



Prevalence and Determinants of Stunting Incidence in Toddlers

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ABSTRACT

The incidence of stunting in children under five is still the main cause of death in children under five in the world because the impact of stunting is not only on health problems but is closely related to the level of intelligence of children. This study aims to determine the prevalence and investigate the determinants of stunting in children under five. This study is quantitative research with a cross-sectional design. The population of this study was all mothers of children under five who visited the Mandrehe Barat Non-Inpatient Puskesmas in 2021, and the research sample was 200 mothers of children under five. Data was collected directly by distributing questionnaires to mothers of children under five. Then, continued with the process of data analysis with the chi-square test and binary logistic regression. The results showed that exclusive breastfeeding ($p = <0.001$; PR = 9.5; 95% CI 6.788-22.948), feeding patterns ($p = <0.001$; PR = 7.6; 95%CI 4.833-12.266), and consumption of vitamin A and zinc during pregnancy ($p = <0.001$; PR = 4.4; 95%CI 3.172-6.043) had a significant effect on the incidence of stunting, but a history of low birth weight ($p = 0.785$; PR = 1.08; 95% CI 0.372-3.306) and history of infectious disease ($p=0.111$; PR=1.5; 95%CI 0.978-2.441) were not significant for the incidence of stunting. Furthermore, the dominant factor in the incidence of stunting shows that toddlers who are stunted are 5.7 times more likely do not to be given exclusive breastfeeding compared to toddlers who are not stunted. Thus, mothers of children under five are expected to take the time to visit health services by bringing their children under five to monitor the growth and development of children such as height and weight according to the child's age.



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ABSTRAK

Kejadian stunting pada anak balita hingga saat ini masih merupakan penyebab utama kematian pada anak balita di dunia, karena dampak stunting bukan hanya pada masalah kesehatan, namun, sangat erat kaitannya pada tingkat kecerdasan anak. Penelitian ini bertujuan untuk mengetahui prevalensi dan menyelidiki determinan kejadian stunting pada balita. Studi ini merupakan penelitian kuantitatif dengan desain cross-sectional. Populasi penelitian ini adalah seluruh ibu balita yang berkunjung di Wilayah Puskesmas Non Rawat Inap Mandrehe Barat Tahun 2021, dan sampel penelitian sebanyak 200 orang ibu balita. Pengumpulan data dilakukan secara langsung dengan menyebarkan kuesioner kepada ibu balita. Kemudian, dilanjutkan dengan proses analisis data dengan uji Chi Square dan regresi logistik biner. Hasil penelitian menunjukkan bahwa pemberian ASI Eksklusif ($p = <0,001$; PR=9,5; 95% CI 6,788-22,948), pola pemberian makan ($p = <0,001$; PR=7,6; 95% CI 4,833-12,266), dan konsumsi vitamin A dan Zinc pada masa kehamilan ($p = <0,001$; PR=4,4; 95% CI 3,172-6,043) berpengaruh signifikan terhadap kejadian stunting, namun riwayat BBLR ($p=0,785$; PR=1,08; 95% CI 0,372-3,306) dan riwayat penyakit infeksi

($p=0,111$; $PR=1,5$; 95% CI 0,978-2,441) tidak signifikan terhadap kejadian stunting. Selanjutnya, faktor dominan terhadap kejadian stunting menunjukkan bahwa balita yang mengalami stunting 5,7 kali kecenderungannya tidak diberi ASI Eksklusif dibanding dengan balita yang tidak mengalami stunting. Dengan demikian, kepada ibu balita diharapkan agar melongkan waktu untuk berkunjung ke tempat pelayanan kesehatan dengan membawa anak balita untuk memantau tumbuh kembang anak seperti tinggi dan berat badan sesuai usia anak.



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INTRODUCTION

Stunting is one of the health problems that can hinder the development of toddlers' growth and will hinder their future life (Hadisuyitno & Riyadi, 2021; Rakotomanana *et al.*, 2016). One of them is the failure to develop linear tissues of the baby's body due to chronic malnutrition and result in a decrease in children's intelligence, the immune system becomes weak, susceptible to disease, and can also cause various negative consequences for the child (Munawir & Wahyuningtiyas, 2018; Rakotomanana *et al.*, 2016). Even stunting is the main cause of death in children under five in the world.

Incidence of stunting globally in 2017 there were as many as 150.8 million or around (22.2%) children under five experiencing stunting, with a focus on poor countries (35.2%) and developing countries (22.4%) (Anggryni *et al.*, 2021). The World Health Organization (WHO) states that in 2014 in Madagascar around (49.2%) children experienced chronic malnutrition and the prevalence of stunting was the highest in the world (*World Health Organization*, 2015). Indonesia's Millennium Challenge Account states that countries in Southeast Asia have a lower prevalence of stunting than Indonesia, such as Thailand (16%), Vietnam (23%), and Myanmar (35%) (Munawir and Wahyuningtiyas, 2018). In Indonesia, based on basic health research, in 2013 (37.2%) the prevalence of stunting in children under five Indonesia was higher than in 2018 (30.8%) (Kemenkes RI, 2018), likewise, the incidence of stunting in North Sumatra in 2013 (42%) was higher than in 2018 (35%) (Kemenkes RI, 2018). There were 4 districts in North Sumatra in 2013 that had a high prevalence of stunting, namely Langkat District (55.48%), Padang Lawas District (54.86%), and North Nias (54.83%) (Lusiatun, Adethia and Sinaga, 2020).

The high prevalence of stunting in an area reflects the low nutritional and health status of children under five in the area (Khan, Zaheer and Safdar, 2019). The direct cause of stunting in children is due to lack of protein-energy intake, while the indirect causes are socio-economic factors, low maternal education, and maternal parenting patterns (Munawir and Wahyuningtiyas, 2018). In addition, pregnancy in adolescent girls under the age of 20 years is more at risk of giving birth to stunted children with baby height <48cm and premature than adult women who are healthy and have the right age at pregnancy (Rahmawati, Pamungkasari and Murti, 2018). Therefore, if this problem is not addressed quickly, it will increase the risk of child death, delays in child development, cannot capture learning well, the high risk of contracting infectious diseases significantly contributes to child morbidity and mortality, and reduces work productivity when they are adults (Martins *et al.*, 2011; Stewart *et al.*, 2013; Black *et al.*, 2013).

Recently, a lot of literature has developed around the theme of preventing stunting in toddlers. Previous studies suggest efforts made to reduce stunting problems by providing education as in Pakistan carried out in hospitals, schools, regional and community settings (Mustufa *et al.*, 2017; Sand *et al.*, 2018). In addition, the promotion of complementary feeding is also carried out to reduce the problem of stunting along with other supporting strategies such as increasing knowledge and helping mothers provide food for children entering the period of complementary feeding (Bhutta *et al.*, 2008). Stunting prevention efforts are also carried out by approaching mothers who are about to have a baby and who already have a baby under 5 years for 1000 days to support good fetal development, normal birth weight, and the baby's height according to the height of other normal babies (Khara & Dolan, 2014; Rakotomanana *et al.*, 2016).

Stunting is a major nutritional problem faced by Indonesia to date. Various previous studies that affect the incidence of stunting in children under five stated that micronutrients such as vitamin A, iron, and zinc are very necessary for the growth and development of children from the time they are in the womb, if there is a shortage of children, there will be a risk of stunting (Nugraheni *et al.*, 2021), the risk is less likely to occur in girls than boys (AOR = 0,69; 0,55-0,88) and (AOR=0,84; 0,72-0,97); ($p < 0,01$) (Rakotomanana *et al.*, 2016) with more than 65% male toddlers under 24 months experiencing stunting (Wanimbo and Wartiningsih, 2020). In addition, almost half (47.8%) of the children were stunted (Semali *et al.*, 2015), with the strongest factor being toddlers who have a history of infectious diseases are 7 times more likely to experience stunting ($p= <0,001$; OR = 7,073; 95%CI 3,174-15,758 (Sutriyawan *et al.*, 2020). Toddlers born with low birth weight babies under 2.5 kg have the potential to experience stunting 3 times compared to those with normal birth weight (OR=2,99; 95%CI 1,44-6,17) (Boylan *et al.*, 2017). Then, the provision of complementary foods for breastfeeding also affects the incidence of stunting in children who are not by the balanced menu of food that must be given (Hien & Hoa, 2009; Sujendran *et al.*, 2015), because in general, mothers only give food in the form of porridge mixed with fish or eggs and very rarely add fiber such as fruit and vegetables (Angkat, 2018). In the Trongsa region of Bhutan, the stunting prevalence rate is relatively high (51.4%) with (21.2%) infants under 6 months not receiving exclusive breastfeeding which is very influential on the growth of the baby, the main reason is that mothers are more concerned with returning to work than breastfeeding (Mawaddah, 2019; Tshering *et al.*, 2018).

Furthermore, although various previous studies have known the factors that influence the incidence of stunting, however investigating the stunting problem is an ongoing

problem because the impact of stunting is not only on health problems, however, it is very closely related to the level of intelligence of children. The phenomenon that occurs in the West Mandrehe Non-Inpatient Puskesmas area, shows that there are still children under five who experience stunting, where, their height is still short and thin from the standard age. Then, from the results of interviews with mothers of toddlers when conducting research, it shows that mothers of toddlers do not get information related to stunting prevention in toddlers so that they do not know the causes and effects of stunting, even some mothers of toddlers still do not consume vitamin A and zinc during pregnancy and do not fully provide exclusive breastfeeding to children under five because they are busy with work as farmers, even though mothers of toddlers have an important role in preventing stunting in toddlers. Therefore, in this study, it is important to explore the problem of stunting in the West Mandrehe Non-Inpatient Puskesmas area to determine the prevalence and investigate the determinants of stunting in children under five.

METHOD

Research Design

This study is a quantitative study with a cross-sectional design, where observations were made only once and measurements were carried out simultaneously at the time of the study to know the prevalence and determinants of stunting in children under five. Furthermore, this research was carried out in the West Mandrehe Non-Inpatient Puskesmas area in May 2021. Then, the variables studied in this study consisted of independent variables which included a history of low birth weight, exclusive breastfeeding, a history of infectious diseases, feeding patterns, and consumption of vitamin A and zinc during pregnancy, then the dependent variable included the incidence of stunting in children under five.

Participant Recruitment

The subjects of this study were all mothers of children under five who visited the Mandrehe Barat Non-Inpatient Community Health Center in 2021. The sample size of the study was 200 mothers of children under five.

Data Collection

Data collection was carried out directly by distributing questionnaires to mothers of children under five containing questions related to the determinants of stunting in toddlers which included a history of low birth weight based on the card to health, Exclusive breastfeeding consists of 1 statement with answer choices yes = 1, no = 0. Furthermore, the history of the infectious disease consists of 1 statement with answer choices yes = 1, no = 0. Then, a feeding pattern questionnaire based on the food frequency questionnaire (FFQ) includes carbohydrate sources, vegetable protein sources, animal protein sources, vegetables, fruits, and milk. The questionnaire on vitamin A and zinc consumption during pregnancy also consist of 5 questions with answer choices yes = 1 and no = 0, so the lowest score is 0 and the highest score is 5. However, before respondents answered the questionnaire, all respondents were given informed consent to state their availability to be involved in this study.

Data Processing

Research data processing begins with the process of examining data that has been obtained from the field after researching the form of a list of questions or respondents' answers to questionnaires that have been answered by respondents during the study. Then, provide an answer code to the questionnaire that has been answered by the respondent during the research. Furthermore, transfer the respondent's answers by using the Microsoft office excel program, and proceed with transferring the data into a computer program package. Then, transfer the respondent's answers by using the microsoft office excel program, and proceed with transferring the data into a computer program package. In the final stage, the data is compiled in the form of graphs, frequency distribution tables, and cross tables (Hulu and Sinaga, 2019).

Data Analysis

Analysis of research data began by calculating the frequency distribution of demographic data for mothers under five, maternal age, mother's education, and mother's occupation, as well as variables of low birth weight history, exclusive breastfeeding, history of infectious diseases, feeding patterns, consumption of vitamin A and zinc during pregnancy, and the incidence of stunting., bivariate analysis was conducted to determine the effect of the independent variables (history of low birth weight, exclusive breastfeeding, history of infectious diseases, feeding patterns, consumption of vitamin A and zinc during pregnancy) on the incidence of stunting in children under five, and calculate the value of the size of the association prevalence ratio (PR) using the Chi-Square test at $\alpha = 0.05$ (Hulu and Kurniawan, 2021). The final stage, carried out multivariate analysis to determine the dominant variable influencing the incidence of stunting in children under five by using a binary logistic regression test.

RESULTS AND DISCUSSION

Research on the determinants of stunting in toddlers, involving 200 toddlers in the West Mandrehe Non-Inpatient Puskesmas in 2021. In this study, all respondents were willing to fill in the consent form and were involved until data collection was completed. The results of the study indicate that the characteristics of the respondents obtained from the calculation of the frequency distribution are that most mothers of children under five are aged 21-35 years by 57%, followed by age >35 years by 31.5%, and age <20 years by 11.5%. (Gambar 1). When viewed from the characteristics of the mother of toddlers, who are dominated by the age of 21-35 years, this age group can affect a mother's motivation to breastfeed her toddler because, at that age usually, a mother of toddlers has better lactation abilities. According to (Domili *et al.*, 2021) mothers aged between 20 and 35 years have a better breastfeeding capacity than mothers aged over 35 years, so breastfeeding is less common in women of childbearing age.

Based on education, most mothers of children under five had high school education as much as 58.5%, followed by junior high school education as much as 22%, bachelor degree as much as 15.5%, and elementary school as much as 4%. Education of mothers and toddlers is very varied, however, it is mostly dominated by high school and junior

high school education so it can affect the understanding and knowledge of mothers of toddlers to be less good at preventing stunting in children under five. However, the research results (Rahayuh *et al.*, 2016) showed that as many as 42 (35.9%) mothers of children under five had a low level of education and as many as 75 (64.1%) mothers of children under five had a high level of education. Children born to mothers with high education have a lower risk than children born to mothers with low education.

Then, in terms of the job characteristics of mothers under five, most of them work as farmers as much as 52%. From the results of interviews and observations in the field, it can be seen that the work of mothers of toddlers as farmers is rubber tappers and also works in the fields. Therefore, because of the work of mothers of toddlers as farmers, this affects the behavior of mothers of toddlers who rarely pay attention to the growth and development of children under five, because the majority of mothers of toddlers often leave their children for one day at home. Therefore, since infancy, many children under five rarely consume exclusive breastfeeding. However, research results (Dahrianti, Madepungeng and Latief, 2021) showed that the work of mothers under five was not significantly related to the incidence of stunting in children aged 12-24 months ($p=1,000 > 0.05$).

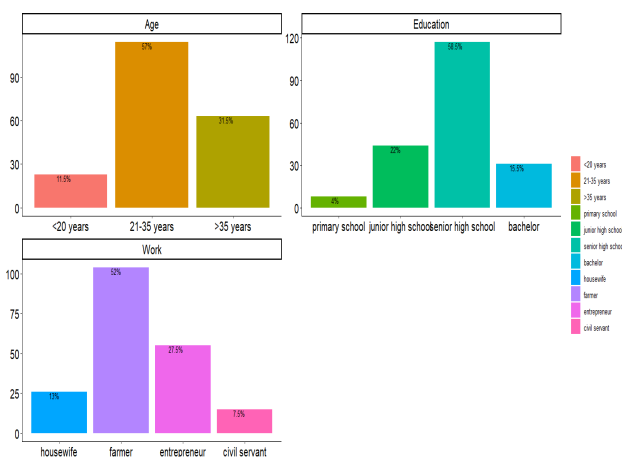


Figure 1 Characteristics of Respondents

Table 1 shows the results of the calculation of the frequency distribution of the history of low birth weight variables, most children under five do not have a history of low birth weight as much as 91.5%. Furthermore, there are as many as 26.5% of children under five who are not exclusively breastfed. Then, as many as 24% of toddlers have a history of infectious diseases and 22.5% with poor feeding patterns. However, more mothers have consumed vitamin A and zinc during pregnancy as much as 90% and who have never consumed vitamin A and zinc as much as 10%. Of the total toddlers, there are 27.5% of toddlers are stunted, and 72.5% of toddlers are not stunted.

In this study, in addition to conducting univariate analysis to see the frequency distribution of each research variable, bivariate analysis was also carried out using the Chi-Square test which aims to determine the effect of a history of low birth weight, exclusive breastfeeding, a history of infectious diseases, feeding patterns, consumption of vitamin A and zinc during pregnancy on the incidence of stunting (Tabel 2). The results of the study indicate that a

history of low birth weight does not significantly affect the incidence of stunting in toddlers, however, a history of low birth weight was a protective factor against stunting ($p = 0.785$; $PR = 1.08$; 95% CI: 0.372-3.306). From the results of the study, it was also seen that most of the children under five did not have a history of low birth weight as much as 91.5% so it did not effect on the incidence of stunting in toddlers. This study is in line with research (Windasari, Syam and Kamal, 2020) which indicates that there is no significant relationship between low birth weight infants and the incidence of stunting ($p=0.172 > 0.05$). These results are in line with research conducted in NTB Puskesmas Soromandi that there is no relationship between low birth weight status and the incidence of stunting in toddlers ($p=0.768 > 0.05$) (Hairunis, Rohmawati and Ratnawati, 2016). However, another study also showed that mothers who gave birth under the age of 20 years were 1.7 times more likely to give birth to babies with low birth weight (AOR = 1.710; 95% CI: 2.165-17.689) than those who gave birth at childbearing age (20-34 years) (Gebregzabiherher *et al.*, 2017). Babies born with low body weight can cause stunting 4 times greater risk (OR = 4.018; 95% CI: 1.714-9.420) than babies born with normal weight, the incidence is at risk in infants aged 12-23 months (95% CI=1.646-4.390) (Nasrul *et al.*, 2015).

Table 1
 Univariate Analysis (n=200)

| Variable | n | % |
|---|-----|------|
| History of low birth weight | | |
| Yes | 17 | 8,5 |
| No | 183 | 91,5 |
| Exclusive Breastfeeding | | |
| Not exclusively breastfed | 53 | 26,5 |
| Exclusive Breastfeeding | 147 | 73,5 |
| History of infection | | |
| Yes | 48 | 24 |
| No | 152 | 76 |
| Feeding pattern | | |
| Not good | 45 | 22,5 |
| Good | 155 | 77,5 |
| Consumption of vitamin A and zinc during pregnancy | | |
| Never | 20 | 10 |
| Ever | 180 | 90 |
| Stunting Incident | | |
| Stunting | 55 | 27,5 |
| Not stunting | 145 | 72,5 |

Furthermore, exclusive breastfeeding had a significant effect on the incidence of stunting in children under five ($p < 0.001$; $PR = 9.5$; 95% CI 6.788-22.948). Toddlers who are stunted are 9.5 times more likely to not be given exclusive breastfeeding compared to toddlers who are not stunted. From the results of the study, it can be seen that there are as many as 26.5% of mothers who do not give exclusive breastfeeding to children under five. From the results of interviews with mothers of toddlers at the time of the study, it showed that they did not give exclusive breastfeeding to babies since 3 months after giving birth because they had to work with rubber and rice fields every day to meet family needs, so babies and toddlers were often left at home with their parents-in-law. Therefore, children under five rarely get exclusive breastfeeding from their mothers. This study is in line with research (Tshering *et al.*, 2018) which shows that the prevalence of stunting in Bhutan is high, around 21.2% of infants under 6 months of age are stunted because the rate of

exclusive breastfeeding is very low (Tshering *et al.*, 2018). Likewise, research that has been carried out in Makassar Puskesmas Tamalate, proves that the incidence of stunting is significantly related to exclusive breastfeeding ($p = 0.001 < 0.05$), and as many as (57.1%) toddlers in Makassar experience stunting (Windasari, Syam and Kamal, 2020). Then, the results of this study are in line with research that has been conducted in Majene Regency which indicates that the low level of exclusive breastfeeding will threaten the

growth and development of children ($p = 0.000 < 0.05$) (Azriful *et al.*, 2018). However, the results of this study are inversely proportional to the results of research in Gorontalo, that exclusive breastfeeding is not statistically significant with the incidence of stunting in toddlers ($p = 0.797 > 0.05$) (Azriful *et al.*, 2018). Therefore, exclusive breastfeeding should be a major concern from birth to 2 years of age so that it can prevent stunting in children under five.

Table 2.
Chi-Square Test Results

| Variable | Stunting incident | | | | | | p | PR | 95% CI | |
|---|-------------------|------|--------------|------|-------|-----|--------|------|--------|--------|
| | Stunting | | Not stunting | | Total | | | | Lower | Upper |
| | n | % | n | % | n | % | | | | |
| History of low birth weight | | | | | | | | | | |
| Yes | 5 | 29,4 | 12 | 70,6 | 17 | 100 | 0,785 | 1,08 | 0,372 | 3,306 |
| No | 50 | 27,3 | 133 | 72,7 | 183 | 100 | | | | |
| Exclusive Breastfeeding | | | | | | | | | | |
| Not exclusively breastfed | 45 | 84,9 | 8 | 15,1 | 53 | 100 | <0,001 | 9,5 | 6,788 | 22,948 |
| Exclusive Breastfeeding | 10 | 6,8 | 137 | 93,2 | 147 | 100 | | | | |
| History of infection | | | | | | | | | | |
| Yes | 18 | 37,5 | 30 | 62,5 | 48 | 100 | 0,111 | 1,5 | 0,972 | 2,441 |
| No | 37 | 24,3 | 115 | 75,7 | 152 | 100 | | | | |
| Feeding pattern | | | | | | | | | | |
| Not good | 38 | 84,4 | 7 | 15,6 | 45 | 100 | <0,001 | 7,6 | 4,833 | 12,266 |
| Good | 17 | 11 | 138 | 89 | 155 | 100 | | | | |
| Consumption of vitamin A and zinc during pregnancy | | | | | | | | | | |
| Never | 18 | 90 | 2 | 10 | 20 | 100 | <0,001 | 4,4 | 3,172 | 6,043 |
| Ever | 37 | 20,6 | 143 | 79,4 | 180 | 100 | | | | |

Furthermore, a history of the infectious disease also showed that it had no significant effect on the incidence of stunting in children under five, however, a history of infectious diseases was a protective factor against the incidence of stunting ($p=0.111$; $PR=1.5$; $95\%CI$ 0.978-2.441). Based on the results of interviews and field observations at the time of the study, most of the children under five had no history of infectious diseases such as diarrhea and acute respiratory infections, so children under five who do not have a history of infectious diseases are protective factors or not risk factors for stunting in toddlers. This study is in line with the results of research (Hendraswari *et al.*, 2021) that a history of infectious diseases such as acute respiratory tract infections ($p=0,210 > 0.05$; $OR=2.8$; $95\%CI$ 0.751–10.331) and diarrhea ($p=1.00 > 0.05$; $95\%CI$) did not prove an association with stunting in toddler, however, having a history of these infectious diseases can increase the risk of toddlers getting stunted. However, other studies have shown that infectious diseases are a direct factor that affects the nutritional status of children under five, as the results of previous studies showed that toddlers with a history of infectious diseases were 7 times more likely to be stunted than children who were healthy or had no history of infectious diseases ($p = 0.000 < 0.05$; $OR = 7.073$; $95\% CI = 3.174-15.758$) (Angkat, 2018). Likewise research (Abas and Gobel, 2021) which shows that toddlers with a history of infectious diseases are at 8.33 times risk of stunting ($p = 0.000 < 0.05$; $OR = 8.33$; $95\%, CI = 2.92-23.75$). Thus, a history of infectious diseases in children under five, such as frequent diarrhea and acute respiratory infections, should also be a major concern as a protective factor against stunting, because a history of infectious diseases can be a risk for toddlers to be stunted, even children who often suffer from infectious diseases such

as diarrhea and acute respiratory infections tend to experience stunting.

Feeding patterns also significantly influence the incidence of stunting in children under five ($p < 0.001$; $PR=7,6$; $95\%CI$ 4,833-12,266). Toddlers who are stunted are 7.6 times more likely to have a poor feeding pattern compared to toddlers who are not stunted. This feeding pattern is assessed based on a food frequency questionnaire (FFQ) which includes carbohydrate sources, vegetable protein sources, animal protein sources, vegetables, fruits, and milk consumed by children under five. From the results of observations in the field at the time of the study, it was shown that the pattern of giving food to children under five was still not good. This happens because low family income affects the ability to buy nutritious food is very limited so many children under five rarely consume food sourced from animal and vegetable protein and milk to support children's nutrition. Previous studies have shown that giving complementary foods to breast milk at the age of 6 months is very helpful for the child's growth and development and is an investment in health in the future, the pattern of complementary feeding should be varied and not every day with the same menu (Indah Nurdin, Octaviani Katili and Ahmad, 2019), because basically, feeding must consist of four groups to get better food quality (World Health Organization, 2017). The pattern of giving food to children who are not good can occur because of hereditary habits of parents first, some believe that giving food in the form of meat can cause infection because it contains worms and if you eat vegetables, your child's stomach will become bloated. A previous study in Myanmar stated that a low feeding pattern in children also had a significant relationship with the incidence of stunting ($p=0.00 < 0.05$; $OR=15.45$;

95%CI=5.5842.81), toddlers who are stunted are 15.45 times more likely to have a poor feeding pattern compared to toddlers who are not stunted (Phu, Wittayasoporn and Kongsaktrakul, 2019). This study is also in line with research that has been conducted in Central Sulawesi, namely the pattern of complementary feeding is the dominant factor for stunting ($p=0.000 <0.05$; OR = 12.04; 95% CI = 5.02-28.89) which means that the improper feeding pattern will be 12.04 times greater risk than the right feeding pattern (Hijra, Fatimah-Muis and Kartasurya, 2016). Thus, the pattern of feeding children has an important role in preventing stunting. If toddlers get the right diet, the child can avoid the risk of stunting, however, from the results of the study, it can be seen that the pattern of feeding is still not good. Therefore, parental awareness, especially for mothers, is very important in improving the pattern of feeding children under five so that they can avoid the risk of stunting.

Consumption of vitamin A and zinc during pregnancy had a significant effect on the incidence of stunting in children under five ($p = <0.001$; PR = 4.4; 95%CI 3.172-6.043). Mothers of toddlers who have never consumed vitamin A and zinc are 4.4 times more likely to experience stunting compared to mothers who have consumed vitamin A and zinc during pregnancy. From the results of interviews with mothers of toddlers at the time of conducting research, it shows that there are still mothers of toddlers who have never consumed vitamin A and zinc during pregnancy because they rarely do antenatal care at the Puskesmas because they are busy working as farmers, so that information about the benefits of consuming vitamin A and zinc during pregnancy is not known. Most mothers of toddlers state that they do not have the money to buy the vitamins needed during pregnancy. Even though the consumption of vitamin A and zinc is very important during pregnancy to prevent stunting. This is by previous studies

which stated that the provision of micronutrients such as Vitamin A and Zinc during pregnancy is one way for children to avoid stunting which can inhibit the growth of the baby and also improve the nutritional status of the child (Hendrayati, Adam and Sunarto, 2021). According to research results (Azmy and Mundiastut, 2018) which shows that there is a significant relationship between energy consumption and nutritional status which prevents children from stunting ($p=0.015<0.05$). Vitamin A functions to regulate the body's metabolism to avoid disease, while Zinc is used for protein synthesis to create an immune system. Children who lack vitamin A intake will be at risk of stunting. Likewise studies (Ssentongo *et al.*, 2020) shows that children who lack Vitamin A intake have a higher chance of inhibiting growth by about 43% ($p = 0.01<0.05$; OR=1.43; 95% CI = 1.08-1.89) or they can be said that they have a 1.43 times risk of stunting than children who have an adequate intake of Vitamin A. Not only does vitamin A deficiency increase the risk of stunting, but low zinc intake is also a risk factor for stunting (OR = 6.39; 95% CI = 1.34-30.33) which means that a low level of zinc adequacy has a risk of stunting 6.39 times that of a sufficient level of zinc. (Bening, Margawati and Rosidi, 2017). Thus the consumption of vitamin A and zinc during pregnancy is very important, therefore pregnant women need to consume vitamin A and zinc during pregnancy to prevent stunting in children under five.

Furthermore, in addition to univariate and bivariate analysis using the Chi-Square test, multivariate analysis with binary logistic regression was also carried out to identify the dominant determinants of stunting in children under five. Exclusive breastfeeding variables, history of infectious diseases, feeding patterns, and consumption of vitamins A and Zinc are candidate variables in logistic regression modeling with a value ($p < 0.25$).

Table 3
Logistics Regression Model

| Variable | Model 1 | Model 2 | Model 3 |
|--|----------------------------|----------------------------|----------------------------|
| | <i>p value; PR (95%CI)</i> | <i>p value; PR (95%CI)</i> | <i>p value; PR (95%CI)</i> |
| Exclusive Breastfeeding | <0,001; 9,8(7,097-23,791) | <0,001; 7,9(1,368-24,302) | <0,001; 5,7(1,565-35,186) |
| History of infectious disease | 0,084; 0,11(0,011-1,333) | 0,091; 0,129 (0,012-1,386) | - |
| Feeding pattern | 0,607; 1,62(0,254-10,429) | - | - |
| Consumption of vitamin A and zinc during pregnancy | <0,001; 8,3(1,102-15,870) | <0,001; 6,4(1,020-18,584) | 0,012; 4,3(1,725-29,509) |

Table 3 shows that the dominant variable affecting the incidence of stunting in children under five in the Non-Inpatient Puskesmas area of West Mandrehe in 2021 is exclusive breastfeeding (Model 3) ($p = <0.001$; PR = 5.7; 95%CI 1.565-35,186). Toddlers who are stunted are 5.7 times more likely to not be given exclusive breastfeeding compared to toddlers who are not stunted. This study is in line with research (Budiastutik and Rahfiludin, 2019) in impoverished nations, not providing exclusive breastfeeding increases the risk of child stunting by 4.0 times.

CONCLUSIONS AND SUGGESTIONS

From the results of the study, it can be concluded that exclusive breastfeeding, feeding patterns, consumption of vitamin A and zinc during pregnancy have a significant effect on the incidence of stunting in children under five. However, a history of low birth weight and a history of infectious diseases did not significantly affect the incidence of stunting in children under five. Thus, the dominant factor in the incidence of stunting shows that toddlers who are stunted are 5.7 times more likely to not be given exclusive breastfeeding compared to toddlers who are not stunted.

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ETHICAL CONSIDERATION

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