Indonesia showed a high figure, with the first visit reaching 96.84% and the fourth visit 90.18%. However, in 2021, although the figure remained high, there was a slight decline, with the first visit reaching 94.71% and the fourth visit 86.85%. In November 2023, 19,929 pregnant women visited the Sumedang health center for ANC services. ANC visits according to government recommendations, are important to monitor the health of the mother and fetus as early as possible. In addition, this visit helps prepare for the optimal labor process, postpartum period, and lactation for the mother [3]. The minimum standard ANC frequency is as follows: trimester 1 has 2 visits, trimester 2 has 1 visit, and trimester 3 has 2 visits [4].

Poor ANC services can trigger LBW; the weight and length of the BBL body are a reflection of the mother's health condition during pregnancy, such as nutritional status [5]. Parameters for assessing the nutritional status of pregnant women include anthropometry, LILA, hemoglobin (Hb), and diet. The Hb level of pregnant women <10 mg/dl is classified as anemia [6]. Pregnancy with complications of anemia can cause problems in babies, such as LBW, stunting, and infant death, while the impact of anemia on the health of pregnant women is the risk of bleeding before and during childbirth, and maternal death. Thus, it can increase the percentage of maternal mortality rates and infant mortality rates. Anemia in pregnant women inhibits the transportation of food and O₂ to the fetus through the placenta, resulting in impaired fetal growth and development [6].

Nutrition during childhood has a big influence on growth and development, even when you are still in the womb, nutrition plays an important role. If a pregnant mother gets adequate food, the baby she is carrying will be born with a normal birth weight. Meanwhile, mothers who are malnourished will give birth to babies with low birth weight [7]. The most important nutrition that is first obtained when a baby is born is breast milk. Breast milk is the most ideal food both physiologically and biologically that must be given to babies in their early life. This is because in addition to containing quite high nutritional value, breast milk also contains immune substances that will protect against various types of diseases that can inhibit the growth of the baby. [8].

Breastfeeding begins when the baby is born for 6 months, without adding and/or replacing it with other foods or drinks [9]. Exclusive breastfeeding in Indonesia is still far from expectations. Nationally, the coverage of babies receiving exclusive breastfeeding in 2017 was 61.33%. However, this figure has not reached the target coverage of exclusive breastfeeding set by the government, which is 80% (Ministry of Health, 2018) [10]. Therefore, researchers want to know whether there is a relationship between the history of maternal ANC and

exclusive breastfeeding on the nutritional status of children, especially in Ciranggem Village, Sumedang Regency, West Java

Literature Review

A. Antenatal Care (ANC)

Antenatal Care (ANC) is a health service by professional personnel for mothers during their pregnancy which is carried out by the established antenatal care standards. Pregnant women are recommended to visit health services twice in the first trimester, once in the second trimester, and three times in the third trimester. The aim of Antenatal Care is for pregnant women to receive care during pregnancy including pregnancy check-ups, education and high-risk detection, so that if there are any findings that are not good, preventive and curative efforts can be taken immediately [10].

B. Anemia in Pregnant Women

Anemia is a condition in which the number of erythrocytes or the capability and capacity of erythrocytes in transporting oxygen is inadequate to meet the physiological needs of the body which can be caused by decreased production of erythrocytes and/or hemoglobin (WHO, 2021:1). Anemia in pregnancy is a condition of anemia that occurs during pregnancy characterized by hemoglobin (Hb) levels <11 g/dl in the first and third trimesters, while in the second trimester, the hemoglobin level is <10.5 g/dl or the hematocrit level is <33% [11]. According to the severity of the disease, anemia is divided into 3 based on the hemoglobin levels in the blood, namely (WHO, 2011:3):

1. Mild: Hemoglobin levels 10-10.9 g/dl
2. Moderate: Hemoglobin levels 7-9.9 g/dl
3. Severe: Hemoglobin levels <7 g/dl

In severe anemia conditions, immediate medical attention is required, while if Hb <4 g/dl is found, it indicates an emergency condition that is at risk of causing congestive heart failure, sepsis, and even death.

C. Pregnant Women's Diet

Eating patterns are a way or effort to regulate the amount and type of food with descriptive information including maintaining health, nutritional status, preventing or helping to cure diseases [12]. Eating patterns are defined as characteristics of repeated activities of eating by individuals or everyone eating to meet food needs [13].

In general, eating patterns have 3 (three) components consisting of: type, frequency, and amount of food.

- a. Type of food

Type of food is a type of staple food eaten every day consisting of staple foods, animal side dishes, vegetable side dishes, vegetables, and fruits consumed every day. Staple foods are the main food source in Indonesia which is consumed by every person or group of people consisting of rice, corn, sago, tubers, and flour.

b. Frequency of eating

Frequency of eating is several times a day including breakfast, lunch, dinner and snacks [14]. While according to frequency of eating is repeatedly eating a day with a total of three times breakfast, lunch, and dinner.

c. Number of meals

The number of meals is the amount of food eaten by each person or each individual in a group.

D. Child Nutritional Status

Nutritional status is a measure of success in fulfilling nutrition for children indicated by the child's weight and height. This condition is influenced by the balance between nutrient intake from food and the nutritional needs required by the body for metabolism. The condition of the body as a result of the use, absorption, and use of food. Food that meets the body's nutritional needs generally leads to good nutritional status. It is better if the lack or excess of essential nutrients in food for a long period is called malnutrition or lack. Manifestations or manifestations of poor nutrition can be in the form of malnutrition and overnutrition [15]. Nutritional status is a measure of success in fulfilling nutrition for children indicated by the child's weight and height. Nutritional status is also defined as a health status resulting from a balance between nutrient needs and inputs [16].

Below is an adaptation of the UNICEF framework to reflect the specific maternal factors investigated in this research—namely antenatal care (ANC) history, maternal anemia, exclusive breastfeeding, and maternal diet pattern—and their influence on the nutritional status of children aged 2–5 year

1. Basic Causes:

- Socio-economic status
- Maternal education
- Access to healthcare services

2. **Underlying Causes (Household & Maternal Level):**

- **Maternal Diet Pattern:** Reflects the quality and diversity of maternal food intake during and after pregnancy, which influences maternal nutritional reserves, breastfeeding quality, and family dietary practices.

- **Maternal Anemia:** A biomedical condition reducing maternal oxygen-carrying capacity, often linked to iron deficiency, which can impair fetal development, reduce birth weight, and hinder effective breastfeeding.
- **Antenatal Care (ANC) History:** Frequency and quality of ANC visits affect early detection and management of nutritional risks during pregnancy, influencing both maternal and fetal health.
- **Exclusive Breastfeeding Practice:** Exclusive breastfeeding in the first 6 months provides essential nutrients and immune protection, laying the foundation for adequate growth and development.

3. **Immediate Causes (Child Level):**

- Inadequate dietary intake and disease in the post-weaning period (age 6–59 months) mediated by:
 - Suboptimal maternal feeding practices
 - Poor household food diversity
 - Infections or recurrent illnesses linked to early nutritional deficits

4. **Outcome:**

- **Child Nutritional Status (Aged 2–5 Years):** Measured via indicators such as weight-for-age, height-for-age (stunting), and weight-for-height (wasting), reflecting cumulative exposure to risks over time.

Material And Methods

Based on the research objectives to find a description and relationship between Maternal Antenatal Care History, Anemia in Pregnancy, Maternal Diet and Exclusive Breastfeeding on Children's Nutritional Status in 2021-2023 in Ciranggeng Village, Sumedang Regency, the type of research used is an observational analytical study with a Cross Sectional approach. Based on Politano et al., 2020[17], correlational research must use a minimum sample of 30 subjects. Therefore, the sample taken in the study was 30 respondents. The study was conducted at the Posyandu of Ciranggeng Village, Sumedang Regency, West Java. The study was conducted from November 2023 to December 08, 2023. The population in this study was the total number of mothers who already had children aged 2-5 years who were registered and actively carrying out control activities at the Ciranggeng Village Posyandu during pregnancy in 2021-2023. The sample was taken using a total sampling technique of 30 people and met the inclusion and exclusion criteria. Data processing will be done using SPSS Statistics Version 27 software (IBM, New York). Chi-square (χ^2) is used to analyze whether or not there is a relationship between the independent variables and the dependent variables. The confidence interval (CI) is set at 95%. A P value of less than 0.05 indicates statistically significant data.

Results

A. Univariate Analysis Results

Table 1 below is the result of research using univariate analysis with 30 respondents, consisting of Data on the distribution of antenatal care (ANC) history, data on the distribution of anemia history in pregnant women, data on the distribution of exclusive breastfeeding, and data on the distribution of mothers' dietary patterns. The results showed that most respondents, namely 22 mothers (73.3%), were in the group with a history of ANC fulfilled, namely ≥ 6 times during pregnancy. Meanwhile, respondents who did not have a history of ANC fulfilled were 8 mothers (26.7%) during pregnancy. In terms of anemia history in pregnant women, the data shows that mothers who have Hb levels < 12 are 9 out of 30 respondents, or 26.7 percent, while the remainder have Hb levels > 12 , as many as 21 out of 30 respondents, or 73.3 percent. For the provision of Exclusive Breastfeeding, the data is dominated by mothers who provide Exclusive Breastfeeding, namely 22 out of 30 respondents or 73.3 percent, while for Eating Patterns, data was obtained that most pregnant women have a diet that meets standards, namely 22 out of 30 respondents or 73.3 percent.

Table 1. Univariate Analysis Results

Description	Frequency	Percentage
Antenatal Care History		
Fulfilled	22	73.3
Not Fulfilled	8	26.7
Hb Level		
< 12	9	30.0
≥ 12	21	70.0
Exclusive Breastfeeding		
Yes	22	73.3
No	8	26.7
Nutritional Needs		
Fulfilled	22	73.3
Not Fulfilled	8	26.7

Table 2 provides an overview of the nutritional status of children in Ciranggem Village in 2021-2023, out of 30 children, 20 (66.7%) had normal nutritional status; 1 (3.3%) child was overweight; 3 (10%) children were underweight; and 6 (20%) children experienced stunting.

Table 2. Children's Nutritional Needs

Nutrition Needs	Frequency	Percentage
Normal	20	66.7
Overweight	1	3.3
Underweight	3	10
Stunting	6	20

B. Bivariate Analysis Results

Table 3 shows the relationship between Antenatal Care (ANC) history in pregnant women and children's nutritional status. The relationship between Antenatal Care (ANC) history and child nutritional status can be seen in Table 3. Based on data processing using Chi-square, it was found that there was a relationship between ANC history during the mother's pregnancy and the child's nutritional status ($p < 0.05$). Based on the results of the study, 19 mothers who had a history of Antenatal Care (ANC) ≥ 6 had a child with underweight and 1 child with overweight. In 8 mothers who had a history of ANC < 6 during pregnancy, there was an underweight nutritional status in 1 child, a stunting nutritional status in 6 children, and an underweight and stunting nutritional status in 1 child. large thus, the relationship between Antenatal Care history during the mother's pregnancy and the child's nutritional status was significant. These results show a relationship between Antenatal Care history during the mother's pregnancy and the incidence of the child's nutritional status.

Table 3. Relationship between Antenatal Care (ANC) History in Pregnant Women and Child Nutritional Status

Child Nutritional Status	Maternal ANC history		Total	P-Value
	< 6	≥ 6		
Normal and Overweight	1	19	20	0.001
Underweight dan Stunting	8	2	10	
Total	9	21	30	

Antenatal care (ANC) examinations are very necessary to optimize the mental and physical health of both the mother and the baby. The use of ANC, especially for the mother, is so that the mother can face childbirth, the postpartum period, preparation for breastfeeding, and the return to normal reproductive health [18]. ANC services are preventive services to monitor the mother's health and prevent complications for the mother and fetus. Efforts that must be made are to ensure that pregnant women are healthy until delivery, if there are physical or psychological abnormalities, they can be identified immediately, and pregnant women can give birth without complications [19]. The frequency of ANC examinations is at least 6 times during the pregnancy period. The examination includes anamnesis, monitoring the mother and fetus, recognizing high-risk pregnancies, immunization, advice, and counseling, recording accurate data at each visit [20]. Based on the studies that have been conducted, it is seen that pregnancy checks are related to various factors. Attitude and knowledge have a significant relationship to the completeness of pregnancy checks (ANC 2-1-3), especially the attitude factor [21]. The awareness and willingness of pregnant women to carry out regular pregnancy checks is a manifestation of healthy behavior. Healthy behavior is influenced by the knowledge, attitude and motivation factors of individuals to take action. If someone has

knowledge about what will be done, then they will have a positive attitude and motivation to do it [22].

The reluctance of pregnant women to have regular check-ups is caused by low public awareness of the importance of regular pregnancy check-ups and economic factors [23]. Some reasons that often make regular check-ups not carried out are not having time because they have to work and take care of children, not having any complaints about their pregnancy, not knowing how to have a check-up and being lazy. Meanwhile, economic factors are complex factors that have a major influence on various aspects of life, which have an impact on how a person behaves [24]. Nutritional intake greatly determines the health of pregnant women and the fetus they are carrying. Nutritional needs during pregnancy will increase by 15% compared to the needs of normal women. This increase in nutrition is needed for the growth of the uterus, breasts (mamae), blood volume, placenta, water needs and fetal growth by 40% and the remaining 60% is used for the growth of the mother [25]. Through education or knowledge, every pregnant woman can train her thinking skills so that it is easier to solve the problems faced. The results of this study are also in accordance with the theory that anemia is influenced by poor nutritional status. A woman who experiences poor nutritional status LILA <23.5 cm who loses iron and is anemic [26].

Table 4 shows the relationship between the History of Anemia in Pregnant Women and the Child Nutritional Status. The relationship between the condition of pregnant women experiencing anemia and the nutritional status of children was obtained from the results of the analysis using Chi-square, it was found that there was a relationship between pregnant women experiencing anemia and the nutritional status of children $p = 0.001$, ($p < 0.05$). Based on Mutiarasari 2019 [5], the Hb level required for pregnant women during pregnancy is $> 12\text{g} / \text{dL} - 15\text{g} / \text{dL}$. The results of the study showed that 10 pregnant women with Hb levels ≤ 12 provided good nutritional status for their children. Meanwhile, in the condition of pregnant women with Hb levels ≤ 12 , it caused a nutritional status of children with underweight conditions of 2 children with normal and overweight conditions, underweight conditions of 2 children, stunting conditions of 6 children, and underweight conditions accompanied by stunting of 1 child.

Table 4. Relationship between History of Anemia in Pregnant Women and Child Nutritional Status

Child Nutritional Status	Mother's Hb history		Total	P-Value
	≤ 12	> 12		
Normal and Overweight	2	18	20	0.001
Underweight dan Stunting	8	2	10	
Total	10	20	30	

[27]The increase in blood volume begins in the first trimester by 15% compared to the pre-pregnancy condition. Then there will be a very rapid increase in the second trimester. During pregnancy, 1000 mg of iron is needed. As much as 300 mg of iron will be actively sent to the fetus and placenta [25]. In general, there are three causes of iron deficiency anemia in pregnant women, namely, low iron (Fe) reserves in women during menstruation and previous childbirth, lack of iron intake from food consumed, and disturbed eating patterns in pregnant women due to nausea felt during pregnancy [28]. Physiological needs that occur during pregnancy will increase along with increasing gestational age, if this condition is not balanced with adequate iron consumption, it can cause anemia in pregnant women. Anemia that occurs during pregnancy causes the flow of iron and oxygen to the fetus to decrease. Iron is a micro component that plays a role in the formation of hemoglobin which functions as a carrier of oxygen throughout the body. The small flow of iron causes the fetal body's metabolic process to not be carried out perfectly. The metabolic process is needed to obtain bone mineral density during fetal growth which begins in the 1-13th week of pregnancy/first trimester [29]. Iron deficiency during this period will increase the risk of prematurity, low birth weight (LBW), and low birth length [30]

Table 5 shows that the observed variable is Exclusive Breastfeeding while the observed independent variable is the child's nutritional status. The results of the analysis show that the p-value = 0.001 (p-value <0.05) which statistically means that there is a relationship between the history of Exclusive Breastfeeding and the child's nutritional status.

Table 5. Relationship between Exclusive Breastfeeding History and Child Nutritional Status

Child Nutritional Status	Exclusive Breastfeeding		Total	P-Value
	≤ 12	> 12		
Normal and Overweight	20	2	22	0.001
Underweight dan Stunting	2	6	8	
Total	22	8	30	

Exclusive breastfeeding provision while the independent variable observed is the child's nutritional status. The results of the analysis show that the p value = 0.001 which statistically means that there is a relationship between the history of exclusive breastfeeding and the child's nutritional status. This is in line with the research conducted by Syahlis Irwandi entitled "The Relationship between Exclusive Breastfeeding and Stunting at the Hinai Kiri Health Center, Secanggang District, Langkat Regency" obtained a p value of 0.001 which means that there is a relationship between exclusive breastfeeding and nutritional status. Stunting is caused by multidimensional factors and is not only caused by poor nutrition experienced by pregnant women or toddlers. Several factors that cause stunting can be described, namely the situation of the mother/prospective mother, the situation of the toddler, the socio-economic

situation and the sanitation situation and access to drinking water [31]. Breast milk is milk produced by the mother and contains all the nutrients needed by the child for the child's growth and development needs [32]. Exclusive breastfeeding is when the child is only given breast milk, without additional fluids such as formula milk, orange juice, honey, tea, water and without additional solid foods such as bananas, papaya, milk porridge, biscuits, rice porridge and porridge, for 6 months. Children who receive exclusive breastfeeding are children who only receive breast milk so that no other fluids or solids are given, even water with the exception of oral rehydration, or vitamin drops/syrups, minerals or medicines. The United Nation Children's Fund (UNICEF) and the World Health Organization (WHO) recommend that children should only be breastfed for at least six months. Solid foods should be given after the child is 6 months old, and breastfeeding should be continued until the child is two years old [33].

The results of the study also showed that there were toddlers who were exclusively breastfed and experienced stunting as many as 1 (3.3%) respondents. Stunting is caused by multidimensional factors and is not only caused by poor nutrition experienced by pregnant women or toddlers. Several factors that cause stunting can be described as the situation of the mother/prospective mother, the situation of the toddler, the socio-economic situation and the sanitation situation and access to drinking water [34]. One factor in the situation of toddlers is LBW, namely a baby's birth weight of less than 2500 grams. LBW is closely related to fetal mortality and morbidity. This condition can inhibit growth and cognitive development, vulnerability to chronic diseases in the future [35].

Table 6 shows data that there are 22 mothers whose nutritional needs are met and 8 mothers whose nutrition is not met. Chi-square analysis revealed a significant association ($p = 0.001$); thus the relationship between maternal nutritional needs and child nutritional status is significant. These results show a relationship between maternal nutritional needs and the incidence of child nutritional status.

Table 6. Relationship between Maternal Dietary History and Child Nutritional Status

Child Nutritional Status	Nutritional Needs		Total	P-Value
	Fulfilled	Not Fulfilled		
Normal and Overweight	21	1	22	0.001
Underweight dan Stunting	1	7	8	
Total	22	8	30	

The measurement of children's nutritional status aims to assess the nutritional status of children and predict long-term infant health [36]. Body weight and height are one of the predictors for determining the nutritional status of children as normal, underweight,

overweight or stunted [37]. As an indicator of nutritional status, body weight provides a picture of the current state which can increase and decrease every day. Body weight is very easily affected by sudden conditions such as food and drink consumption, excretion of metabolic substances and disease [38]. Many factors affect the birth weight of babies, one of which is the nutritional status of pregnant women, which determines the intake obtained by the baby in the womb. Adequate nutritional status before pregnancy can be assessed using the Body Mass Index (BMI). Nutritional status before and during pregnancy has a major effect on the intake and growth of the fetus in the womb. The fetus' nutritional needs occur very rapidly in the third trimester where fetal cellular hypertrophy begins, if the mother's nutrition intake is lacking, it can affect the outcome of the baby's weight. Women who have unmet nutritional status or are classified as thin during pregnancy are at risk of giving birth to babies with low birth weight [39]

Conclusion

This study highlights the multifactorial relationship between maternal health factors—namely antenatal care (ANC) history, maternal anemia, exclusive breastfeeding practices, and maternal dietary patterns—and the nutritional status of children aged 2–5 years. In line with the adapted UNICEF conceptual framework, the findings affirm that child nutrition is not the result of isolated variables but rather a product of intersecting biological, behavioral, and social determinants rooted in maternal conditions and caregiving practices. The observed associations underscore the critical role of integrated maternal health interventions that span the prenatal to postnatal continuum. Poor ANC attendance, maternal anemia, suboptimal breastfeeding, and inadequate maternal diets were all found to significantly contribute to the risk of undernutrition in early childhood. These findings are consistent with WHO and Indonesian government priorities that advocate for a life-course approach to maternal and child health, particularly within the first 1,000 days and extending beyond.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Original Article Title: ""Relationship between Antenatal Care History, Anemia, Exclusive Breastfeeding, and Mother's Diet Pattern Towards The Nutritional Status of Children Aged 2-5 Years ""

To: IISTR Editorial Office

Re: Response to reviewers

Dear Editor,

Thank you for allowing a resubmission of our manuscript, with an opportunity to address the reviewers' comments.

We are uploading (a) our point-by-point response to the comments (below) (response to reviewers), (b) an updated manuscript with **yellow** highlighting indicating changes (pdf), and (c) a clean updated manuscript without highlights (*.docx main document/LaTeX files).

Best regards,

Louisa Ariantje Langi

Reviewer#B, Concern # 1: The article is highly relevant to child nutrition and maternal care, aligning well with global and national stunting reduction efforts. However, to increase academic impact, the study should engage more critically with theory and refine its presentation for journal standards. Timely and context-specific study. Focuses on integrated maternal factors (not just one variable). Cites WHO and Indonesian government benchmarks

Author response: Agreed

Author action: We updated the manuscript with the revision on pages 2 and 3

Reviewer#B, Concern # 2: Introduce a diagram or theoretical framework (e.g., UNICEF's Conceptual Framework on Child Undernutrition) showing how ANC, anemia, diet, and breastfeeding may influence nutritional outcomes.

Author response: Agreed

Author action: We updated the manuscript by revision on page 5 and 6

Reviewer#B, Concern # 3: Rephrase for clarity and academic tone: E.g., "The large p-value test was $p = 0.01$ " → "Chi-square analysis revealed a significant association ($p = 0.01$)"; Use present tense for general facts, past tense for findings.

Author response: Agreed

Author action: We updated the manuscript by revision on page 11

Reviewer#B, Concern # 4: Refine Abstract and Keywords: The abstract should be tighter, with clear mention of methods, key findings, and conclusion in 250 words or fewer. Expand keywords to include "Child nutrition," "Cross-sectional study," "Stunting," "Maternal health."

Author response: Agreed

Author action: We updated the manuscript by revision of the Abstract and Keywords

Reviewer#B, Concern # 5: Instead of merely summarizing findings, offer recommendations: For local health services (e.g., ANC counseling, iron supplementation outreach). For future research (e.g., longitudinal studies or interventional designs).

Author response: Agreed

Author action: We updated the manuscript by revision of Conclusion

Reviewer#B, Concern # 6: Some references lack uniform formatting (e.g., inconsistent use of [Online] vs. full journal names). Apply a standard format of IEEE

Author response: Reference writing is by IEEE format

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Congratulations on the acceptance of your manuscript! We are pleased to inform you that we will proceed with publishing your work as soon as the remaining documentation and the copyediting process are completed.

However, before we can finalize the publication process, we kindly request the following:

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THE ETHICS REVIEW COMMITTEE

Ethical Clearance

No. 7A/Etik Penelitian/FKUKI/2023

The Ethics Review Committee Faculty of Universitas Kristen Indonesia after reviewing proposal entitled :

With the following :

Title : Relationship between Antenatal Care History, Anemia, Exclusive Breastfeeding and Mother's Diet Pattern Towards the Nutritional Status of Children Aged 2-5 Years.

Researcher : 1. Louisa Ariantje Langi
2. Nur Nunu Prihantini
3. Louise Kartika Indah

Address : Universitas Kristen Indonesia
Jl. Mayjen Sutoyo No.2, RT.9/RW.6, Cawang, Kramat jati, 13630

Stated the research has met ethical requirements to be implemented, based on The Indonesia National Guideliness on Health Research Ethic, Ministry of Health 2007.

Jakarta, 14th August 2023

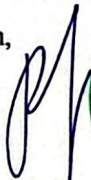
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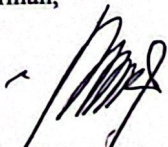
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**INFORMED CONSENT
(INFORMATION SHEET)**

We, Louisa Ariantje Langi, Nur Nunu Prihantini, Louise Kartika Indah intend to conduct a study to determine the Relationship of ANC History, Anemia, Exclusive Breastfeeding, and Maternal Diet with Nutritional Status of Children. This study aims to describe and relate the maternal antenatal care history, anemia during pregnancy, maternal diet, and exclusive breastfeeding to the nutritional status of children in 2021-2023 in Ciranggem Village, Sumedang Regency.

In this study, you will be asked to complete a questionnaire and participate in an interview, which will take approximately 15 minutes. Please answer the questions as truthfully and accurately as possible. There is no cost involved in participating in this research.

The researchers guarantee that this study will not have any negative impact on any party (including respondents, their families, or the community). All information and data obtained during the data collection, processing, and presentation stages of this research will be treated confidentially and will not be disclosed except for scientific or educational purposes.

Through the above explanation, we sincerely hope for your participation and willingness to sign the consent form to take part in this research. We also extend our gratitude for your participation and willingness to be a respondent in this study.

Jakarta, May 5th 2025

Researchers Leader,



Louisa Ariantje Langi

Relationship between Antenatal Care History, Anemia, Exclusive Breastfeeding, and Mother's Diet Pattern Towards The Nutritional Status of Children Aged 2-5 Years

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Relationship between Antenatal Care History, Anemia, Exclusive Breastfeeding, and Mother's Diet Pattern Towards The Nutritional Status of Children Aged 2-5 Years

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ABSTRACT

Background: The first thousand days of life are a golden period for the growth and development of children and are closely related to pregnant women starting from the level of adequacy of nutritional intake of pregnant women, health status and antenatal care in pregnant women, exclusive breastfeeding, birth weight of babies, immunization and provision of complementary foods (MPASI). ANC visits according to government recommendations, are also important to monitor the health of the mother and fetus as early as possible. Purpose: This study seeks to describe and relate the maternal antenatal care history, anemia during pregnancy, maternal diet, and exclusive breastfeeding to the nutritional status of children in 2022-2023 in Ciranggem Village, Sumedang Regency. Method: The type of research used is analytical observational research with a cross-sectional approach, and the sampling technique is total sampling. Result: It was found that ANC services, exclusive breastfeeding, and maternal diet in Ciranggem Village were 73.3%. Mothers who had a history of anemia were 26.7%. The nutritional status of children in Ciranggem Village was found to be Normal 66.7% (20 people), Stunting 20% (6 people), Underweight 10% (3 people), and Overweight 3.3% (1 person). Conclusion: by obtaining data analysis results with a p-value <0.05, which shows a relationship between the history of Antenatal Care (ANC), Exclusive Breastfeeding, anemia, dietary patterns in pregnant women, with the nutritional status of children in Ciranggem Village.

Keywords

Antenatal Care
Exclusive Breastfeeding,
Child nutrition
Stunting
Maternal health

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Introduction

The first thousand days of life or window of opportunity is a golden period for the growth and development of children, starting from the time of conception until the age of 2 years. The first thousand days of life are closely related to pregnant women starting from the level of adequacy of nutritional intake of pregnant women, health status, and antenatal care in pregnant women, while at the stage of children aged 0-24 months including exclusive breastfeeding, birth weight of babies, immunization and provision of complementary foods (MPASI) [1]. According to WHO (World Health Organization) 2018, around 86% of women worldwide access antenatal care at least once during their pregnancy. According to WHO in 2020, 89% of pregnant women access antenatal care services with health workers once [1]. However, this percentage varies by region. In developing countries, the percentage drops to around 68%. Southeast Asia has the lowest ANC attendance rate, with 54% of women attending at least one ANC visit [2]. Globally, the World Health Organization (WHO) underscores the first 1,000 days of life, including pregnancy through the first two years post-birth, as a vital period for establishing a child's lifelong health trajectory. Inadequate maternal nutrition and poor access to quality antenatal care can compromise fetal growth and increase the risk of stunting and other forms of malnutrition in early childhood. The WHO recommends a minimum of eight ANC visits during pregnancy to ensure timely screening, health education, and nutritional interventions, yet many women in Indonesia fail to meet this standard, particularly in rural and underserved communities (WHO, 2016; Indonesian Ministry of Health, 2021). The number of antenatal care (ANC) visits in Indonesia in the last three years (2019-2021) has shown an increase. In 2019, ANC coverage reached 92.7%, while in 2021 it increased

to 95.2%. There was also an increase in the coverage of the first ANC in the first trimester (2019: 72.3%, 2021: 81.3%) and the coverage of the fourth visit (2019: 61.4%, 2021: 70.0%). In 2020, the coverage of ANC visits in Indonesia showed a high figure, with the first visit reaching 96.84% and the fourth visit 90.18%. However, in 2021, although the figure remained high, there was a slight decline, with the first visit reaching 94.71% and the fourth visit 86.85%. In November 2023, 19,929 pregnant women visited the Sumedang health center for ANC services. ANC visits according to government recommendations, are important to monitor the health of the mother and fetus as early as possible. In addition, this visit helps prepare for the optimal labor process, postpartum period, and lactation for the mother [3]. The minimum standard ANC frequency is as follows: trimester 1 has 2 visits, trimester 2 has 1 visit, and trimester 3 has 2 visits [4].

Poor ANC services can trigger LBW; the weight and length of the BBL body are a reflection of the mother's health condition during pregnancy, such as nutritional status [5]. Parameters for assessing the nutritional status of pregnant women include anthropometry, LILA, hemoglobin (Hb), and diet. The Hb level of pregnant women <10 mg/dl is classified as anemia [6]. Pregnancy with complications of anemia can cause problems in babies, such as LBW, stunting, and infant death, while **the impact of anemia on the health of pregnant women** is **the risk of** bleeding before and during childbirth, and maternal death. **Thus, it can increase the percentage of maternal mortality rates and infant mortality rates. Anemia in pregnant women** inhibits **the transportation of food and O₂** to the fetus through the placenta, resulting in impaired fetal growth and development [6].

Nutrition during childhood has a big influence on growth and development, even when you are still in the womb, nutrition plays an important role. If a pregnant mother gets adequate food, the baby she is carrying will be born with a normal birth weight. Meanwhile, mothers who are malnourished will give birth to babies with low birth weight [7]. The most important nutrition that is first obtained when a baby is born is breast milk. Breast milk is the most ideal food both physiologically and biologically that must be given to babies in their early life. This is because in addition to containing quite high nutritional value, breast milk also contains immune substances that will protect against various types of diseases that can inhibit the growth of the baby. [8].

Breastfeeding begins when the **baby** is born for 6 months, without adding and/or replacing it with other foods or drinks [9]. **Exclusive breastfeeding in Indonesia is still far from** expectations. Nationally, the coverage of babies receiving exclusive breastfeeding in 2017 was 61.33%. However, this figure has not reached the target coverage of exclusive breastfeeding set by the government, which is 80% (Ministry of Health, 2018) [10]. Therefore, researchers want to know whether there is a relationship between the history of maternal ANC and

exclusive breastfeeding on the nutritional status of children, especially in Ciranggem Village, Sumedang Regency, West Java

Literature Review

A. Antenatal Care (ANC)

Antenatal Care (ANC) is a health service by professional personnel for mothers during their pregnancy which is carried out by the established antenatal care standards. Pregnant women are recommended to visit health services twice in the first trimester, once in the second trimester, and three times in the third trimester. The aim of Antenatal Care is for pregnant women to receive care during pregnancy including pregnancy check-ups, education and high-risk detection, so that if there are any findings that are not good, preventive and curative efforts can be taken immediately [10].

B. Anemia in Pregnant Women

Anemia is a condition in which the number of erythrocytes or the capability and capacity of erythrocytes in transporting oxygen is inadequate to meet the physiological needs of the body which can be caused by decreased production of erythrocytes and/or hemoglobin (WHO, 2021:1). Anemia in pregnancy is a condition of anemia that occurs during pregnancy characterized by hemoglobin (Hb) levels <11 g/dl in the first and third trimesters, while in the second trimester, the hemoglobin level is <10.5 g/dl or the hematocrit level is <33% [11]. According to the severity of the disease, anemia is divided into 3 based on the hemoglobin levels in the blood, namely (WHO, 2011:3):

1. Mild: Hemoglobin levels 10-10.9 g/dl
2. Moderate: Hemoglobin levels 7-9.9 g/dl
3. Severe: Hemoglobin levels <7 g/dl

In severe anemia conditions, immediate medical attention is required, while if Hb <4 g/dl is found, it indicates an emergency condition that is at risk of causing congestive heart failure, sepsis, and even death.

C. Pregnant Women's Diet

Eating patterns are a way or effort to regulate the amount and type of food with descriptive information including maintaining health, nutritional status, preventing or helping to cure diseases [12]. Eating patterns are defined as characteristics of repeated activities of eating by individuals or everyone eating to meet food needs [13].

In general, eating patterns have 3 (three) components consisting of: type, frequency, and amount of food.

- a. Type of food

Type of food is a type of staple food eaten every day consisting of staple foods, animal side dishes, vegetable side dishes, vegetables, and fruits consumed every day. Staple foods are the main food source in Indonesia which is consumed by every person or group of people consisting of rice, corn, sago, tubers, and flour.

b. Frequency of eating

Frequency of eating is several times a day including breakfast, lunch, dinner and snacks [14]. While according to frequency of eating is repeatedly eating a day with a total of three times breakfast, lunch, and dinner.

c. Number of meals

The number of meals is the amount of food eaten by each person or each individual in a group.

D. Child Nutritional Status

Nutritional status is a measure of success in fulfilling nutrition for children indicated by the child's weight and height. This condition is influenced by the balance between nutrient intake from food and the nutritional needs required by the body for metabolism. The condition of the body as a result of the use, absorption, and use of food. Food that meets the body's nutritional needs generally leads to good nutritional status. It is better if the lack or excess of essential nutrients in food for a long period is called malnutrition or lack. Manifestations or manifestations of poor nutrition can be in the form of malnutrition and overnutrition [15]. Nutritional status is a measure of success in fulfilling nutrition for children indicated by the child's weight and height. Nutritional status is also defined as a health status resulting from a balance between nutrient needs and inputs [16].

Below is an adaptation of the UNICEF framework to reflect the specific maternal factors investigated in this research—namely antenatal care (ANC) history, maternal anemia, exclusive breastfeeding, and maternal diet pattern—and their influence on the nutritional status of children aged 2–5 year

1. Basic Causes:

- Socio-economic status
- Maternal education
- Access to healthcare services

2. Underlying Causes (Household & Maternal Level):

- **Maternal Diet Pattern:** Reflects the quality and diversity of maternal food intake during and after pregnancy, which influences maternal nutritional reserves, breastfeeding quality, and family dietary practices.

- **Maternal Anemia:** A biomedical condition reducing maternal oxygen-carrying capacity, often linked to iron deficiency, which can impair fetal development, reduce birth weight, and hinder effective breastfeeding.
 - **Antenatal Care (ANC) History:** Frequency and quality of ANC visits affect early detection and management of nutritional risks during pregnancy, influencing both maternal and fetal health.
 - **Exclusive Breastfeeding Practice:** Exclusive breastfeeding in the first 6 months provides essential nutrients and immune protection, laying the foundation for adequate growth and development.
3. **Immediate Causes (Child Level):**
- Inadequate dietary intake and disease in the post-weaning period (age 6–59 months) mediated by:
 - Suboptimal maternal feeding practices
 - Poor household food diversity
 - Infections or recurrent illnesses linked to early nutritional deficits
4. **Outcome:**
- **Child Nutritional Status (Aged 2–5 Years):** Measured via indicators such as weight-for-age, height-for-age (stunting), and weight-for-height (wasting), reflecting cumulative exposure to risks over time.

Material And Methods

Based on the research objectives to find a description and relationship between Maternal Antenatal Care History, Anemia in Pregnancy, Maternal Diet and Exclusive Breastfeeding on Children's Nutritional Status in 2021-2023 in Ciranggem Village, Sumedang Regency, the type of research used is an observational analytical study with a Cross Sectional approach. Based on Politano et al., 2020[17], correlational research must use a minimum sample of 30 subjects. Therefore, the sample taken in the study was 30 respondents. The study was conducted at the Posyandu of Ciranggem Village, Sumedang Regency, West Java. The study was conducted from November 2023 to December 08, 2023. The population in this study was the total number of mothers who already had children aged 2-5 years who were registered and actively carrying out control activities at the Ciranggem Village Posyandu during pregnancy in 2021-2023. The sample was taken using a total sampling technique of 30 people and met the inclusion and exclusion criteria. Data processing will be done using SPSS Statistics Version 27 software (IBM, New York). Chi-square (X²) is used to analyze whether or not there is a relationship between the independent variables and the dependent variables. The confidence interval (CI) is set at 95%. A P value of less than 0.05 indicates statistically significant data.

Results

A. Univariate Analysis Results

Table 1 below is the result of research using univariate analysis with 30 respondents, consisting of Data on the distribution of antenatal care (ANC) history, data on the distribution of anemia history in pregnant women, data on the distribution of exclusive breastfeeding, and data on the distribution of mothers' dietary patterns. The results showed that most respondents, namely 22 mothers (73.3%), were in the group with a history of ANC fulfilled, namely ≥ 6 times during pregnancy. Meanwhile, respondents who did not have a history of ANC fulfilled were 8 mothers (26.7%) during pregnancy. In terms of anemia history in pregnant women, the data shows that mothers who have Hb levels < 12 are 9 out of 30 respondents, or 26.7 percent, while the remainder have Hb levels > 12 , as many as 21 out of 30 respondents, or 73.3 percent. For the provision of Exclusive Breastfeeding, the data is dominated by mothers who provide Exclusive Breastfeeding, namely 22 out of 30 respondents or 73.3 percent, while for Eating Patterns, data was obtained that most pregnant women have a diet that meets standards, namely 22 out of 30 respondents or 73.3 percent.

Table 1. Univariate Analysis Results

Description	Frequency	Percentage
Antenatal Care History		
Fulfilled	22	73.3
Not Fulfilled	8	26.7
Hb Level		
< 12	9	30.0
≥ 12	21	70.0
Exclusive Breastfeeding		
Yes	22	73.3
No	8	26.7
Nutritional Needs		
Fulfilled	22	73.3
Not Fulfilled	8	26.7

Table 2 provides an overview of the nutritional status of children in Ciranggem Village in 2021-2023, out of 30 children, 20 (66.7%) had normal nutritional status; 1 (3.3%) child was overweight; 3 (10%) children were underweight; and 6 (20%) children experienced stunting.

Table 2. Children's Nutritional Needs

Nutrition Needs	Frequency	Percentage
Normal	20	66.7
Overweight	1	3.3
Underweight	3	10
Stunting	6	20

B. Bivariate Analysis Results

Table 3 shows the relationship between Antenatal Care (ANC) history in pregnant women and children's nutritional status. The relationship between Antenatal Care (ANC) history and child nutritional status can be seen in Table 3. Based on data processing using Chi-square, it was found that there was a relationship between ANC history during the mother's pregnancy and the child's nutritional status ($p < 0.05$). Based on the results of the study, 19 mothers who had a history of Antenatal Care (ANC) ≥ 6 had a child with underweight and 1 child with overweight. In 8 mothers who had a history of ANC < 6 during pregnancy, there was an underweight nutritional status in 1 child, a stunting nutritional status in 6 children, and an underweight and stunting nutritional status in 1 child. large thus, the relationship between Antenatal Care history during the mother's pregnancy and the child's nutritional status was significant. These results show a relationship between Antenatal Care history during the mother's pregnancy and the incidence of the child's nutritional status.

Table 3. Relationship between Antenatal Care (ANC) History in Pregnant Women and Child Nutritional Status

Child Nutritional Status	Maternal ANC history		Total	P-Value
	< 6	≥ 6		
Normal and Overweight	1	19	20	0.001
Underweight dan Stunting	8	2	10	
Total	9	21	30	

Antenatal care (ANC) examinations are very necessary to optimize the mental and physical health of both the mother and the baby. The use of ANC, especially for the mother, is so that the mother can face childbirth, the postpartum period, preparation for breastfeeding, and the return to normal reproductive health [18]. ANC services are preventive services to monitor the mother's health and prevent complications for the mother and fetus. Efforts that must be made are to ensure that pregnant women are healthy until delivery, if there are physical or psychological abnormalities, they can be identified immediately, and pregnant women can give birth without complications [19]. The frequency of ANC examinations is at least 6 times during the pregnancy period. The examination includes anamnesis, monitoring the mother and fetus, recognizing high-risk pregnancies, immunization, advice, and counseling, recording accurate data at each visit [20]. Based on the studies that have been conducted, it is seen that pregnancy checks are related to various factors. Attitude and knowledge have a significant relationship to the completeness of pregnancy checks (ANC 2-1-3), especially the attitude factor [21]. The awareness and willingness of pregnant women to carry out regular pregnancy checks is a manifestation of healthy behavior. Healthy behavior is influenced by the knowledge, attitude and motivation factors of individuals to take action. If someone has

knowledge about what will be done, then they will have a positive attitude and motivation to do it [22].

The reluctance of pregnant women to have regular check-ups is caused by low public awareness of the importance of regular pregnancy check-ups and economic factors [23]. Some reasons that often make regular check-ups not carried out are not having time because they have to work and take care of children, not having any complaints about their pregnancy, not knowing how to have a check-up and being lazy. Meanwhile, economic factors are complex factors that have a major influence on various aspects of life, which have an impact on how a person behaves [24]. Nutritional intake greatly determines the health of pregnant women and the fetus they are carrying. Nutritional needs during pregnancy will increase by 15% compared to the needs of normal women. This increase in nutrition is needed for the growth of the uterus, breasts (mamae), blood volume, placenta, water needs and fetal growth by 40% and the remaining 60% is used for the growth of the mother [25]. Through education or knowledge, every pregnant woman can train her thinking skills so that it is easier to solve the problems faced. The results of this study are also in accordance with the theory that anemia is influenced by poor nutritional status. A woman who experiences poor nutritional status LILA <23.5 cm who loses iron and is anemic [26].

Table 4 shows the relationship between the History of Anemia in Pregnant Women and the Child Nutritional Status. The relationship between the condition of pregnant women experiencing anemia and the nutritional status of children was obtained from the results of the analysis using Chi-square, it was found that there was a relationship between pregnant women experiencing anemia and the nutritional status of children $p = 0.001$, ($p < 0.05$). Based on Mutiarasari 2019 [5], the Hb level required for pregnant women during pregnancy is $> 12\text{g} / \text{dL} - 15\text{g} / \text{dL}$. The results of the study showed that 10 pregnant women with Hb levels ≤ 12 provided good nutritional status for their children. Meanwhile, in the condition of pregnant women with Hb levels ≤ 12 , it caused a nutritional status of children with underweight conditions of 2 children with normal and overweight conditions, underweight conditions of 2 children, stunting conditions of 6 children, and underweight conditions accompanied by stunting of 1 child.

Table 4. Relationship between History of Anemia in Pregnant Women and Child Nutritional Status

Child Nutritional Status	Mother's Hb history		Total	P-Value
	≤ 12	> 12		
Normal and Overweight	2	18	20	0.001
Underweight dan Stunting	8	2	10	
Total	10	20	30	

[27]The increase in blood volume begins in the first trimester by 15% compared to the pre-pregnancy condition. Then there will be a very rapid increase in the second trimester. During pregnancy, 1000 mg of iron is needed. As much as 300 mg of iron will be actively sent to the fetus and placenta [25]. In general, there are three causes of iron deficiency anemia in pregnant women, namely, low iron (Fe) reserves in women during menstruation and previous childbirth, lack of iron intake from food consumed, and disturbed eating patterns in pregnant women due to nausea felt during pregnancy [28]. Physiological needs that occur during pregnancy will increase along with increasing gestational age, if this condition is not balanced with adequate iron consumption, it can cause anemia in pregnant women. Anemia that occurs during pregnancy causes the flow of iron and oxygen to the fetus to decrease. Iron is a micro component that plays a role in the formation of hemoglobin which functions as a carrier of oxygen throughout the body. The small flow of iron causes the fetal body's metabolic process to not be carried out perfectly. The metabolic process is needed to obtain bone mineral density during fetal growth which begins in the 1-13th week of pregnancy/first trimester [29]. Iron deficiency during this period will increase the risk of prematurity, low birth weight (LBW), and low birth length [30]

Table 5 shows that the observed variable is Exclusive Breastfeeding while the observed independent variable is the child's nutritional status. The results of the analysis show that the p-value = 0.001 (p-value <0.05) which statistically means that there is a relationship between the history of Exclusive Breastfeeding and the child's nutritional status.

Table 5. Relationship between Exclusive Breastfeeding History and Child Nutritional Status

Child Nutritional Status	Exclusive Breastfeeding		Total	P-Value
	≤ 12	> 12		
Normal and Overweight	20	2	22	0.001
Underweight dan Stunting	2	6	8	
Total	22	8	30	

Exclusive breastfeeding provision while the independent variable observed is the child's nutritional status. The results of the analysis show that the p value = 0.001 which statistically means that there is a relationship between the history of exclusive breastfeeding and the child's nutritional status. This is in line with the research conducted by Syahlis Irwandi entitled "The Relationship between Exclusive Breastfeeding and Stunting at the Hinai Kiri Health Center, Secanggang District, Langkat Regency" obtained a p value of 0.001 which means that there is a relationship between exclusive breastfeeding and nutritional status. Stunting is caused by multidimensional factors and is not only caused by poor nutrition experienced by pregnant women or toddlers. Several factors that cause stunting can be described, namely the situation of the mother/prospective mother, the situation of the toddler, the socio-economic

situation and the sanitation situation and access to drinking water [31]. Breast milk is milk produced by the mother and contains all the nutrients needed by the child for the child's growth and development needs [32]. Exclusive breastfeeding is when the child is only given breast milk, without additional fluids such as formula milk, orange juice, honey, tea, water and without additional solid foods such as bananas, papaya, milk porridge, biscuits, rice porridge and porridge, for 6 months. Children who receive exclusive breastfeeding are children who only receive breast milk so that no other fluids or solids are given, even water with the exception of oral rehydration, or vitamin drops/syrups, minerals or medicines. The United Nation Children's Fund (UNICEF) and the World Health Organization (WHO) recommend that children should only be breastfed for at least six months. Solid foods should be given after the child is 6 months old, and breastfeeding should be continued until the child is two years old [33].

The results of the study also showed that there were toddlers who were exclusively breastfed and experienced stunting as many as 1 (3.3%) respondents. Stunting is caused by multidimensional factors and is not only caused by poor nutrition experienced by pregnant women or toddlers. Several factors that cause stunting can be described as the situation of the mother/prospective mother, the situation of the toddler, the socio-economic situation and the sanitation situation and access to drinking water [34]. One factor in the situation of toddlers is LBW, namely a baby's birth weight of less than 2500 grams. LBW is closely related to fetal mortality and morbidity. This condition can inhibit growth and cognitive development, vulnerability to chronic diseases in the future [35].

Table 6 shows data that there are 22 mothers whose nutritional needs are met and 8 mothers whose nutrition is not met. Chi-square analysis revealed a significant association ($p = 0.001$); thus the relationship between maternal nutritional needs and child nutritional status is significant. These results show a relationship between maternal nutritional needs and the incidence of child nutritional status.

Table 6. Relationship between Maternal Dietary History and Child Nutritional Status

Child Nutritional Status	Nutritional Needs		Total	P-Value
	Fulfilled	Not Fulfilled		
Normal and Overweight	21	1	22	0.001
Underweight dan Stunting	1	7	8	
Total	22	8	30	

The measurement of children's nutritional status aims to assess the nutritional status of children and predict long-term infant health [36]. Body weight and height are one of the predictors for determining the nutritional status of children as normal, underweight,

overweight or stunted [37]. As an indicator of nutritional status, body weight provides a picture of the current state which can increase and decrease every day. Body weight is very easily affected by sudden conditions such as food and drink consumption, excretion of metabolic substances and disease [38]. Many factors affect the birth weight of babies, one of which is **the nutritional status of pregnant women**, which determines **the** intake obtained by **the** baby in the womb. Adequate nutritional status before pregnancy can be assessed using the Body Mass Index (BMI). Nutritional status before and during pregnancy has a major effect on the intake and growth of the fetus in the womb. The fetus' nutritional needs occur very rapidly in the third trimester where fetal cellular hypertrophy begins, if the mother's nutrition intake is lacking, it can affect the outcome of the baby's weight. **Women who have unmet nutritional status or are classified as thin during pregnancy are at risk of giving birth to babies with low birth weight** [39]

Conclusion

This study highlights the multifactorial relationship between maternal health factors—namely antenatal care (ANC) history, **maternal anemia**, exclusive breastfeeding practices, and maternal dietary patterns—and the **nutritional status of children aged 2–5 years**. In line with **the** adapted UNICEF conceptual framework, the findings affirm that child nutrition is not the result of isolated variables but rather a product of intersecting biological, behavioral, and social determinants rooted in maternal conditions and caregiving practices. The observed associations underscore the critical role of integrated maternal health interventions that span the prenatal to postnatal continuum. Poor ANC attendance, maternal anemia, suboptimal breastfeeding, and inadequate maternal diets were all found to significantly contribute to the risk of undernutrition in early childhood. These findings are consistent with WHO and Indonesian government priorities that advocate for a life-course approach to maternal and child health, particularly within the first 1,000 days and extending beyond.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Relationship between Antenatal Care History, Anemia, Exclusive Breastfeeding, and Mother's Diet Pattern Towards The Nutritional Status of Children Aged 2-5 Years

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Relationship of ANC History, Anemia, Exclusive Breastfeeding, and Maternal Diet with Nutritional Status of Children

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ABSTRACT

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Background: The first thousand days of life are a golden period for the growth and development of children and are closely related to pregnant women starting from the level of adequacy of nutritional intake of pregnant women, health status and antenatal care in pregnant women, exclusive breastfeeding, birth weight of babies, immunization and provision of complementary foods (MPASI). ANC visits according to government recommendations, are also important to monitor the health of the mother and fetus as early as possible. Purpose: This study seeks to describe and relate the maternal antenatal care history, anemia during pregnancy, maternal diet, and exclusive breastfeeding to the nutritional status of children in 2021-2023 in Ciranggem Village, Sumedang Regency. Method: The type of research used is analytical observational research with a cross-sectional approach, and the sampling technique is total sampling. Result: It was found that ANC services, exclusive breastfeeding, and maternal diet in Ciranggem Village were 73.3%. Mothers who had a history of anemia were 26.7%. The nutritional status of children in Ciranggem Village was found to be Normal 66.7% (20 people), Stunting 20% (6 people), Underweight 10% (3 people), and Overweight 3.3% (1 person). Conclusion: by obtaining data analysis results with a p-value <0.05, which shows a relationship between the history of Antenatal Care (ANC), Exclusive Breastfeeding, anemia, dietary patterns in pregnant women, with the nutritional status of children in Ciranggem Village.

Keywords

Antenatal Care
Exclusive Breastfeeding,
Child nutrition
Stunting
Maternal health

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Introduction

The first thousand days of life or window of opportunity is a golden period for the growth and development of children, starting from the time of conception until the age of 2 years. The first thousand days of life are closely related to pregnant women starting from the level of adequacy of nutritional intake of pregnant women, health status, and antenatal care in pregnant women, while at the stage of children aged 0-24 months including exclusive breastfeeding, birth weight of babies, immunization and provision of complementary foods (MPASI) (Rosmalina et al., 2018). According to WHO (World Health Organization) 2018, around 86% of women worldwide access antenatal care at least once during their pregnancy. According to WHO in 2020, 89% of pregnant women access antenatal care services with health workers once (Rosmalina et al., 2018). However, this percentage varies by region. In developing countries, the percentage drops to around 68%. Southeast Asia has the lowest ANC attendance rate, with 54% of women attending at least one ANC visit (*Infeksi Emerging*, 2025). Globally, the World Health Organization (WHO) underscores the first 1,000 days of life, including pregnancy through the first two years post-birth, as a vital period for establishing a child's lifelong health trajectory. Inadequate maternal nutrition and poor access to quality antenatal care can compromise fetal growth and increase the risk of stunting and other forms of malnutrition in early childhood. The WHO recommends a minimum of eight ANC visits during pregnancy to ensure timely screening, health education, and nutritional interventions, yet many women in Indonesia fail to meet this standard, particularly in rural and underserved communities (WHO, 2016; Indonesian Ministry of Health, 2021). The number of antenatal care (ANC) visits in Indonesia in the last three years (2019-2021) has shown an increase. In 2019,

ANC coverage reached 92.7%, while in 2021 it increased to 95.2%. There was also an increase in the coverage of the first ANC in the first trimester (2019: 72.3%, 2021: 81.3%) and the coverage of the fourth visit (2019: 61.4%, 2021: 70.0%). In 2020, the coverage of ANC visits in Indonesia showed a high figure, with the first visit reaching 96.84% and the fourth visit 90.18%. However, in 2021, although the figure remained high, there was a slight decline, with the first visit reaching 94.71% and the fourth visit 86.85%. In November 2023, 19,929 pregnant women visited the Sumedang health center for ANC services. ANC visits according to government recommendations, are important to monitor the health of the mother and fetus as early as possible. In addition, this visit helps prepare for the optimal labor process, postpartum period, and lactation for the mother (Abdal Qader et al., 2012). The minimum standard ANC frequency is as follows: trimester 1 has 2 visits, trimester 2 has 1 visit, and trimester 3 has 2 visits (Aryani & Annisa, 2019).

Poor ANC services can trigger LBW; the weight and length of the BBL body are a reflection of the mother's health condition during pregnancy, such as nutritional status (Mutiarasari, 2019). Parameters for assessing the nutritional status of pregnant women include anthropometry, LILA, hemoglobin (Hb), and diet. The Hb level of pregnant women <10 mg/dl is classified as anemia (Okubo et al., 2012). Pregnancy with complications of anemia can cause problems in babies, such as LBW, stunting, and infant death, while the impact of anemia on the health of pregnant women is the risk of bleeding before and during childbirth, and maternal death. Thus, it can increase the percentage of maternal mortality rates and infant mortality rates. Anemia in pregnant women inhibits the transportation of food and O₂ to the fetus through the placenta, resulting in impaired fetal growth and development (Okubo et al., 2012).

Nutrition during childhood has a big influence on growth and development, even when you are still in the womb, nutrition plays an important role. If a pregnant mother gets adequate food, the baby she is carrying will be born with a normal birth weight. Meanwhile, mothers who are malnourished will give birth to babies with low birth weight (Narendra et al., 2002). The most important nutrition that is first obtained when a baby is born is breast milk. Breast milk is the most ideal food both physiologically and biologically that must be given to babies in their early life. This is because in addition to containing quite high nutritional value, breast milk also contains immune substances that will protect against various types of diseases that can inhibit the growth of the baby. (Syarif DR, Lestari ED, Mexitalia M, Nasar SS. *Buku Ajar Nutrisi Pediatrik Dan Penyakit Metabolik. Jilid I. Jakarta: Badan Penerbit Ikatan Dokter Anak Indonesia; 2011 - Google Search, 2025*).

Breastfeeding begins when the baby is born for 6 months, without adding and/or replacing it with other foods or drinks (Indonesia, 2012). Exclusive breastfeeding in Indonesia is still far from expectations. Nationally, the coverage of babies receiving exclusive breastfeeding in 2017 was 61.33%. However, this figure has not reached the target coverage of exclusive breastfeeding set by the government, which is 80% (Ministry of Health, 2018) (Barus, 2021). Therefore, researchers want to know whether there is a relationship between the history of maternal ANC and exclusive breastfeeding on the nutritional status of children, especially in Ciranggeng Village, Sumedang Regency, West Java

Literature Review

A. Antenatal Care (ANC)

Antenatal Care (ANC) is a health service by professional personnel for mothers during their pregnancy which is carried out by the established antenatal care standards. Pregnant women are recommended to visit health services twice in the first trimester, once in the second trimester, and three times in the third trimester. The aim of Antenatal Care is for pregnant women to receive care during pregnancy including pregnancy check-ups, education and high-risk detection, so that if there are any findings that are not good, preventive and curative efforts can be taken immediately (Barus, 2021).

B. Anemia in Pregnant Women

Anemia is a condition in which the number of erythrocytes or the capability and capacity of erythrocytes in transporting oxygen is inadequate to meet the physiological needs of the body which can be caused by decreased production of erythrocytes and/or hemoglobin (WHO, 2021:1). Anemia in pregnancy is a condition of anemia that occurs during pregnancy characterized by hemoglobin (Hb) levels <11 g/dl in the first and third trimesters, while in the second trimester, the hemoglobin level is <10.5 g/dl or the hematocrit level is <33% (Oktarina, 2015). According to the severity of the disease, anemia is divided into 3 based on the hemoglobin levels in the blood, namely (WHO, 2011:3):

1. Mild: Hemoglobin levels 10-10.9 g/dl
2. Moderate: Hemoglobin levels 7-9.9 g/dl
3. Severe: Hemoglobin levels <7 g/dl

In severe anemia conditions, immediate medical attention is required, while if Hb <4 g/dl is found, it indicates an emergency condition that is at risk of causing congestive heart failure, sepsis, and even death.

C. Pregnant Women's Diet

Eating patterns are a way or effort to regulate the amount and type of food with descriptive information including maintaining health, nutritional status, preventing or helping to cure diseases (Afika, 2017). Eating patterns are defined as characteristics of repeated activities of eating by individuals or everyone eating to meet food needs (Luengo et al., 2019).

In general, eating patterns have 3 (three) components consisting of: type, frequency, and amount of food.

a. Type of food

Type of food is a type of staple food eaten every day consisting of staple foods, animal side dishes, vegetable side dishes, vegetables, and fruits consumed every day. Staple foods are the main food source in Indonesia which is consumed by every person or group of people consisting of rice, corn, sago, tubers, and flour.

b. Frequency of eating

Frequency of eating is several times a day including breakfast, lunch, dinner and snacks (Maryunani, 2012). While according to frequency of eating is repeatedly eating a day with a total of three times breakfast, lunch, and dinner.

c. Number of meals

The number of meals is the amount of food eaten by each person or each individual in a group.

D. Child Nutritional Status

Nutritional status is a measure of success in fulfilling nutrition for children indicated by the child's weight and height. This condition is influenced by the balance between nutrient intake from food and the nutritional needs required by the body for metabolism. The condition of the body as a result of the use, absorption, and use of food. Food that meets the body's nutritional needs generally leads to good nutritional status. It is better if the lack or excess of essential nutrients in food for a long period is called malnutrition or lack. Manifestations or manifestations of poor nutrition can be in the form of malnutrition and overnutrition (Kemenkes, 2022). Nutritional status is a measure of success in fulfilling nutrition for children indicated by the child's weight and height. Nutritional status is also defined as a health status resulting from a balance between nutrient needs and inputs (Berger et al., 2020).

Below is an adaptation of the UNICEF framework to reflect the specific maternal factors investigated in this research—namely antenatal care (ANC) history, maternal anemia, exclusive breastfeeding, and maternal diet pattern—and their influence on the nutritional status of children aged 2–5 year

1. Basic Causes:

- Socio-economic status
- Maternal education
- Access to healthcare services

2. **Underlying Causes (Household & Maternal Level):**

- **Maternal Diet Pattern:** Reflects the quality and diversity of maternal food intake during and after pregnancy, which influences maternal nutritional reserves, breastfeeding quality, and family dietary practices.
- **Maternal Anemia:** A biomedical condition reducing maternal oxygen-carrying capacity, often linked to iron deficiency, which can impair fetal development, reduce birth weight, and hinder effective breastfeeding.
- **Antenatal Care (ANC) History:** Frequency and quality of ANC visits affect early detection and management of nutritional risks during pregnancy, influencing both maternal and fetal health.
- **Exclusive Breastfeeding Practice:** Exclusive breastfeeding in the first 6 months provides essential nutrients and immune protection, laying the foundation for adequate growth and development.

3. **Immediate Causes (Child Level):**

- Inadequate dietary intake and disease in the post-weaning period (age 6–59 months) mediated by:
 - Suboptimal maternal feeding practices
 - Poor household food diversity
 - Infections or recurrent illnesses linked to early nutritional deficits

4. **Outcome:**

- **Child Nutritional Status (Aged 2–5 Years):** Measured via indicators such as weight-for-age, height-for-age (stunting), and weight-for-height (wasting), reflecting cumulative exposure to risks over time.

Material And Methods

Based on the research objectives to find a description and relationship between Maternal Antenatal Care History, Anemia in Pregnancy, Maternal Diet and Exclusive Breastfeeding on Children's Nutritional Status in 2021-2023 in Ciranggem Village, Sumedang Regency, the type of research used is an observational analytical study with a Cross Sectional approach. Based on Politano et al., 2020(Politano & López-Berroa, 2020), correlational research must use a minimum sample of 30 subjects. Therefore, the sample taken in the study was 30 respondents. he study was conducted at the Posyandu of Ciranggem Village, Sumedang Regency, West Java. The study was conducted from November 2023 to December 08, 2023.

The population in this study was the total number of mothers who already had children aged 2-5 years who were registered and actively carrying out control activities at the Ciranggem Village Posyandu during pregnancy in 2021-2023. The sample was taken using a total sampling technique of 30 people and met the inclusion and exclusion criteria. Data processing will be done using SPSS Statistics Version 27 software (IBM, New York). Chi-square (X²) is used to analyze whether or not there is a relationship between the independent variables and the dependent variables. The confidence interval (CI) is set at 95%. A P value of less than 0.05 indicates statistically significant data.

Results

A. Univariate Analysis Results

Table 1 below is the result of research using univariate analysis with 30 respondents, consisting of Data on the distribution of antenatal care (ANC) history, data on the distribution of anemia history in pregnant women, data on the distribution of exclusive breastfeeding, and data on the distribution of mothers' dietary patterns. The results showed that most respondents, namely 22 mothers (73.3%), were in the group with a history of ANC fulfilled, namely ≥ 6 times during pregnancy. Meanwhile, respondents who did not have a history of ANC fulfilled were 8 mothers (26.7%) during pregnancy. In terms of anemia history in pregnant women, the data shows that mothers who have Hb levels < 12 are 9 out of 30 respondents, or 26.7 percent, while the remainder have Hb levels > 12 , as many as 21 out of 30 respondents, or 73.3 percent. For the provision of Exclusive Breastfeeding, the data is dominated by mothers who provide Exclusive Breastfeeding, namely 22 out of 30 respondents or 73.3 percent, while for Eating Patterns, data was obtained that most pregnant women have a diet that meets standards, namely 22 out of 30 respondents or 73.3 percent.

Table 1. Univariate Analysis Results

Description	Frequency	Percentage
Antenatal Care History		
Fulfilled	22	73.3
Not Fulfilled	8	26.7
Hb Level		
< 12	9	30.0
≥ 12	21	70.0
Exclusive Breastfeeding		
Yes	22	73.3
No	8	26.7
Nutritional Needs		
Fulfilled	22	73.3
Not Fulfilled	8	26.7

Table 2 provides an overview of the nutritional status of children in Ciranggem Village in 2021-2023, out of 30 children, 20 (66.7%) had normal nutritional status; 1 (3.3%) child was overweight; 3 (10%) children were underweight; and 6 (20%) children experienced stunting.

Table 2. Children's Nutritional Needs

Nutrition Needs	Frequency	Percentage
Normal	20	66.7
Overweight	1	3.3
Underweight	3	10
Stunting	6	20

B. Bivariate Analysis Results

Table 3 shows the relationship between Antenatal Care (ANC) history in pregnant women and children's nutritional status. The relationship between Antenatal Care (ANC) history and child nutritional status can be seen in Table 3. Based on data processing using Chi-square, it was found that there was a relationship between ANC history during the mother's pregnancy and the child's nutritional status ($p < 0.05$). Based on the results of the study, 19 mothers who had a history of Antenatal Care (ANC) ≥ 6 had a child with underweight and 1 child with overweight. In 8 mothers who had a history of ANC < 6 during pregnancy, there was an underweight nutritional status in 1 child, a stunting nutritional status in 6 children, and an underweight and stunting nutritional status in 1 child. large thus, the relationship between Antenatal Care history during the mother's pregnancy and the child's nutritional status was significant. These results show a relationship between Antenatal Care history during the mother's pregnancy and the incidence of the child's nutritional status.

Table 3. Relationship between Antenatal Care (ANC) History in Pregnant Women and Child Nutritional Status

Child Nutritional Status	Maternal ANC history		Total	P-Value
	< 6	≥ 6		
Normal and Overweight	1	19	20	0.001
Underweight dan Stunting	8	2	10	
Total	9	21	30	

Antenatal care (ANC) examinations are very necessary to optimize the mental and physical health of both the mother and the baby. The use of ANC, especially for the mother, is so that the mother can face childbirth, the postpartum period, preparation for breastfeeding, and the return to normal reproductive health (Almeida et al., 2021). ANC services are preventive services to monitor the mother's health and prevent complications for the mother and fetus. Efforts that must be made are to ensure that pregnant women are healthy until delivery, if there are physical or psychological abnormalities, they can be identified

immediately, and pregnant women can give birth without complications (Wijaya, 2019). The frequency of ANC examinations is at least 6 times during the pregnancy period. The examination includes anamnesis, monitoring the mother and fetus, recognizing high-risk pregnancies, immunization, advice, and counseling, recording accurate data at each visit (Erick, 2018). Based on the studies that have been conducted, it is seen that pregnancy checks are related to various factors. Attitude and knowledge have a significant relationship to the completeness of pregnancy checks (ANC 2-1-3), especially the attitude factor (Means, 2020). The awareness and willingness of pregnant women to carry out regular pregnancy checks is a manifestation of healthy behavior. Healthy behavior is influenced by the knowledge, attitude and motivation factors of individuals to take action. If someone has knowledge about what will be done, then they will have a positive attitude and motivation to do it (Grzeszczak et al., 2020).

The reluctance of pregnant women to have regular check-ups is caused by low public awareness of the importance of regular pregnancy check-ups and economic factors (*World Health Organization. Antenatal Iron Supplementation. 2023. <https://www.who.int/data/nutrition/nlis/info/antenatal-iron-supplementation>. - Google Search, 2025*). Some reasons that often make regular check-ups not carried out are not having time because they have to work and take care of children, not having any complaints about their pregnancy, not knowing how to have a check-up and being lazy. Meanwhile, economic factors are complex factors that have a major influence on various aspects of life, which have an impact on how a person behaves (Riyadi et al., 2023). Nutritional intake greatly determines the health of pregnant women and the fetus they are carrying. Nutritional needs during pregnancy will increase by 15% compared to the needs of normal women. This increase in nutrition is needed for the growth of the uterus, breasts (mamae), blood volume, placenta, water needs and fetal growth by 40% and the remaining 60% is used for the growth of the mother (Soliman et al., 2021). Through education or knowledge, every pregnant woman can train her thinking skills so that it is easier to solve the problems faced. The results of this study are also in accordance with the theory that anemia is influenced by poor nutritional status. A woman who experiences poor nutritional status LILA <23.5 cm who loses iron and is anemic (Salakory & Wija, 2021).

Table 4 shows the relationship between the History of Anemia in Pregnant Women and the Child Nutritional Status. The relationship between the condition of pregnant women experiencing anemia and the nutritional status of children was obtained from the results of the analysis using Chi-square, it was found that there was a relationship between pregnant women experiencing anemia and the nutritional status of children $p = 0.001$, ($p < 0.05$). Based on Mutiarasari 2019 (Mutiarasari, 2019), the Hb level required for pregnant women during

pregnancy is $> 12\text{g / dL} - 15\text{g / dL}$. The results of the study showed that 10 pregnant women with Hb levels ≤ 12 provided good nutritional status for their children. Meanwhile, in the condition of pregnant women with Hb levels ≤ 12 , it caused a nutritional status of children with underweight conditions of 2 children with normal and overweight conditions, underweight conditions of 2 children, stunting conditions of 6 children, and underweight conditions accompanied by stunting of 1 child (White et al., 2024).

Table 4. Relationship between History of Anemia in Pregnant Women and Child Nutritional Status

Child Nutritional Status	Mother's Hb history		Total	P-Value
	≤ 12	> 12		
Normal and Overweight	2	18	20	0.001
Underweight dan Stunting	8	2	10	
Total	10	20	30	

The increase in blood volume begins in the first trimester by 15% compared to the pre-pregnancy condition. Then there will be a very rapid increase in the second trimester. During pregnancy, 1000 mg of iron is needed. As much as 300 mg of iron will be actively sent to the fetus and placenta (Soliman et al., 2021). In general, there are three causes of iron deficiency anemia in pregnant women, namely, low iron (Fe) reserves in women during menstruation and previous childbirth, lack of iron intake from food consumed, and disturbed eating patterns in pregnant women due to nausea felt during pregnancy (Ophie & Tjarono, 2019). Physiological needs that occur during pregnancy will increase along with increasing gestational age, if this condition is not balanced with adequate iron consumption, it can cause anemia in pregnant women. Anemia that occurs during pregnancy causes the flow of iron and oxygen to the fetus to decrease. Iron is a micro component that plays a role in the formation of hemoglobin which functions as a carrier of oxygen throughout the body. The small flow of iron causes the fetal body's metabolic process to not be carried out perfectly. The metabolic process is needed to obtain bone mineral density during fetal growth which begins in the 1-13th week of pregnancy/first trimester (Hulayya, 2021). Iron deficiency during this period will increase the risk of prematurity, low birth weight (LBW), and low birth length (De Onis et al., 2013)

Table 5 shows that the observed variable is Exclusive Breastfeeding while the observed independent variable is the child's nutritional status. The results of the analysis show that the p-value = 0.001 (p-value < 0.05) which statistically means that there is a relationship between the history of Exclusive Breastfeeding and the child's nutritional status.

Child Nutritional Status	Exclusive Breastfeeding		Total	P-Value
	≤ 12	> 12		
Normal and Overweight	20	2	22	0.001

Underweight dan Stunting	2	6	8
Total	22	8	30

Table 5. Relationship between Exclusive Breastfeeding History and Child Nutritional Status

Exclusive breastfeeding provision while the independent variable observed is the child's nutritional status. The results of the analysis show that the p value = 0.001 which statistically means that there is a relationship between the history of exclusive breastfeeding and the child's nutritional status. This is in line with the research conducted by Syahlis Irwandi entitled "The Relationship between Exclusive Breastfeeding and Stunting at the Hinai Kiri Health Center, Secanggang District, Langkat Regency" obtained a p value of 0.001 which means that there is a relationship between exclusive breastfeeding and nutritional status. Stunting is caused by multidimensional factors and is not only caused by poor nutrition experienced by pregnant women or toddlers. Several factors that cause stunting can be described, namely the situation of the mother/prospective mother, the situation of the toddler, the socio-economic situation and the sanitation situation and access to drinking water (Ch Rosha et al., 2020). Breast milk is milk produced by the mother and contains all the nutrients needed by the child for the child's growth and development needs (Dewi & Nindya, 2017). Exclusive breastfeeding is when the child is only given breast milk, without additional fluids such as formula milk, orange juice, honey, tea, water and without additional solid foods such as bananas, papaya, milk porridge, biscuits, rice porridge and porridge, for 6 months. Children who receive exclusive breastfeeding are children who only receive breast milk so that no other fluids or solids are given, even water with the exception of oral rehydration, or vitamin drops/syrups, minerals or medicines. The United Nation Children's Fund (UNICEF) and the World Health Organization (WHO) recommend that children should only be breastfed for at least six months. Solid foods should be given after the child is 6 months old, and breastfeeding should be continued until the child is two years old (Nasution et al., 2019).

The results of the study also showed that there were toddlers who were exclusively breastfed and experienced stunting as many as 1 (3.3%) respondents. Stunting is caused by multidimensional factors and is not only caused by poor nutrition experienced by pregnant women or toddlers. Several factors that cause stunting can be described as the situation of the mother/prospective mother, the situation of the toddler, the socio-economic situation and the sanitation situation and access to drinking water (Permatasari, 2020). One factor in the situation of toddlers is LBW, namely a baby's birth weight of less than 2500 grams. LBW is

closely related to fetal mortality and morbidity. This condition can inhibit growth and cognitive development, vulnerability to chronic diseases in the future (Hutasoit et al., 2020).

Table 6 shows data that there are 22 mothers whose nutritional needs are met and 8 mothers whose nutrition is not met. Chi-square analysis revealed a significant association ($p = 0.001$); thus the relationship between maternal nutritional needs and child nutritional status is significant. These results show a relationship between maternal nutritional needs and the incidence of child nutritional status.

Table 6. Relationship between Maternal Dietary History and Child Nutritional Status

Child Nutritional Status	Nutritional Needs		Total	P-Value
	Fulfilled	Not Fulfilled		
Normal and Overweight	21	1	22	0.001
Underweight dan Stunting	1	7	8	
Total	22	8	30	

The measurement of children's nutritional status aims to assess the nutritional status of children and predict long-term infant health (Ramadhini et al., 2021). Body weight and height are one of the predictors for determining the nutritional status of children as normal, underweight, overweight or stunted (Kemenkes, 2016). As an indicator of nutritional status, body weight provides a picture of the current state which can increase and decrease every day. Body weight is very easily affected by sudden conditions such as food and drink consumption, excretion of metabolic substances and disease (Nurul, 2020). Many factors affect the birth weight of babies, one of which is the nutritional status of pregnant women, which determines the intake obtained by the baby in the womb. Adequate nutritional status before pregnancy can be assessed using the Body Mass Index (BMI). Nutritional status before and during pregnancy has a major effect on the intake and growth of the fetus in the womb. The fetus' nutritional needs occur very rapidly in the third trimester where fetal cellular hypertrophy begins, if the mother's nutrition intake is lacking, it can affect the outcome of the baby's weight. Women who have unmet nutritional status or are classified as thin during pregnancy are at risk of giving birth to babies with low birth weight (Ernawati et al., 2013)

Conclusion

This study highlights the multifactorial relationship between maternal health factors—namely antenatal care (ANC) history, maternal anemia, exclusive breastfeeding practices, and maternal dietary patterns—and the nutritional status of children aged 2–5 years. In line with the adapted UNICEF conceptual framework, the findings affirm that child nutrition is not the result of isolated variables but rather a product of intersecting biological, behavioral, and social determinants rooted in maternal conditions and caregiving practices. The observed associations underscore the critical role of integrated maternal health interventions that span the prenatal to postnatal continuum. Poor ANC attendance, maternal anemia, suboptimal breastfeeding, and inadequate maternal diets were all found to significantly contribute to the risk of undernutrition in early childhood. These findings are consistent with WHO and Indonesian government priorities that advocate for a life-course approach to maternal and child health, particularly within the first 1,000 days and extending beyond.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Relationship between Antenatal Care History, Anemia, Exclusive Breastfeeding, and Mother's Diet Pattern towards The Nutritional Status of Children Aged 2-5 Years

3 refer to?

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ABSTRACT

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Background: The first thousand days of life are a golden period for the growth and development of children and are closely related to pregnant women starting from the level of adequacy of nutritional intake of pregnant women, health status and antenatal care in pregnant women, exclusive breastfeeding, birth weight of babies, immunization and provision of complementary foods (MPASI). ANC visits according to government recommendations, are also important to monitor the health of the mother and fetus as early as possible. Purpose: This study seeks to describe and relate the maternal antenatal care history, anemia during pregnancy, maternal diet, and exclusive breastfeeding to the nutritional status of children in 2021-2023 in Ciranggem Village, Sumedang Regency. Method: The type of research used is analytical observational research with a cross-sectional approach, and the sampling technique is total sampling. Result: It was found that ANC services, exclusive breastfeeding, and maternal diet in Ciranggem Village were 73.3%. Mothers who had a history of anemia were 26.7%. The nutritional status of children in Ciranggem Village was found to be Normal 66.7% (20 people), Stunting 20% (6 people), Underweight 10% (3 people), and Overweight 3.3% (1 person). Conclusion: by obtaining data analysis results with a p-value <0.05, which shows a relationship between the history of Antenatal Care (ANC), Exclusive Breastfeeding, anemia, dietary patterns in pregnant women, with the nutritional status of children in Ciranggem Village.

Keywords

Antenatal Care
Exclusive Breastfeeding,
Child nutrition
Stunting
Maternal health

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**Introduction**

The first thousand days of life or window of opportunity is a golden period for the growth and development of children, starting from the time of conception until the age of 2 years. The first thousand days of life are closely related to pregnant women starting from the level of adequacy of nutritional intake of pregnant women, health status, and antenatal care in pregnant women, while at the stage of children aged 0-24 months including exclusive breastfeeding, birth weight of babies, immunization and provision of complementary foods (MPASI) [1]. According to WHO (World Health Organization) 2018, around 86% of women worldwide access antenatal care at least once during their pregnancy. According to WHO in 2020, 89% of pregnant women access antenatal care services with health workers once [1]. However, this percentage varies by region. In developing countries, the percentage drops to around 68%. Southeast Asia has the lowest ANC attendance rate, with 54% of women attending at least one ANC visit [2]. Globally, the World Health Organization (WHO) underscores the first 1,000 days of life, including pregnancy through the first two years post-birth, as a vital period for establishing a child's lifelong health trajectory. Inadequate maternal nutrition and poor access to quality antenatal care can compromise fetal growth and increase the risk of stunting and other forms of malnutrition in early childhood. The WHO recommends a minimum of eight ANC visits during pregnancy to ensure timely screening, health education, and nutritional interventions, yet many women in Indonesia fail to meet this standard, particularly in rural and underserved communities (WHO, 2016; Indonesian Ministry of Health, 2021). The number of antenatal care (ANC) visits in Indonesia in the last three years

(2019-2021) has shown an increase. In 2019, ANC coverage reached 92.7%, while in 2021 it increased to 95.2%. There was also an increase in the coverage of the first ANC in the first trimester (2019: 72.3%, 2021: 81.3%) and the coverage of the fourth visit (2019: 61.4%, 2021: 70.0%). In 2020, the coverage of ANC visits in Indonesia showed a high figure, with the first visit reaching 96.84% and the fourth visit 90.18%. However, in 2021, although the figure remained high, there was a slight decline, with the first visit reaching 94.71% and the fourth visit 86.85%. In November 2023, 19,929 pregnant women visited the Sumedang health center for ANC services. ANC visits according to government recommendations, are important to monitor the health of the mother and fetus as early as possible. In addition, this visit helps prepare for the optimal labor process, postpartum period, and lactation for the mother [3]. The minimum standard ANC frequency is as follows: trimester 1 has 2 visits, trimester 2 has 1 visit, and trimester 3 has 2 visits [4].

Poor ANC services can trigger LBW; the weight and length of the BBL body are a reflection of the mother's health condition during pregnancy, such as nutritional status [5]. Parameters for assessing the nutritional status of pregnant women include anthropometry, LILA, hemoglobin (Hb), and diet. The Hb level of pregnant women <10 mg/dl is classified as anemia [6]. Pregnancy with complications of anemia can cause problems in babies, such as LBW, stunting, and infant death, while the impact of anemia on the health of pregnant women is the risk of bleeding before and during childbirth, and maternal death. Thus, it can increase the percentage of maternal mortality rates and infant mortality rates. Anemia in pregnant women inhibits the transportation of food and O₂ to the fetus through the placenta, resulting in impaired fetal growth and development [6].

Nutrition during childhood has a big influence on growth and development, even when you are still in the womb, nutrition plays an important role. If a pregnant mother gets adequate food, the baby she is carrying will be born with a normal birth weight. Meanwhile, mothers who are malnourished will give birth to babies with low birth weight [7]. The most important nutrition that is first obtained when a baby is born is breast milk. Breast milk is the most ideal food both physiologically and biologically that must be given to babies in their early life. This is because in addition to containing quite high nutritional value, breast milk also contains immune substances that will protect against various types of diseases that can inhibit the growth of the baby [8].

Breastfeeding begins when the baby is born for 6 months, without adding and/or replacing it with other foods or drinks [9]. Exclusive breastfeeding in Indonesia is still far from expectations. Nationally, the coverage of babies receiving exclusive breastfeeding in 2017 was 61.33%. However, this figure has not reached the target coverage of exclusive breastfeeding set by the government, which is 80% (Ministry of Health, 2018) [10]. Therefore, researchers

want to know whether there is a relationship between the history of maternal ANC and exclusive breastfeeding on the nutritional status of children, especially in Ciranggem Village, Sumedang Regency, West Java.

Literature Review

A. Antenatal Care (ANC)

Antenatal Care (ANC) is a health service by professional personnel for mothers during their pregnancy which is carried out by the established antenatal care standards. Pregnant women are recommended to visit health services twice in the first trimester, once in the second trimester, and three times in the third trimester. The aim of Antenatal Care is for pregnant women to receive care during pregnancy including pregnancy check-ups, education and high-risk detection, so that if there are any findings that are not good, preventive and curative efforts can be taken immediately [10].

B. Anemia in pregnant women

Anemia is a condition in which the number of erythrocytes or the capability and capacity of erythrocytes in transporting oxygen is inadequate to meet the physiological needs of the body which can be caused by decreased production of erythrocytes and/or hemoglobin (WHO, 2021:1). Anemia in pregnancy is a condition of anemia that occurs during pregnancy characterized by hemoglobin (Hb) levels <11 g/dl in the first and third trimesters, while in the second trimester, the hemoglobin level is <10.5 g/dl or the hematocrit level is <33% [11]. According to the severity of the disease, anemia is divided into 3 based on the hemoglobin levels in the blood, namely (WHO, 2011:3):

- a) Mild : hemoglobin levels 10-10.9 g/dl;
- b) Moderate : hemoglobin levels 7-9.9 g/dl;
- c) Severe : hemoglobin levels <7 g/dl.

In severe anemia conditions, immediate medical attention is required, while if Hb <4 g/dl is found, it indicates an emergency condition that is at risk of causing congestive heart failure, sepsis, and even death.

C. Pregnant women's diet

Eating patterns are a way or effort to regulate the amount and type of food with descriptive information including maintaining health, nutritional status, preventing or helping to cure diseases [12]. Eating patterns are defined as characteristics of repeated activities of eating by individuals or everyone eating to meet food needs [13].

In general, eating patterns have 3 (three) components consisting of: type, frequency, and amount of food.

1. Type of food

Type of food is a type of staple food eaten every day consisting of staple foods, animal side dishes, vegetable side dishes, vegetables, and fruits consumed every day. Staple foods are the main food source in Indonesia which is consumed by every person or group of people consisting of rice, corn, sago, tubers, and flour.

2. Frequency of eating

Frequency of eating is several times a day including breakfast, lunch, dinner and snacks [14]. While according to frequency of eating is repeatedly eating a day with a total of three times breakfast, lunch, and dinner.

3. Number of meals

The number of meals is the amount of food eaten by each person or each individual in a group.

D. Child nutritional status

Nutritional status is a measure of success in fulfilling nutrition for children indicated by the child's weight and height. This condition is influenced by the balance between nutrient intake from food and the nutritional needs required by the body for metabolism. The condition of the body as a result of the use, absorption, and use of food. Food that meets the body's nutritional needs generally leads to good nutritional status. It is better if the lack or excess of essential nutrients in food for a long period is called malnutrition or lack. Manifestations or manifestations of poor nutrition can be in the form of malnutrition and overnutrition [15]. Nutritional status is a measure of success in fulfilling nutrition for children indicated by the child's weight and height. Nutritional status is also defined as a health status resulting from a balance between nutrient needs and inputs [16].

Below is an adaptation of the UNICEF framework to reflect the specific maternal factors investigated in this research—namely antenatal care (ANC) history, maternal anemia, exclusive breastfeeding, and maternal diet pattern—and their influence on the nutritional status of children aged 2–5 year:

1. Basic causes:

- a) Socio-economic status;
- b) Maternal education;
- c) Access to healthcare services.

2. **Underlying causes (household & maternal level):**

- a) **Maternal diet pattern:** reflects the quality and diversity of maternal food intake during and after pregnancy, which influences maternal nutritional reserves, breastfeeding quality, and family dietary practices;

- b) **Maternal anemia:** a biomedical condition reducing maternal oxygen-carrying capacity, often linked to iron deficiency, which can impair fetal development, reduce birth weight, and hinder effective breastfeeding;
 - c) **Antenatal Care (ANC) history:** frequency and quality of ANC visits affect early detection and management of nutritional risks during pregnancy, influencing both maternal and fetal health;
 - d) **Exclusive breastfeeding practice:** exclusive breastfeeding in the first 6 months provides essential nutrients and immune protection, laying the foundation for adequate growth and development.
3. **Immediate causes (child level):**
- Inadequate dietary intake and disease in the post-weaning period (age 6–59 months) mediated by:
- a) Suboptimal maternal feeding practices;
 - b) Poor household food diversity;
 - c) Infections or recurrent illnesses linked to early nutritional deficits.
4. **Outcome:**
- Child nutritional status (aged 2–5 years):** measured via indicators such as weight-for-age, height-for-age (stunting), and weight-for-height (wasting), reflecting cumulative exposure to risks over time.

Material And Methods

Based on the research objectives to find a description and relationship between Maternal Antenatal Care History, Anemia in Pregnancy, Maternal Diet and Exclusive Breastfeeding on Children's Nutritional Status in 2021-2023 in Ciranggeng Village, Sumedang Regency, the type of research used is an observational analytical study with a Cross Sectional approach. Based on Politano et al., 2020[17], correlational research must use a minimum sample of 30 subjects. Therefore, the sample taken in the study was 30 respondents. The study was conducted at the Posyandu of Ciranggeng Village, Sumedang Regency, West Java. The study was conducted from November 2023 to December 08, 2023. The population in this study was the total number of mothers who already had children aged 2-5 years who were registered and actively carrying out control activities at the Ciranggeng Village Posyandu during pregnancy in 2021-2023. The sample was taken using a total sampling technique of 30 people and met the inclusion and exclusion criteria. Data processing will be done using SPSS Statistics Version 27 software (IBM, New York). Chi-square (χ^2) is used to analyze whether or not there is a relationship between the independent variables and the dependent variables. The confidence interval (CI) is set at 95%. A P value of less than 0.05 indicates statistically significant data.

Results

A. Univariate analysis results

Table 1 below is the result of research using univariate analysis with 30 respondents, consisting of Data on the distribution of antenatal care (ANC) history, data on the distribution of anemia history in pregnant women, data on the distribution of exclusive breastfeeding, and data on the distribution of mothers' dietary patterns. The results showed that most respondents, namely 22 mothers (73.3%), were in the group with a history of ANC fulfilled, namely ≥ 6 times during pregnancy. Meanwhile, respondents who did not have a history of ANC fulfilled were 8 mothers (26.7%) during pregnancy. In terms of anemia history in pregnant women, the data shows that mothers who have Hb levels < 12 are 9 out of 30 respondents, or 26.7 percent, while the remainder have Hb levels > 12 , as many as 21 out of 30 respondents, or 73.3 percent. For the provision of Exclusive Breastfeeding, the data is dominated by mothers who provide Exclusive Breastfeeding, namely 22 out of 30 respondents or 73.3 percent, while for Eating Patterns, data was obtained that most pregnant women have a diet that meets standards, namely 22 out of 30 respondents or 73.3 percent.

Table 1. Univariate analysis results

Description	Frequency	Percentage
<i>Antenatal Care History</i>		
Fulfilled	22	73.3
Not Fulfilled	8	26.7
<i>Hb Level</i>		
< 12	9	30.0
≥ 12	21	70.0
<i>Exclusive Breastfeeding</i>		
Yes	22	73.3
No	8	26.7
<i>Nutritional Needs</i>		
Fulfilled	22	73.3
Not Fulfilled	8	26.7

Table 2. Children's nutritional needs

Nutrition needs	Frequency	Percentage
Normal	20	66.7
Overweight	1	3.3
Underweight	3	10
Stunting	6	20

Table 2 provides an overview of the nutritional status of children in Ciranggeng Village in 2021-2023, out of 30 children, 20 (66.7%) had normal nutritional status; 1 (3.3%) child

was overweight; 3 (10%) children were underweight; and 6 (20%) children experienced stunting.

B. Bivariate analysis results

Table 3 shows the relationship between Antenatal Care (ANC) history in pregnant women and children's nutritional status. The relationship between Antenatal Care (ANC) history and child nutritional status can be seen in Table 3. Based on data processing using Chi-square, it was found that there was a relationship between ANC history during the mother's pregnancy and the child's nutritional status ($p < 0.05$). Based on the results of the study, 19 mothers who had a history of Antenatal Care (ANC) ≥ 6 had a child with underweight and 1 child with overweight. In 8 mothers who had a history of ANC < 6 during pregnancy, there was an underweight nutritional status in 1 child, a stunting nutritional status in 6 children, and an underweight and stunting nutritional status in 1 child. large thus, the relationship between Antenatal Care history during the mother's pregnancy and the child's nutritional status was significant. These results show a relationship between Antenatal Care history during the mother's pregnancy and the incidence of the child's nutritional status.

Table 3. Relationship between Antenatal Care (ANC) history in pregnant women and child nutritional status

Child Nutritional Status	Maternal ANC history		Total	P-Value
	< 6	≥ 6		
Normal and Overweight	1	19	20	0.001
Underweight dan Stunting	8	2	10	
Total	9	21	30	

Antenatal care (ANC) examinations are very necessary to optimize the mental and physical health of both the mother and the baby. The use of ANC, especially for the mother, is so that the mother can face childbirth, the postpartum period, preparation for breastfeeding, and the return to normal reproductive health [18]. ANC services are preventive services to monitor the mother's health and prevent complications for the mother and fetus. Efforts that must be made are to ensure that pregnant women are healthy until delivery, if there are physical or psychological abnormalities, they can be identified immediately, and pregnant women can give birth without complications [19]. The frequency of ANC examinations is at least 6 times during the pregnancy period. The examination includes anamnesis, monitoring the mother and fetus, recognizing high-risk pregnancies, immunization, advice, and counseling, recording accurate data at each visit [20]. Based on the studies that have been conducted, it is seen that pregnancy checks are

related to various factors. Attitude and knowledge have a significant relationship to the completeness of pregnancy checks (ANC 2-1-3), especially the attitude factor [21]. The awareness and willingness of pregnant women to carry out regular pregnancy checks is a manifestation of healthy behavior. Healthy behavior is influenced by the knowledge, attitude and motivation factors of individuals to take action. If someone has knowledge about what will be done, then they will have a positive attitude and motivation to do it [22].

The reluctance of pregnant women to have regular check-ups is caused by low public awareness of the importance of regular pregnancy check-ups and economic factors [23]. Some reasons that often make regular check-ups not carried out are not having time because they have to work and take care of children, not having any complaints about their pregnancy, not knowing how to have a check-up and being lazy. Meanwhile, economic factors are complex factors that have a major influence on various aspects of life, which have an impact on how a person behaves [24]. Nutritional intake greatly determines the health of pregnant women and the fetus they are carrying. Nutritional needs during pregnancy will increase by 15% compared to the needs of normal women. This increase in nutrition is needed for the growth of the uterus, breasts (mamae), blood volume, placenta, water needs and fetal growth by 40% and the remaining 60% is used for the growth of the mother [25]. Through education or knowledge, every pregnant woman can train her thinking skills so that it is easier to solve the problems faced. The results of this study are also in accordance with the theory that anemia is influenced by poor nutritional status. A woman who experiences poor nutritional status LILA <23.5 cm who loses iron and is anemic [26].

Table 4 shows the relationship between the History of Anemia in Pregnant Women and the Child Nutritional Status. The relationship between the condition of pregnant women experiencing anemia and the nutritional status of children was obtained from the results of the analysis using Chi-square, it was found that there was a relationship between pregnant women experiencing anemia and the nutritional status of children $p = 0.001$, ($p < 0.05$). Based on Mutiarasari 2019 [5], the Hb level required for pregnant women during pregnancy is $> 12\text{g} / \text{dL} - 15\text{g} / \text{dL}$. The results of the study showed that 10 pregnant women with Hb levels ≤ 12 provided good nutritional status for their children. Meanwhile, in the condition of pregnant women with Hb levels ≤ 12 , it caused a nutritional status of children with underweight conditions of 2 children with normal and overweight conditions, underweight conditions of 2 children, stunting conditions of 6 children, and underweight conditions accompanied by stunting of 1 child.

Table 4. Relationship between history of anemia in pregnant women and child nutritional status

Child Nutritional Status	Mother's Hb history		Total	P-Value
	≤ 12	> 12		
Normal and Overweight	2	18	20	0.001
Underweight dan Stunting	8	2	10	
Total	10	20	30	

[27] The increase in blood volume begins in the first trimester by 15% compared to the pre-pregnancy condition. Then there will be a very rapid increase in the second trimester. During pregnancy, 1000 mg of iron is needed. As much as 300 mg of iron will be actively sent to the fetus and placenta [25]. In general, there are three causes of iron deficiency anemia in pregnant women, namely, low iron (Fe) reserves in women during menstruation and previous childbirth, lack of iron intake from food consumed, and disturbed eating patterns in pregnant women due to nausea felt during pregnancy [28]. Physiological needs that occur during pregnancy will increase along with increasing gestational age, if this condition is not balanced with adequate iron consumption, it can cause anemia in pregnant women. Anemia that occurs during pregnancy causes the flow of iron and oxygen to the fetus to decrease. Iron is a micro component that plays a role in the formation of hemoglobin which functions as a carrier of oxygen throughout the body. The small flow of iron causes the fetal body's metabolic process to not be carried out perfectly. The metabolic process is needed to obtain bone mineral density during fetal growth which begins in the 1-13th week of pregnancy/first trimester [29]. Iron deficiency during this period will increase the risk of prematurity, low birth weight (LBW), and low birth length [30]

Table 5 shows that the observed variable is Exclusive Breastfeeding while the observed independent variable is the child's nutritional status. The results of the analysis show that the p-value = 0.001 (p-value <0.05) which statistically means that there is a relationship between the history of Exclusive Breastfeeding and the child's nutritional status.

Table 5. Relationship between exclusive breastfeeding history and child nutritional status

Child Nutritional Status	Exclusive Breastfeeding		Total	P-Value
	≤ 12	> 12		
Normal and Overweight	20	2	22	0.001
Underweight dan Stunting	2	6	8	
Total	22	8	30	

Exclusive breastfeeding provision while the independent variable observed is the child's nutritional status. The results of the analysis show that the p value = 0.001 which statistically means that there is a relationship between the history of exclusive

breastfeeding and the child's nutritional status. This is in line with the research conducted by Syahlis Irwandi entitled "The Relationship between Exclusive Breastfeeding and Stunting at the Hinai Kiri Health Center, Secanggang District, Langkat Regency" obtained a p value of 0.001 which means that there is a relationship between exclusive breastfeeding and nutritional status. Stunting is caused by multidimensional factors and is not only caused by poor nutrition experienced by pregnant women or toddlers. Several factors that cause stunting can be described, namely the situation of the mother/prospective mother, the situation of the toddler, the socio-economic situation and the sanitation situation and access to drinking water [31]. Breast milk is milk produced by the mother and contains all the nutrients needed by the child for the child's growth and development needs [32]. Exclusive breastfeeding is when the child is only given breast milk, without additional fluids such as formula milk, orange juice, honey, tea, water and without additional solid foods such as bananas, papaya, milk porridge, biscuits, rice porridge and porridge, for 6 months. Children who receive exclusive breastfeeding are children who only receive breast milk so that no other fluids or solids are given, even water with the exception of oral rehydration, or vitamin drops/syrups, minerals or medicines. The United Nation Children's Fund (UNICEF) and the World Health Organization (WHO) recommend that children should only be breastfed for at least six months. Solid foods should be given after the child is 6 months old, and breastfeeding should be continued until the child is two years old [33].

The results of the study also showed that there were toddlers who were exclusively breastfed and experienced stunting as many as 1 (3.3%) respondents. Stunting is caused by multidimensional factors and is not only caused by poor nutrition experienced by pregnant women or toddlers. Several factors that cause stunting can be described as the situation of the mother/prospective mother, the situation of the toddler, the socio-economic situation and the sanitation situation and access to drinking water [34]. One factor in the situation of toddlers is LBW, namely a baby's birth weight of less than 2500 grams. LBW is closely related to fetal mortality and morbidity. This condition can inhibit growth and cognitive development, vulnerability to chronic diseases in the future [35].

Table 6 shows data that there are 22 mothers whose nutritional needs are met and 8 mothers whose nutrition is not met. Chi-square analysis revealed a significant association ($p = 0.001$); thus the relationship between maternal nutritional needs and child nutritional status is significant. These results show a relationship between maternal nutritional needs and the incidence of child nutritional status.

Table 6. Relationship between maternal dietary history and child nutritional status

Child Nutritional Status	Nutritional Needs		Total	P-Value
	Fulfilled	Not Fulfilled		
Normal and Overweight	21	1	22	0.001
Underweight dan Stunting	1	7	8	
Total	22	8	30	

The measurement of children's nutritional status aims to assess the nutritional status of children and predict long-term infant health [36]. Body weight and height are one of the predictors for determining the nutritional status of children as normal, underweight, overweight or stunted [37]. As an indicator of nutritional status, body weight provides a picture of the current state which can increase and decrease every day. Body weight is very easily affected by sudden conditions such as food and drink consumption, excretion of metabolic substances and disease [38]. Many factors affect the birth weight of babies, one of which is the nutritional status of pregnant women, which determines the intake obtained by the baby in the womb. Adequate nutritional status before pregnancy can be assessed using the Body Mass Index (BMI). Nutritional status before and during pregnancy has a major effect on the intake and growth of the fetus in the womb. The fetus' nutritional needs occur very rapidly in the third trimester where fetal cellular hypertrophy begins, if the mother's nutrition intake is lacking, it can affect the outcome of the baby's weight. Women who have unmet nutritional status or are classified as thin during pregnancy are at risk of giving birth to babies with low birth weight [39].

Conclusion

This study highlights the multifactorial relationship between maternal health factors—namely antenatal care (ANC) history, maternal anemia, exclusive breastfeeding practices, and maternal dietary patterns—and the nutritional status of children aged 2–5 years. In line with the adapted UNICEF conceptual framework, the findings affirm that child nutrition is not the result of isolated variables but rather a product of intersecting biological, behavioral, and social determinants rooted in maternal conditions and caregiving practices. The observed associations underscore the critical role of integrated maternal health interventions that span the prenatal to postnatal continuum. Poor ANC attendance, maternal anemia, suboptimal breastfeeding, and inadequate maternal diets were all found to significantly contribute to the risk of undernutrition in early childhood. These findings are consistent with WHO and Indonesian government priorities that advocate for a life-course approach to maternal and child health, particularly within the first 1,000 days and extending beyond.

Conflict of Interest

The authors declare that there is no conflict of interest.

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