THE RELATIONSHIP OF ANTENATAL CARE FREQUENCY AND INCIDENTS OF STUNTING IN TODDLERS IN INDONESIA (ADVANCED ANALYSIS OF RISKESDAS 2018)

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ABSTRACT

Stunting is a growth disorder in children which is measured by the child's height which is indicated by a z-score below -2 SD of the growth standard according to WHO. One of the risk factors that can cause stunting is the frequency of antenatal check-ups. Antenatal examination (ANC) is a health service provided to pregnant women, by the provisions of Minister of Health Regulation Number 97 of 2014. The 2018 Riskesdas data obtained from 34 provinces, 416 regencies, and 98 cities in Indonesia was used in this study. It was then further processed by the authors at the Faculty of Medicine, Christian University of Indonesia, in July 2024. This study further analyzes the 2018 Basic Health Research (Riskesdas) data. A cross-sectional method was used in this study, considering the data collection of research variables obtained at a specific point in time, by Riskesdas. Diagnostic testing was then used to determine whether there is a relationship between the frequency of antenatal care visits and the incidence of stunting in toddlers in Indonesia. Based on this study, 49,283 pregnant women underwent antenatal check-ups according to the criteria, while 6,206 did not meet the criteria. Among toddlers, 15,192 children experienced stunting, while 40,297 did not. The chi-square test results showed a p-value of <0.001, which is less than 0.05, indicating that, statistically, there is a significant relationship between the frequency of antenatal check-ups during pregnancy and the occurrence of stunting in toddlers. Based on data processing and discussion, this study concludes that there is a relationship between the frequency of antenatal care (ANC) visits by pregnant women and the occurrence of stunting in toddlers, with a p-value of <0.001 and an odds ratio of 0.826. This p-value indicates a strong relationship between the frequency or number of antenatal visits and the occurrence of stunting. This means that the likelihood of stunting occurring is 0.826 times higher compared to those who undergo antenatal check-ups according to the standard.

Keywords: antenatal care; stunting; toddlers

INTRODUCTION

A person is considered stunted if their height or length is significantly shorter compared to others of the same age. Stunting in children is determined by their height score, which, if below -2 SD from the growth standard set by WHO, is classified as stunted (De Onis et al., 2013). In Indonesia, stunting remains one of the major nutritional problems among toddlers that has yet to be fully addressed. Data from the Basic Health Research (Riskesdas) showed that the prevalence of toddlers (children under five) with short and very short stature was 37.2% in 2013, then decreased by 6.4% to 30.8% in 2018. For infants under two years old (baduta), the prevalence in 2013 was 32.8% and also declined by 2.9% to 29.9% in 2018. Another national survey in 2019, conducted by the Indonesian Nutrition Status Study (SSGI), reported a stunting rate of 27.7%, which further declined to 24.4% in 2021. According to WHO, in 2012, Indonesia's stunting rate was still considered high at 39.2% (>20%), placing Indonesia among the countries with the highest stunting burden in the world (De Onis et al.,

2013) The frequency of antenatal care (ANC) is one of the factors that can contribute to stunting. ANC is a healthcare service that must be provided to pregnant women, as stated in the Regulation of the Minister of Health Number 97 of 2014 ((Hartiningrum & Fitriyah, 2019).

This service is provided by medical professionals such as obstetricians, general practitioners, midwives, and nurses. The first ANC visit, regardless of when it takes place, is referred to as K1. Standard ANC, or K4, requires a minimum of four visits throughout pregnancy: one visit in the first trimester, one in the second trimester, and two visits in the third trimester. The purpose of antenatal care (ANC) is to detect diseases or issues experienced by pregnant women early and provide timely interventions. ANC includes various services such as weight and height measurements, blood pressure monitoring, nutritional status evaluation, health screening, measurement of uterine fundal height, provision of iron supplementation (TTD), tetanus toxoid (TT) immunization, laboratory tests, case management, and health education counseling. These services include providing knowledge about health, nutrition fulfillment, physical and mental readiness during pregnancy, and proper postnatal care, which can support optimal child growth and development. Therefore, ANC visits can equip pregnant women with adequate knowledge from pregnancy to childbirth, ultimately helping to prevent stunting in their children (Ketut Suarayasa, 2021).

According to research conducted by Camelia, Maulina, Hutasoit, and Hamid, pregnant women who do not undergo ANC examinations according to the standard are at a higher risk of giving birth to children with stunting compared to those who comply with ANC standards (Camelia, 2020; Hamid et al., 2021) ANC visits serve as a preventive measure to avoid severe preeclampsia, Chronic Energy Deficiency (CED), and iron deficiency anemia, as well as to prevent low birth weight (LBW) and protect newborns from toxoplasmosis/tetanus infections, which can lead to stunting (Ramadhini et al., 2021) Failure to follow the recommended ANC visits can result in health issues for pregnant women, affecting both their well-being and that of their unborn child, including an increased risk of stunting (Maulina & Rachmayanti, 2021) According to the 2018 Riskesdas results, the coverage of standard ANC visits (K4) across Indonesia remains low, reaching only 74.1%. This figure is still below the target set in Indonesia's 2018 Strategic Plan (Renstra), which is 78%. The lowest coverage is found in eastern Indonesia (the Nusa Tenggara Islands, Sulawesi, Maluku, and Papua), where the percentage of standard antenatal check-ups ranges only between 40% and 60%. Considering the low coverage of ANC services, the still high stunting rates, and the fact that the frequency of ANC visits has been identified as a risk factor for stunting in previous studies, the authors are interested in investigating the relationship between the frequency of antenatal care and the occurrence of stunting in Indonesia. It is hoped that fulfilling the healthcare needs of pregnant women will contribute to an optimal reduction in stunting rates. Based on the background, Based on the background above, the problem formulation in this research is how the frequency of antenatal care is related to the incidence of stunting in Indonesia in 2018. This research aims to analyze the relationship between the frequency of prenatal care and the incidence of stunting in Indonesia.

METHOD
Research Design
This study further analyzes the 2018 Basic Health Research (Riskesdas) data. A cross-sectional method was used in this study, considering the collection of research variable data obtained at a specific point in time, by Riskesdas. Diagnostic testing was then used to determine whether there is a relationship between the frequency of antenatal care visits and the occurrence of stunting in toddlers in Indonesia.

Research Location and Time
The 2018 Riskesdas data, obtained from 34 provinces, 416 regencies, and 98 cities in Indonesia, was used in this study. It was then further processed by the authors at the Faculty of Medicine

Population and Sample
The population in this study includes all households in Indonesia. This study used data from mothers who had given birth, whether live births, stillbirths, or miscarriages, within the period from January 1, 2013, until the interview for the 2018 Riskesdas, totaling 80,648 individuals. The sample used consisted of data that met the inclusion criteria and was selected using a total sampling technique, resulting in a final sample size of 55,489 individuals.

Inclusion and Exclusion Criteria
Inclusion Criteria
1. Pregnant women who receive antenatal care from healthcare professionals.
2. Children aged 0-59 months, whether stunted or not.

Exclusion Criteria
1. Pregnant women who have never received antenatal care from healthcare professionals.
2. Children older than 59 months, whether stunted or not.

Research Variables
The variables studied are the frequency of antenatal care performed by pregnant women, including the number of check-ups and gestational age at the time of examination (RKD18.IND.J16), as well as the length/height of toddlers (RKD18.IND.L01).

Data Analysis Method
The data was collected following the methodology of the 2018 Basic Health Research (Riskesdas), using interview techniques, examinations, and follow-ups conducted by Riskesdas. Before processing the data, a data request was first submitted to the Health Development Policy Agency of the Ministry of Health of the Republic of Indonesia. The submission included a form containing the variable names and variable codes selected based on the 2018 Riskesdas questionnaire, by the needs of this study. Next, a univariate analysis is conducted to obtain the distribution and percentage of each previously collected variable. The results of this univariate analysis are presented in frequency distribution tables based on the research variables. The variable data includes the number of ANC visits and stunting. The calculation of stunting itself is performed using the WHO Anthro Survey Analyzer. The independent and dependent variables are then analyzed using bivariate analysis. The relationship between the two variables is examined using the chi-square test and odds ratio through the SPSS (Statistical Package for the Social Sciences) application.

RESULT
Distribution of Respondents' Demographic Characteristics
The sample in this study consists of 55,489 respondents, with characteristics including maternal age, maternal education level, and maternal occupation. Table 1 presents the distribution of maternal age, showing that the highest number of pregnant women were aged 30-34 years, totaling 15,341 mothers (27.6%), followed by those aged 25-29 years with 14,087 mothers (25.4%), 35-39 years with 11,643 mothers (21%), 20-24 years with 7,725 mothers (13.9%), 40-44 years with 4,731 mothers (8.5%), 15-19 years with 951 mothers (1.7%), 45-49 years with 925 mothers (1.7%), 50 years and above with 75 mothers (0.1%), and the lowest number in the under 15 years category, with 11 mothers (0%).

Table 1.
Distribution of Pregnant Women's Identity (n=55.489)

Variable	f	%
Age (year)		
<15	11	0
15 – 19	951	1,7
20 – 24	7.725	13,9
25 – 29	14.087	25,4
30 – 34	15.341	27,6
35 – 39	11.643	21,0
40 – 44	4.731	8,5
45 – 49	925	1,7
>50	75	0,1
Education Level		
Never attended school	831	1,5
Did not complete elementary school (SD/MI)	3.320	6,0
Completed elementary school (SD/MI)	10.949	19,7
Completed junior high school (SLTP/MTs)	13.114	23,6
Completed senior high school (SLTA/MA)	18.631	33,6
Completed diploma (D1/D2/D3)	3.263	5,9
Completed higher education (university)	5.381	9,7
Job		
Unemployed	30.211	54,4
Student	322	0,6
Civil servant/military/police/State-Owned Enterprise (BUMN)/Regional-Owned Enterprise (BUMD)	2.528	4,6
Private sector employee	4.028	7,3
Entrepreneur	5.465	9,8
Farmer/farm laborer	5.846	10,5
Fisherman	85	0,2
Laborer/driver/domestic workers	1.614	2,9
Others	5.390	9,7

Furthermore, the table also categorizes respondents based on their education level, with the highest number of mothers having completed senior high school (SLTA/MA or equivalent), totaling 18,631 mothers (33.6%). This is followed by those who completed junior high school (SLTP/MTs or equivalent) with 13,114 mothers (23.6%), elementary school (SD/MI or equivalent) with 10,949 mothers (19.7%), higher education with 5,381 mothers (9.7%), those who did not complete elementary school (SD/MI or equivalent) with 3,320 mothers (6%), completed diploma (D1/D2/D3) with 3,263 mothers (5.9%), and the lowest number being mothers who never attended school, totaling 831 mothers (1.5%). Regarding respondents' occupations, the majority of mothers were unemployed, totaling 30,211 mothers (54.4%). This is followed by farmers/farm laborers with 5,846 mothers (10.5%), entrepreneurs with 5,465 mothers (9.8%), other occupations with 5,390 mothers (9.7%), private sector employees with 4,028 mothers (7.3%), civil servants with 2,528 mothers (4.6%), laborers/drivers/domestic workers with 1,614 mothers (2.9%), students with 322 mothers (0.6%), and the lowest number being fishermen, totaling 85 mothers (0.2%).

Table 2.
Distribution of Toddler Identity (n=55.489)

Variable	f	%
Age (Month)		
0 - 23	25.448	45,9
24 - 59	30.041	54,1
Gender		
Male	28.697	51,7
Female	26.792	48,3

Table 2 presents the characteristics of toddlers based on age and gender. Among the toddlers, the majority are aged 24-59 months (54.1%), while 25,448 children (45.9%) are aged 0-23 months. In terms of gender, the majority are male, totaling 28,697 children (51.7%), while female children total 26,792 (48.3%).

Description of ANC Frequency among Respondents

Table 3.
ANC Frequency Distribution of Pregnant Women (n=55.489)

Variable	f	%
ANC frequency		
Not according to the criteria	6.206	11,2
According to Criteria	49.283	88,8

Table 3.3 shows that 6,206 respondents (11.2%) had their pregnancy checked only once, regardless of gestational age at the time of examination. Meanwhile, 49,283 respondents (88.8%) had their pregnancy checked according to the standard up to K4, which includes **one** examination in the first and second trimesters and two examinations in the third trimester

Description of Stunting Incidents in Toddlers

Table 4.
Distribution of Stunting Incidents in Toddlers (n=55.489)

Variable	f	%
Incidence of Stunting in Toddlers		
Stunting	15.192	27,4
Not Stunting	40.297	72,6

Table 4 shows that based on the Z-score index for length-for-age (PB/U) or height-for-age (TB/U), 15,192 children (27.4%) were classified as stunted, while 40,297 children (72.6%) were classified as not stunted.

ANC Frequency Distribution Based on Demographic Characteristics of Respondents
The analysis results in Table 5 show that the characteristic of mothers who most frequently underwent examinations that did not meet the criteria were those aged 30-34 years, totaling 1,711 mothers. Then, in terms of education level, the highest number of mothers who did not undergo examinations according to the criteria were those who graduated from senior high school (SLTA/MA or equivalent), totaling 1,967 mothers. Lastly, the highest number of mothers who did not undergo examinations according to the criteria were those who were unemployed, totaling 3,332 mothers.

Table 5.
Distribution of Maternal ANC Frequency Based on Demographic Characteristics

Variable	ANC		Frequency	P value
	Does not meet the criteria	According to Criteria	(n=55.489)	
Age (tahun)				
<15	1	10	11	
15 – 19	121	830	951	
20 – 24	902	6.823	7.725	
25 – 29	1.525	12.562	14.087	0,270
30 – 34	1.711	13.630	15.341	
35 – 39	1.283	10.360	11.643	
40 – 44	533	4.198	4.731	
45 – 49	119	806	925	
>50	11	64	75	

| Variable | ANC | | Frequency | P value |
	Does not meet the criteria	According to Criteria	(n=55.489)	
Tingkat Pendidikan				
Never attended school	147	684	831	
Did not complete elementary school (SD/MI)	467	2.853	3.320	
Completed elementary school (SD/MI)	1.366	9.583	10.949	<0,001
Completed junior high school (SLTP/MTs)	1.450	11.664	13.114	
Completed senior high school (SLTA/MA)	1.967	16.664	18.631	
Completed diploma (D1/D2/D3)	313	2.950	3.263	
Completed higher education (university)	496	4.885	5.381	
Job				
Unemployed	3.332	26.879	30.211	
Student	46	276	322	
Civil servant/military/police/State-Owned Enterprise (BUMN)/Regional-Owned Enterprise (BUMD)	242	2.286	2.528	
Private sector employee	310	3.718	4.028	<0,001
Entrepreneur	516	4.949	5.465	
Farmer/farm laborer	926	4.920	5.846	
Fisherman	16	69	85	
Laborer/driver/domestic workers	153	1.461	1.614	
Others	665	4.725	5.390	

Distribution of Stunting Incidents Based on Demographic Characteristics of Respondents

Table 6.
Stunting Frequency Distribution Based on Demographic Characteristics

| Variable | Stunting | | Frequency | P value |
	Yes	No	(n=55.489)	
Age (Month)				
0 – 23	6.027	19.421	25.448	<0,001
24 – 59	9.165	20.876	30.041	
Gender				
Male	8.236	20.461	28.697	<0,001
Female	6.956	19.836	26.792	

The analysis results in Table 3.6 show that the characteristic of toddlers who most frequently experienced stunting were those aged 24-59 months, totaling 9,165 children. Then, in terms of gender, the highest number of children experiencing stunting were male toddlers, totaling 8,236 children.

Analysis of the Relationship between ANC Frequency and Stunting Incidents in Toddlers

Table 7.
Analysis of the Relationship between ANC Frequency and Stunting Incidents

| | Incidence of Stunting in Toddlers | | | | | | | | |
| ANC frequency | Stunting | | Not Stunting | | Total | | P Value | OR | 95% CI |
	f	%	f	%	f	%			
Does not meet the criteria	1.916	3,5	4.290	7,7	76.093	100	<0,001	0,826	0,779-0,874
According to Criteria	13.276	23,9	36.007	64,9	52.475	100			

Based on table 7, the analysis shows that stunting occurs more frequently in toddlers whose mothers followed the standard examination, totaling 13,276 children (23.9%), compared to mothers who underwent examinations that did not meet the standard, totaling 1,916 children (3.5%). Based on the Chi-square test results, a p-value of <0.001 (p-value <0.05) was obtained, indicating a statistically significant relationship between ANC frequency and stunting in toddlers. Furthermore, a correlation test using the odds ratio was conducted, resulting in an OR value of 0.826. This means that mothers who did not undergo antenatal examinations according to the criteria had 0.826 times the risk of having a stunted child, with a 95% confidence interval (CI) of 0.779 – 0.874. This suggests that in the general population, there is a 95% confidence level that not following the standard examination may result in a child experiencing stunting within a range of 0.779 – 0.874 times.

DISCUSSION
The relationship between the frequency of Antenatal Care (ANC) visits and the occurrence of stunting in toddlers can be examined from various aspects based on the research findings. From the obtained data, the demographic characteristics of mothers show that the majority of pregnant mothers were aged between 30-34 years (27.6%) and 25 to 29 years (25.4%). This age group represents a productive group that is expected to have good knowledge and compliance regarding ANC visits (Notoatmodjo, 2012) However, this study did not find a significant relationship between maternal age and the frequency of antenatal examinations they underwent.

The level of maternal education is also important for their understanding and compliance with the ANC program, and this relationship was found in this study (Sari et al., 2023) The majority of respondents had an education level up to senior high school (SLTA/MA) at 33.6%, indicating that higher education levels can increase awareness of the importance of ANC visits during pregnancy, as it can impact stunting prevention (Dusingizimana et al., 2023) Furthermore, in terms of employment, the majority of mothers in this study were unemployed, accounting for 54.4% (Kumbeni et al., 2021) This finding aligns with studies conducted by Savita and Ruislinawati et al., which found a relationship between maternal employment and ANC visits, where a person's job status can influence how easily they receive or access health information, including the behavior of undergoing ANC examinations (Amelia, 2020; Ruslinawati, 2022)

The results of this study show that the majority of pregnant mothers (88.8%) have attended ANC visits according to the standard, while 11.2% did not meet the standard. ANC visits are influenced by several factors, including maternal education level, maternal employment, husband's support, accessibility of healthcare services, and the attitudes of both the mother and healthcare providers (Islam & Masud, 2018; Putri et al., 2024). If ANC visits are of poor quality, the risk of stunting in children increases, as standard ANC visits include comprehensive examinations of the mother's and fetus's condition, proper nutritional education, and necessary medical interventions to prevent complications during pregnancy and childbirth (Lattof et al., 2020). Therefore, adherence to the ANC visit schedule is essential to ensure the health of both the mother and her child. The distribution of stunting cases in toddlers shows that 27.4% of children experience stunting, while 72.6% do not. This data indicates a still-high prevalence of stunting, although there has been a decline compared to previous data from the Basic Health Research (Riskesdas), which reported that the prevalence of stunted toddlers in Indonesia was 37.2% in 2013. In this study, stunting was more prevalent among children aged 24-59 months, totaling 9,165 children. This finding aligns with a study conducted by Hatijar, which showed that the majority of stunted children fall within this age group because, as children grow older, their nutritional needs increase

(Hatijar, 2023). Furthermore, the study results indicate that stunting is more common in male children, with 8,236 cases. This finding is similar to a study by Sovia et al. at the Kotabunan Health Center, which showed that the majority of stunted children were boys. This may be due to differences in nutritional needs between boys and girls, as well as socioeconomic factors that affect access to adequate nutrition (Krisnana et al., 2020; Sovia Madi et al., 2023) These nutritional differences may be attributed to biological factors, as boys generally require additional energy and nutrients compared to girls. Additionally, in some cultures, nutritious food may be prioritized for boys over girls, which could be one of the reasons for the higher stunting rates among boys (Merkiel-Pawłowska & Chalcarz, 2017)

Standardized ANC visits help in the early detection of pregnancy-related issues and enable prompt interventions to prevent stunting. Standardized visits include various examinations such as monitoring height, weight, blood pressure, fundal height measurement, laboratory tests, and the provision of iron and folic acid supplements. All these interventions aim to ensure that pregnant mothers receive optimal care, ultimately leading to the birth of healthy babies (Kusuma Rahayu et al., 2019). This highlights the importance of a comprehensive and high-quality ANC program in preventing stunting. The analysis of the relationship between ANC frequency and stunting incidence statistically shows a significant association with a p-value of <0.001. The study results indicate that mothers who attended ANC visits according to the standard were 0.826 times more likely to have non-stunted children compared to those who did not follow ANC standards (Hapsari et al., 2022; Walimah & Rahma, 2022) Previous studies by Cameilia, Maulina, Hutasoit, and Hamid also found a strong relationship between the quantity or frequency of ANC visits and stunting incidence, where fewer ANC visits increased the likelihood of a mother having a stunted child.

Additionally, feeding patterns and education levels also play a role in stunting incidence. A study conducted by Apriani found that feeding patterns were significantly associated with stunting, whereas education level was not. Inadequate dietary patterns and a lack of nutritional knowledge can lead to chronic malnutrition in children, impacting their physical and cognitive development. Apriani's study also showed that other factors such as environmental hygiene, access to healthcare services, and socioeconomic support also influence stunting incidence (Susmita Sari et al., 2022) Research by Sari et al. in West Lombok indicated that environmental cleanliness and low family income were also associated with stunting. Therefore, various other approaches are needed to address stunting effectively (Sari et al., 2023). Stunting is a long-term nutritional issue that affects children's physical growth, cognitive balance, and future health. Stunted children are more vulnerable to delayed growth, chronic health problems, and reduced learning ability (Banjarmasin & Asuh, 2021)Therefore, preventing stunting should be a primary focus of maternal and child health programs. A high-quality and standardized ANC program is one of the most effective ways to prevent stunting by ensuring that pregnant mothers receive optimal care and education on the importance of adequate nutrition during pregnancy."

CONCLUSION
Based on data analysis and discussion, this study concludes that there is a relationship between the frequency of ANC visits by pregnant mothers and the incidence of stunting in toddlers, with a p-value of <0.001 and an odds ratio of 0.826. This p-value indicates a strong association between the frequency or number of antenatal visits and the occurrence of stunting. This means that the likelihood of stunting is 0.826 times higher among those who do not undergo standard pregnancy examinations compared to those who follow the recommended ANC guidelines

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