Original Research

The correlations between the determinants of women's health during pregnancy to the incidence of stunting

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ARTICLE INFO	ABSTRACT
	Background: WHO's target of reducing stunting below 20% has not been achieved in Indonesia, especially in Banjar Regency with a prevalence of 33.45%. Lok Buntar village became the locus of stunting, where 38.7% of the 116 children under five were stunted with several determining factors including age at pregnancy, woman's height, birth spacing, nutritional status, and anemia. *Objective*: This study aims to determine the relationship between the determinants of maternal health during pregnancy to the incidence of stunting in Lok Buntar Village, Banjar Regency. *Method*: This type of observational analytic research with a retrospective design case-control approach. The total sample of 90 pregnant women consisted of 45 cases and 45 controls was taken by random sampling technique. Secondary data collection instruments used were checklists, cohorts of mothers and toddlers, and MCH books. *Results*: The findings show that the age of the women during pregnancy is 84.0% at risk between 20 to 35 years, p-value 0.000. The spacing of births within two years was 70.4%, while the spacing of more than two years was 41.3%, p-value of 0.021. Respondents who have a height below 150 cm are 68.6%, with a p-value of 0.009. The nutritional status of pregnant women experiencing caloric energy deficiency has 84.2%, p-value of 0.002. Meanwhile, anemia and the risk of stunting were 89.7%, p-value of 0.000. *Conclusion*: The determinants of women's health during pregnancy have significant correlations with the incidence of stunting.

1. Introduction

Malnutrition slows down the process of growth and development in children. Children who have growth and development problems have a level of intelligence that is not optimal

and are susceptible to disease so they risk reducing productivity and limiting the future economic development of a country (Hanifah et al., 2019). This main issue, both globally and in Indonesia, stunting is increasingly complex and crucial, especially in poor and developing countries, where 178 million children under five years are stunted and this begins in the first 1000 days of life. Stunting is a chronic malnutrition problem due to a lack of nutritional intake or provision of food without meeting basic nutritional needs (Aryastami, 2017; Black et al., 1990). Stunting or termed as short stature or is used for children with a height size below the average (<-2SD) of gender, chronological age, and ideally from the same racial-ethnic group (Phillips et al., 2013) . And, one of the impacts of malnutrition is stunting and wasting in toddlers as well as anemia and chronic energy deficiency (CED) problems in pregnant women.

The results of the Indonesian Toddler Nutrition Status Survey (SSGBI), show a decreased prevalence of stunting from 30.8% in 2018 to 27.67% in 2019, in 2020 to 26.92%, and in 2021 24.4%. However, the stunting rate in Indonesia is still above 20%, not reaching the WHO target of below 20% and the World Health Assembly (WHA) target to reduce the prevalence of stunting by 40% by 2025 (Kemenkes RI, 2019; UNICEF, 2020). This figure shows that stunting cases are still high than the national target, while for the Province of South Kalimantan, it is relatively high, namely 33.2%. According to the Riskesdas results, prevalence of stunting in Banjar Regency is 33.45% consisting of 20.23% short toddlers and 13.22% very short toddlers (Widyawati, 2021).

As for the coverage data from twelve villages in the Puskesmas (Village Health Center) Sungai Tabuk 1, the number of toddlers experiencing stunting was 454 toddlers (11%) of the total number of toddlers 4,331. This figure makes the Puskesmas Sungai Tabuk 1 third place out of 25 with stunting focus locations health centers in Banjar Regency (Kalsel, n.d.). Lok Buntar is the village with the highest prevalence of stunting. Of the 116 toddlers who were measured, 45 toddlers (38.7%) experienced stunting. Several factors from the mother that have an influence are the short mother's height, very close birth spacing, the young or old age of the mother during pregnancy, and inadequate consumption of nutrients during pregnancy.

Therefore, the government has a challenge to reduce the stunting rate that occurs in Indonesia and has established priorities for collaboration between sectors and multi-stakeholders in dealing with stunting, one of which is to remain focused on health and nutrition services in the first 1000 days of life (Berawi, 2021; Sekretariat Wakil Presiden

Republik Indonesia, 2019). Based on these reasons, we aim to determine the correlations between the determinants of women's health during pregnancy to the incidence of stunting in Lok Buntar village, Banjar Regency.

2. Method

The type of research used is analytic observational with a retrospective case-control approach design, to compare between the case group and the control group by assessing the causes or influencing variables at one time. The population includes all toddlers in Lok Buntar village in December 2022 totaling 116 people. The total sample of 90 pregnant women consisted of 45 cases and 45 controls taken by random sampling technique. The data collection instrument used was a checklist, with secondary data in the form of mother and toddler cohorts, as well as the MCH handbook. The Chi-Square ($X2$) cross-tabulation analysis method was used to examine the correlation between variables in the association contingency table.

3. Results

Univariate Analysis

The univariate analysis contains determinants of maternal health including age during pregnancy, birth spacing, height, nutritional status, anemia, and incidence of stunting, which are shown in Table 1. The five determinants of maternal health, all the highest frequencies are in the good and normal categories. The highest frequency of pregnancy was the non-risk category or 20-35 years (72.2%). The highest category of birth spacing is > two years or far (70.0%). Most heights (61.1%) in the category > 145 cm and < 145 cm (38.9%). For nutritional status, the category is not CED anemic (72.2%). Then the number of samples of stunting cases (50%) and the control samples were not stunted (50%).

Table 1. Frequency Distribution of Women's Age during Pregnancy, Gestation Interval, Height, and Nutritional Status, Anemia and Incidence of Stunting

Frequency Distribution of Age during Pregnancy and Height					
Category	Frequency		Category	Frequency	
Age at Pregnancy	n	%	Height	n	%
Risk	25	27,8	< 145 cm (short)	35	38,9
No Risk	65	72,2	> 145 cm (tall)	55	61,1
Total	90	100,0	Total	90	100,0
Frequency Distribution of Birth Spacing and Nutritional Status					
Birth Spacing	n	%	Nutritional Status	n	%
< Two years (short)	27	30,0	CED	19	21,1
> Two years (far)	63	70,0	No CED	71	78,9
Total	90	100,0	Total	90	100,0
Frequency Distribution of Anemia and Incidence of Stunting					
Anemia	n	%	Incidence of Stunting	n	%
Yes	25	27,8	Yes	45	50
Not	65	72,2	Not	45	50
Total	90	100,0	Total	90	100,0

Note: CED: caloric energy deficiency

Bivariate Analysis

Based on the data shown in Table 2, overall that the Chi-square test conditions are met, seen from the value of the continuity correction requirements table (2x2), there is no expected value smaller than 5, the smallest expected value is 9.50 and the largest is 17.50. It can be seen from the results of the Chi-square test that all p-values were <0.05, and the calculated χ^2 value was > 0.05. Thus, the data concluded that the null hypothesis (H0) was rejected and the alternative hypothesis (Ha) was accepted. This means that the five determinants of maternal health which consist of age at pregnancy, gestation interval, height, nutritional status, and anemia have a correlation with the incidence of stunting.

The highest Odd Ratio (OR) value of the five determinants is anemia, which is indicated by the estimated value of 19.158. This means that pregnant women with anemia are 19 times

more at risk of having a child with stunting than those who are not anemic, with a common OR lower bound and upper bound value of 95% CI (5.158 - 71.159). Then the smallest OR value is the gestational interval, which is 3.380 or the birth interval of a child who is less than two years has three times the risk of experiencing stunting compared to the birth interval of more than two years (LB 1.286 - UB 8.884). Then, after anemia, the order of probability of factors that have the potential to experience stunting is age during pregnancy (OR 8.969 95% CI LB 2.750 - UB 29.245), nutritional status (OR 7.724 95% CI LB 2.062 - UB 28.938), and height (OR 3,532 95% CI LB 1,440 - UB 8,665).

Table 2. Crosstab of the age during pregnancy with the incidence of stunting

	Incidence										CI 95 %	
	Stunting		Non-stunting		Total		p-value	X^2_{count}	min expected count	OR	Low	Up
	n=45	%	n=45	%	N=90	%						
Age at pregnancy												
Risk	21	84,0	4	16,0	25	100,0	0,000	14,178	12,50	8,969	2,750	29,24
No Risk	24	36,9	41	63,1	65	100,0						
Birth Spacing												
< Two years	19	70,4	8	29,6	27	100,0	0,021	5,291	13,50	3,380	1,286	8,88
> Two years	26	41,3	37	58,7	63	100,0						
Height												
< 145 cm	24	68,6	11	31,4	35	100,0	0,009	6,732	17,50	3,532	1,440	8,66
> 145 cm	21	38,2	34	61,8	55	100,0						
Nutritional Status												
CED	16	84,2	3	15,8	19	100,0	0,002	9,607	9,50	7,724	2,062	28,93
Normal	29	40,8	42	59,2	71	100,0						
Anemia												
Yes	26	89,7	3	10,3	29	100,0	0,000	24,624	14,50	19,158	5,158	71,15
Not	19	31,1	42	68,9	61	100,0						

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4. Discussions

Condition of women during pregnancy

The highest frequency of the variable age during pregnancy was in the non-risk category or 20-35 years (72.2%), ages <20 and ≥ 35 years were 27.8%. Stunting is influenced by various determinants, both from mother and child factors. Where previous research has assessed several variables and indicators that contribute significantly. And in the form of other studies, it has also explained important aspects of the occurrence of stunting, including parents' education, the woman's age during pregnancy (Santosa et al., 2022; Wemakor et al., 2018), socioeconomic conditions, and nutritional status at pregnancy. According to the theory by Alfarisi et al, (2019), states that pregnant women aged <20 years have blood circulation to the reproductive organs of the cervix and uterus have not reached functional maturity which causes disruption in the process of distribution of nutrients from mother to fetus in the uterus so that the nutritional needs of the fetus are not fulfilled (Alfarisi., R, Nurmalasari, 2019). Meanwhile, pregnant women aged ≥ 35 years begin to appear unbalanced food intake caused by decreased absorption of nutrients, besides that there can also be a decrease in the immune system which results in an increased risk of developing various diseases in these pregnant women. Maternal age partially affects the incidence of short toddlers in Indonesia. Pregnant women in the age group ≤19 have a 1.461 chance (95% CI 1.140–1.872) times higher than mothers in the ≥ 45 group to have very short toddlers (Laksono et al., 2022). Likewise, the study of Syahril et al, (2020); Simbolon, et al, (2021), that children born to pregnant women are at risk of <20 years related to stunting and various obstetric complications and women's health status.

For birth spacing, the highest was at a distance of > 2 years (70%). However, a distance that is too close is also obtained, namely a distance of <2 years (30%), this makes it clear that the condition of the mother's uterus has not fully recovered and the mother's time to breastfeed and care for the baby is decreasing. Meanwhile, height is in the short category (38.9%). As for the high category (61.1%) (Simbolon et al., 2021; Syahril et al., 2020). Where according to Syarif, a child's growth is also influenced by the height of his parents (Syarif, 2022). The gene in the chromosome that carries the short trait causes short parental height to pass this short trait on to their children (Dhingra & Pingali, 2021). The nutritional status of women during pregnancy in this study was mostly in normal nutritional status or those who did not experience CED ≥ 23.5 cm 78.9%. Lack of nutritional status at the beginning of life will have an impact on later life such as stunted fetal growth, LBW, short, small, thin, low immune system and risk of death. For anemia status, 72.2% of pregnant women did not experience anemia with HB > 11 gr/dl. Pregnant women who suffer from anemia are at greater risk of giving birth to LBW babies because anemia can reduce the supply of oxygen to the mother's metabolism resulting in an immature birth process (Jannah, 2023; Syarif, 2022).

Connection between determinants of maternal health to the incidence of stunting

Chi-square statistical test p-value 0.000, that between the age of the mother and the incidence of stunting is concluded to have a significant relation. In women who are younger than 20 years have a higher risk of giving birth to stunting toddlers than mothers who are older than 20 years. Meanwhile, mothers who are older than 35 years also have a higher risk of giving birth to babies who experience stunting than mothers who are younger than 35 years (Yoseph & Beyene, 2020). Subsequent Chi-square finding, the results showed p-value = 0.021, meaning that have a significant relation between the spacing of women's pregnancies and the occurrence of stunting. That short birth intervals (<24 months) are associated with a higher risk of stunting in children compared to longer birth intervals (Finlay et al., 2017; Ramli et al., 2022). Like the study Finlay (2017), and Pimentel (2020), also showed a negative impact on short birth spacing. Chisquare statistical test p-value = 0.009, has a significant relation between maternal height and stunting. The growth and development of children starting from the fetal period is also influenced by the maternal height, this is due to the existence of genetic conditions from the parents which can affect the possibility of children inheriting these genes (Apriningtyas & Kristini, 2019).

Determinants of women health to insidence of stunting (Lathifah et al., 2024)

In this study the results obtained p-value = 0.002. It was concluded that have a significant relation between the nutritional status of pregnant women and the incidence of stunting. A systematic review according to Girard, shows that malnutrition in mothers is closely related to the risk of stunting, and home-made food preparations can be an alternative and solution to increase anthropometric measurements in children and body mass index (BMI) and anemia in womens (Girard et al., 2012). And, in the research data, the results showed a p-value < 0.01 so that it could be concluded that there was a significant relation between womens who had pregnancy and stunting. Maternal hemoglobin level, the results show that children whose womens suffer from anemia are more susceptible to stunting compared to children whose womens do not suffer from anemia (Gete et al., 2020). These results are relevant to the findings which show that maternal and child factors are predictive variables for stunting from moderation analysis, one of which is the study by Santosa et al, whereas the incidence of stunting is directly affected of the maternal health status (t=3.527, P<0.001) with an effect of 30.3%. Factors that have an indirect effect are also significant on stunting (t=4.762, P<0.001) with an effect of 28.2%. Child factors influence the occurrence of stunting (t=5.749, P<0.001) with an effect of 49.8%. Child factors were influenced by maternal factors with an influence of 56.7% (t=10.014, P<0.001) (Santosa et al., 2022).

In terms of height and overall shape especially the function of bone growth, potentially genetically and individuals will follow growth curves determined by rate and timing if conditions are favorable. Then, in general, socioeconomic conditions, maternal nutrition during pregnancy, sick babies, and lack of nutritional intake in infants can be a determining factor for stunting in toddlers, causing difficulties in achieving optimal physical and cognitive development. Insufficient food availability to meet nutritional needs and the emergence of infectious diseases are the most direct and frequent causes of failure to thrive in children under five (Millward, 2017). Furthermore, that the only important priority after giving birth is optimal infant and child feeding practices, starting from exclusive breastfeeding in the first six months to achieve optimal food intake, child development, and prevention of infections and other diseases that inhibit growth and child development. Determinants of household economic status and environmental health include supply of clean water and sanitation for housing, especially the availability and accessibility of safe and healthy food to guarantee and increase food security in households (Titaley et al., 2019).

5. Conclusion

The overall research results show that there is a significant correlation between the determinants of women's health during pregnancy and the incidence of stunting. In these results, we also found that these five factors had the highest frequency levels on the normal condition scale or the no risk category. This can be explained that in the future aspects of limitations will be studied more broadly and in depth regarding all factors including child factors and environmental factors in a comprehensive manner. Then, it is also important to consider the scope of this research target apart from prenatal, also assessing postnatal and childhood aspects, toddlerhood and the health status of adolescent female. In addition, it was found that the odds ratio for risk of stunting which had a greater positive relationship was the woman's age at pregnancy and the incidence of anemia experienced during pregnancy.

6. Conflict of interest

All authors declare no conflict of interest.

7. References

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