



ORIGINAL ARTICLE

ANALYSIS OF STUNTING RISK FACTORS IN CHILDREN IN THE MAGETAN DISTRICT

Analisis Faktor Resiko Terjadinya Stunting Pada Anak

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ABSTRACT

Background: The condition of failure to thrive in toddlers due to chronic malnutrition and making children too short for their age is called stunting. **Purpose:** This research was conducted to analyze the risk factors of stunting in children. **Methods:** The study was conducted from mid-May to mid-August 2020. This study developed a model for maternal empowerment in preventing and managing stunting using a cross-sectional design, then implementing the model using a quasi-experimental non-randomized pre-post control group design. The population involved was all mothers with children under five years old in Posyandu Ngariboyo, Candirejo, and Plaosan, obtaining 250 mothers. Meanwhile, the study sample was 150 mothers who had children under five years old in Posyandu Ngariboyo, Candirejo, who met the inclusion criteria. **Results:** Mothers with good characteristics increased their knowledge of stunting prevention and control by 0.42 times ($p=0.01$). Mothers with good knowledge increased their maternal commitment by 0.23 ($p=0.01$), and mothers who had good commitment reduced stunting by 0.45 ($p=0.01$). Furthermore, mothers with good knowledge increased the family support by 0.24 ($p=0.01$). In addition, good family support also reduced stunting by 0.26 ($p=0.01$). **Conclusion:** Mother's knowledge contributes to the prevention and management of stunting. Children's physical health, family support, nutritional status, and home environment are also important factors in stunting prevention and management. Family support is needed by mothers to realize their commitment to carrying

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out early detection, prevention, and control stunting.

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ABSTRAK

Latar belakang: Kondisi gagal tumbuh balita akibat kekurangan gizi kronis, anak terlalu pendek seusianya disebut stunting. **Tujuan:** Menganalisis faktor resiko terjadinya stunting pada anak. **Metode:** Penelitian dilaksanakan pertengahan Mei sampai pertengahan Agustus 2020. Penelitian ini menyusun model pemberdayaan ibu dalam mencegah dan menangani stunting menggunakan desain cross sectional, implementasi model menggunakan Quasi Eksperimental Non Randomized Pre Post Control Group Design. Populasi semua ibu balita di Posyandu N, C, P 250 ibu. Sampel penelitian sebagian ibu balita di Posyandu N, C, P 150 ibu yang memenuhi kriteria inklusi. **Hasil:** Ibu memiliki karakteristik baik meningkatkan pengetahuan ibu mencegah dan menangani stunting 0,42 kali ($p=0,01$). Ibu memiliki pengetahuan baik meningkatkan komitmen ibu 0,23 ($p=0,01$), ibu yang memiliki komitmen baik menurunkan stunting 0,45 ($p=0,01$). Ibu memiliki pengetahuan baik meningkatkan dukungan keluarga 0,24 ($p=0,01$). Dukungan keluarga baik menurunkan stunting 0,26 ($p=0,01$). **Kesimpulan:** Pengetahuan ibu memberi kontribusi pencegahan dan penanganan stunting. Kesehatan fisik anak, dukungan keluarga, status gizi, lingkungan rumah serta lingkungan luar rumah juga merupakan faktor penting dalam pencegahan dan penanganan stunting. Dukungan keluarga sangat diperlukan ibu mewujudkan komitmen ibu melaksanakan deteksi dini, pencegahan dan penanganan stunting.

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INTRODUCTION

Indonesia ranked 47 among 122 countries that suffer from stunting problems in toddlers and 17 among 117 countries with 3 problems including stunting, wasting, and overweight. In this case, malnutrition in children causes a decrease in intelligence, vulnerability to suffering from a certain disease, low productivity, inhibition in economic growth, and an increase in poverty, inequality, as well as metabolic disorders as adults (increased risk of non-communicable diseases such as diabetes, obesity, stroke, and heart disease) (Hendrawati, KH, & Witdiawati, 2020).

Baby and infants who suffer from chronic malnutrition in their first 1000 days of life cause them to suffer further from stunting, a condition that is too short for their age. Malnutrition can occur while the baby is in the womb and after birth, but it only appears after the child is 2 years old (Wati et al., 2021). When a stunted infant has a z-score of (PB/U (Length/Age)) or (TB/U

(Height/Age)) less than -2SD (standard deviation) and less or equal to -3SD (Nahar et al., 2020).

Research conducted previously by Beal, Tumilowicz, Sutrisna, Izwardy, & Neufeld (2018) revealed that exclusive breastfeeding for the first 6 months of life is essential in determining the stunting condition of infants. Furthermore, another study added that several factors affected the children's growth and development, including mother's commitment, as stated in the previous study, and the mother's income factor (Saadah, Yulianto, Suparji, & Sulikah, 2017). These two studies had similarities, saying that mother's commitment is a significant factor in the early detection, prevention, and treatment of stunting.

Stunting children tend to be vulnerable to suffering from infectious diseases, so they are at risk of experiencing a decrease in the quality of learning at school and are at risk of being absent from attending school. It is because children with stunting usually have poor motor skills for fine and gross motor skills compared to their peers who do

not suffer from stunting. Early detection and intervention of stunting are efforts to improve the quality of children's growth and development by empowering mothers. These things are in accordance with the objective of this study, which was to develop a mother empowerment model for preventing and treating stunting.

Furthermore, in the case of stunting condition, Barir, Murti, & Pamungkasari (2019) claimed that this factor was directly and negatively affected by the birth length of 48 cm, birth weight of 2500 g, exclusive breastfeeding, and timely complementary feeding. In addition, the condition of stunting was indirectly affected by family income, maternal age, attitude, the maternal height of more than 150 cm, occupation, education level, and knowledge. Therefore, the current research aims to analyze the risk factors for stunting in children in the Magetan District. The innovation employed in the current research itself is the utilization of the contribution of mother's knowledge in preventing and treating stunting in children. In addition to the child's physical health and nutritional status, family/husband support, the environment in the home, and the environment outside the home are efforts to prevent and treat stunting.

METHODS

This research was carried out for 3 months, from mid-May to mid-August 2020, in 2 stages. The first stage was carried out through a cross-sectional approach by developing the maternal empowerment model to prevent and treat the condition of stunting using surveys, questionnaires, and Z-Score sheets. Meanwhile, the second stage was done through a quasi-experimental research design by implementing the model that has been designed using the non-randomized control group pretest-posttest design. In this case, the intervention group was provided the module instrument, while the control group was given a leaflet.

Furthermore, the population involved were all mothers with children under five years old visiting Posyandu Ngariboyo, Candirejo, and Plaosan, totaling 250 mothers. Among the population involved, 150 mothers were chosen as the samples as they met the inclusion criteria set. In this case, the inclusion criteria included mothers at the age of 20-45 years, who had children under five years old, and lived permanently for at least 1 year, while the exclusion criteria were

caregivers/fathers, immigrant mothers, and did not live permanently for 1 year.

These 150 samples of mothers were chosen through the Rule of Thumb, where the sample size was 5-10 times the number of indicators. Furthermore, the variables studied consisted of: the characteristics of the majority of mothers at the age of 20-30 years; the mother's education level that was divided into 4 categories of elementary, junior high school, senior high school, and college; socio-economic condition which was divided into 3 categories, high (had salary of more than the UMR (Regional Minimum Salary of Magetan in 2020)), medium (in accordance with the UMR) and low (less than the UMR); the mother's occupation that was divided into 4 categories including civil servants, private employees, farmers, and housewives; the mother's knowledge about early detection and prevention of stunting that was divided into 2 categories, implementing and not implementing efforts, doing and not doing; the physical health that was divided into 2 categories of having been sick such as fever instead of malaria, diarrhea without dehydration (MTBS) and healthy; the nutritional status that was divided into 5 categories, namely very thin, thin, normal, fat, and very fat based on the WHO-NCHS Body Weight standard for boys and girls (Rasni, Susanto, Nur, & Anoegrajekti, 2019).

In this case, the indoor home environment was divided into 4 categories: living with father and mother, living with mother, living with father, and living with grandmother. Meanwhile, the outdoor environment was divided into 3 categories of eating habits, friends in the environment: sufficiently nutritious, moderately nutritious, and less nutritious. Furthermore, mothers' commitment was also divided into 4 categories: having no role, having a lack of role, having a role, and having a very significant role. In addition, family/husband support was divided into 4 categories: those who did not give any support, rarely gave support, frequently gave support, and always gave support. Last, the child's body size was divided into 2 categories: normal and stunting. In this case, stunting was indicated when Body Length/Age was less than -2 SD/ Standard Deviation (Nahar et al., 2020).

In addition, the sampling technique used was multistage random sampling, starting with grouping samples based on the area or population location, then stratification and sampling using a simple random sampling technique. Meanwhile, the data that have been collected were further

analyzed using SEM PLS in order to develop a model and a different test using a t-test to distinguish the results between the intervention group and the control group. In the case of SEM analysis, the validity of the convergence test was carried out with reflective indicators, where it could be seen that there was a correlation between the indicator scores and the structural scores. In addition, the individual indicators were considered reliable if they had a correlation value above 0.70, then the loading factor value was obtained from each question item from the research variable.

Furthermore, the instrument used to collect the data was a questionnaire that has been validated and tested regarding its reliability. In this case, the questionnaires were employed to measure the variables of mother's knowledge, family/husband support, nutritional status, mother's commitment/role, children's physical health, and indoor home environment and outdoor environment. In addition, another instrument used was the Z-Score sheet used to measure the stunting variable. An Independent t-test was also used to see the difference between the intervention and control groups. Before collecting data, research ethics testing was carried out by the Ministry of Health of Poltekkes Surabaya Ethics Team with the number EA/263/KEPK-Poltekkes_Sby/V/2020.

Data collection was carried out at selected Public Health Centers, including those in Ngariboyo, Candirejo, and Plaosan. The researchers and enumerators adjusted their research to the circumstances because Magetan was marked as a red zone during a pandemic. In this case, if there was permission from the Head of the public health centers, we carried out data collection offline using strict health protocols, including wearing masks, maintaining distance, and washing hands before and after collecting the data. The questionnaires used mostly were Google forms to get the data according to the required number of samples. Researchers also protected mothers by providing masks to wear during data collection, keeping a distance, and washing hands before and after filling out forms.

RESULTS

Based on the findings obtained, maternal characteristics improved maternal knowledge regarding early detection, prevention, and treatment of stunting by 0.42 times ($p = 0.00$). Mothers who had knowledge about early

detection, prevention, and treatment of stunting increased the commitment/role of the mother by 0.23 ($p=0.00$), and mothers who had a significant commitment/role in treating stunting reduced the stunting condition in their children by 0.45 ($p = 0.01$). Furthermore, mothers with good knowledge of early detection, prevention, and treatment also increased the family/husband support by 0.24 ($p=0.04$), which further led to the decrease of stunting in their children by 0.26 ($p = 0.01$) (results from causality test of inner model in Path Coefficient table – data are not shown).

The results of this study concluded that the mothers' commitment/role is the most influential factor in addition to the characteristics of the mother and the support of the family/husband.

Respondents' Characteristics

Table 1 shows that most of the mothers were at the age of 20-35 years old, had a high school education level, had moderate socioeconomic conditions, and had an occupation as private sector employees. In addition, most of the mothers had good knowledge, normal child nutritional status, good stunting prevention and treatment, good physical health of children, home environment of living with both parents, the environment outside the house eats nutritious food, had a very important commitment/role, strong support from the family/husband, and normal children.

Based on Table 2 on the age, education level, mother's socio-economic and occupation, mother's knowledge, child's nutritional status, prevention and treatment of stunting, child's physical health, home environment, mother's commitment/role, family/husband support were all valid values. In contrast, the outdoor environment had an invalid value.

DISCUSSION

Effect of Mother's Characteristics (Age, Education, Socioeconomic, and Occupation) on Stunting in Children

This study found that most of the mothers were at the age of 20-35 years old. In this case, maternal characteristic factors significantly and directly affected stunting. The significant and indirect effect on stunting was through mother's knowledge, child's physical health, child's nutritional status, indoor home environment, outdoor environment, mother's commitment/role, and family/husband's support regarding early detection, prevention, and treatment of stunting. In

this case, it was found that the strong influence between maternal commitment/role and the incidence of stunting obtained a t-statistic of 3.74, which is higher than the t-table of 1.96. It is in line with the previous research by Roba et al., (2021) that maternal education, occupation, and age significantly affected stunting.

This research was also supported by Mistry et al., (2019) who stated that maternal education was identified as an important predictor of stunting, while the research conducted by Fadare, Amare, Mavrotas, Akerele, & Ogunniyi (2019) confirmed that higher maternal education significantly reduced stunting in children. In addition, it was also explained that a person's age affected knowledge. The older a person is, the more likely they will have more knowledge and experience. Furthermore, Dompas, Donsu, Mandang, & Muhammad (2019) conducted another relevant research. They discovered that productive age is the age at which a person reaches a level of maturity in terms of productivity in the form of rational and motoric. Mothers aged 19-35 years old are mothers in the productive age group, where they already have rational and motor skills to have sufficient maturity. Based on the research findings and the results of previous studies, maternal education was considered a very supportive factor/variable for the incidence of stunting. Besides, the physical health of children also had a major influence on the incidence of stunting.

Previous study carried out by Barir et al., (2019) stated that stunting was directly and negatively affected by the birth length of 48 cm, birth weight of 2500 g, exclusive breastfeeding, and timely complementary feeding. Meanwhile, those that gave indirect effects were family income, maternal age and attitude, the maternal height of more than 150 cm, occupation, education, and knowledge.

Table 1
Distribution of Research Variable

| Variable | n | % |
|---|-----|-------|
| Age (Years) | | |
| <20 | 0 | 0.00 |
| 20 – 35 | 109 | 73.30 |
| >35 | 41 | 26.70 |
| Education Level | | |
| Elementary School | 7 | 5.20 |
| Junior High School | 61 | 40.40 |
| Senior High School | 64 | 42.20 |
| College | 18 | 12.40 |
| Socio-Economy | | |
| High | 0 | 0 |
| Medium | 52 | 35.30 |
| Low | 98 | 64.70 |
| Occupation | | |
| Civil Servant | 4 | 2.50 |
| Private Sector Employees | 61 | 41.00 |
| Farmer | 38 | 24.80 |
| Housewife | 47 | 31.70 |
| Knowledge of Early Detection of Stunting | | |
| Low | 25 | 16.80 |
| High | 125 | 83.20 |
| Knowledge of Prevention of Stunting | | |
| Low | 22 | 14.90 |
| High | 128 | 85.10 |
| Knowledge of Prevention of Stunting | | |
| Low | 24 | 16.10 |
| High | 126 | 83.90 |
| Knowledge of Physical Health | | |
| Had ever sick | 50 | 33.30 |
| Had never been sick | 100 | 66.70 |
| Children Nutritional Status (Weight/Age) | | |
| Very thin | 0 | 0 |
| Thin | 72 | 48.00 |
| Normal | 78 | 52.00 |
| Fat | 0 | 0 |
| Very Fat | 0 | 0 |
| Inner Home Environment | | |
| Children live at home environment with: | | |
| Living with both parents | 107 | 71.30 |
| Living with mother | 43 | 28.70 |
| Living with father | 0 | 0.00 |
| Living with grandmother | 0 | 0.00 |
| Outer Home Environment | | |
| Less nutritious | 41 | 27.30 |
| Nutritious | 109 | 72.70 |

(Continued)

Table 1
Continued

| Variable | N | % |
|----------------------------------|-----|--------|
| Maternal Commitment/ Role | | |
| Has a role | 37 | 24.70 |
| Has a significant role | 113 | 75.30 |
| Growth | | |
| Normal | 131 | 87.30 |
| Stunting | 19 | 12.70 |
| Total | 140 | 100.00 |

Children who suffered from stunting were vulnerable to suffering from infectious diseases, so they were at risk of experiencing a decrease in the quality of learning at school and were at risk of often being absent from attending school. In this case, stunted children had poor motor skills ($P = 0.01$ for fine motor; $P < 0.00$ for gross motor) compared to their peers who did not suffer from stunting. Early detection and intervention of stunting are efforts to improve the quality of growth and development of children by empowering the mothers. In this case, it is in accordance with the objective of this study that empowers mothers in preventing and treatment with stunting. When a mother is mature, she will be able to take care of her children. Thus, it is expected that the growth and development of her child are also good (Ariyanti & Utami, 2018).

The value of the loading factor of the mother's empowerment model in the prevention and handling of stunting in children with valid results indicates that the indicator can be used further to measure the value of the variable.

Effect of Maternal Knowledge on Early Detection, Prevention, and Treatment of Stunting in Children

Current research claimed that maternal knowledge concerning early detection, prevention, and treatment of stunting in children was mostly high. However, some mothers are still reluctant to implement things they already know, so the health workers need to motivate the mother for them to carry out early detection, prevention, and treatment of stunting in children. The study results are also in accordance with research by Suleman, Tasnim, & Wahab (2021), which explained that there was a significant effect of health promotion on knowledge and attitudes toward stunting prevention.

Effect of Children's Physical Health on Stunting in Children

Based on this research, most of the children involved had never been sick. Even though they had ever been sick, it was only a mild illness, such as fever, not malaria, and diarrhea without dehydration. In this case, they were immediately treated so that it did not interfere with the child's growth and development. The child's physical health factor had a significant indirect effect on the stunting factor.

Borji, Moradi, Otaghi, & Tartjoman (2018) added that infectious diseases could reduce food intake, interfere with nutrient absorption, cause direct loss of nutrients, and increase metabolic needs, affecting Child Growth and Development. These findings were different from the findings of other research conducted by Rah, Sukotjo, Badgaiyan, Cronin, & Torlesse (2020) that no relationship was found between anemia in children and the incidence of stunting in children because nutritional status was also influenced by factors in children's diet, nutritional status, and exclusive breastfeeding. This difference occurred due to other factors that affected the stunting, such as children's diet, nutritional intake, child nutritional status, maternal parenting, and exclusive breastfeeding because exclusive breastfeeding for the first 6 months is a significant determinant of child stunting by (Beal et al., 2018).

Effect of Children Nutritional Status on Stunting in Children

The results of this study explained that most children involved have normal nutritional status, and the comparison between normal and underweight nutritional status is almost balanced. The nutritional status of children had a significant indirect effect on the stunting factor. The level of education also has an influence on health, one of which is nutritional status. Individuals with a high level of education are more likely to know a healthy lifestyle and how to keep the body in shape, which is reflected in the application of a healthy lifestyle, such as consuming nutritious food (Setiawan, Machmud, & Masrul, 2018).

Table 2

Loading Factor Value Of Maternal Empowerment Model In Preventing And Treating Stunting in Children

| Construct | Indicator | Construct Loading Value | Validity Convergent Test Results |
|---|---------------------------------------|-------------------------|----------------------------------|
| X1. Maternal Characteristics | X1.1 Maternal Age | 0.79 | Valid |
| | X1.2 Maternal education level | 0.72 | Valid |
| | X1.3 Socio-economy | 0.69 | Valid |
| | X1.4 Maternal occupation | 0.71 | Valid |
| X2. Maternal knowledge regarding early detection, prevention, and treatment of stunting | X2.1 Early detection of stunting | 0.76 | Valid |
| | X2.2 Prevention of stunting | 0.84 | Valid |
| | X2.3 Treatment of stunting | 0.84 | Valid |
| X3. Children physical health | X3.1 Children physical health | 0.89 | Valid |
| X4. Nutritional Status | X4.1 Nutritional Status | 0.84 | Valid |
| X5. Inner home environment | X5.1 Living with both parents | 0.77 | Valid |
| | X5.2 Living with only one parent | 0.68 | Valid |
| X6. Outer home environment | X6.1 friend' habit in the environment | 0.00 | Invalid |
| Y1. Maternal commitment/role | Y1.1 Maternal role | 0.76 | Valid |
| Y2. Husband/family support | Y2.1 Husband support | 0.69 | Valid |
| Y3. Stunting | Y3. Stunting | 1.00 | Valid |

Furthermore, another research project by Debela, Gehrke, & Qaim (2021) stated that improving child nutrition and empowering women are two important and closely related development goals. If the mother works and has an income, the mother will provide more nutritious food than mothers without income. Meanwhile, another previous study by Sarker et al., (2020) also supported the results of this study that an increase in economic activity would improve the nutritional status of children and, as a result, reduce inequality.

Effect of Inner Home Environment on Stunting in Children

The results of this study revealed that most children lived with both parents. However, the condition does not guarantee they will get their parents' full attention because of the business of both parents. The indoor home environment factor is significant to the stunting factor. It is supported by Orth (2018) research that the indoor home environment affected children in various ways, including influencing how a child develops and learns from their environment. This research was also in line with Nguyen et al., (2018) that providing a home environment that stimulates the growth and development of children is very

important to ensure that children's development runs optimally.

Effect of Outdoor Environment on Stunting in Children

The results of this study stated that most children had received nutritious food. However, it was still lacking in quality and quantity according to the age of the child because children followed and imitated their friends. It supported research that found outdoor environments related to stunting were eating habits with peers. Outdoor environment was not significant to the incidence of stunting (Bueno et al., 2018).

Effect of Maternal Commitment/Role on Early Detection, Prevention, and Treatment of Stunting in Children

Mother's commitment to the efforts of preventing stunting in their children did not have a major role, yet the motivation to implement it is still not optimal. The mother's commitment/role factor had a significant direct effect on the stunting factor, it was proven that most mothers had a strong commitment/role to be able to carry out early detection, prevention, and treatment of stunting in children.

It is in line with the findings from the previous research by Fridman-Teutsch & Attar-

Schwartz (2019) that the commitment/role of parents generally includes the commitment/role of the father and the mother. The mother's commitment/role is as a house manager, caregiver, child educator, family protector, breadwinner, and member of certain social groups. Meanwhile, the father's role is as a family leader, as a breadwinner, educator, protector, or giving a sense of security to each family member and a member of a particular social group

Effect of Family/Husband Role on Early Detection, Prevention, and Treatment of Stunting in Children

The results of this study indicate that family/husband support is significant for mothers in carrying out early detection, prevention, and treatment of stunting in children. The family/husband support is significant for mothers in implementing early detection, prevention, and treatment of stunting. In this case, the support can be in the form of moral and material support. (Arsin & Syafar, 2020).

Furthermore, this research was carried out in two stages, where the first stage was implementing the research results obtained in the first stage by involving both the intervention and the control group. The intervention group was provided by measuring module, while the control group was provided with a leaflet. In addition, the measurements of the two groups showed differences in the results that the intervention group obtained better results than the control group.

CONCLUSION

Based on the results obtained, risk factors for stunting in children include maternal characteristics, maternal knowledge, child's physical health, child's nutritional status, indoor home environment, outdoor environment, maternal commitment, and family/husband support. These things are needed by mothers to realize mother's commitment to carrying out Early Detection, Prevention and Treatment of Stunting.

Conflict of Interest

This research was carried out within the framework of the Tridarma of Higher Education and the collaboration of 2 Poltekkes of the Ministry of Health and as a lecturer's responsibility. Therefore, the research results can be useful for the community, especially mothers of

infants, in preventing and treating stunting. In this case, there was no conflict of interest between the writers involved.

AUTHOR CONTRIBUTION

All researchers contributed, involved, and accounted for the content of the writing, starting from the research preparation, design, analysis, and revision of articles. NS: conceptualization, methodology, HY: writing, drafting, and visualization, SM: writing and editing, BY: data analysis, software, validation.

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