

Original Research Article

The role sanitation to stunting children age 6-35 months, Purwojati subdistrict, Banyumas district, Central Java, Indonesia

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ABSTRACT

Background: Stunting toddlers describe the existence of chronic nutritional problems, influenced by prospective maternal, fetal period, and toddler age, including illnesses during infancy. Children who stunted impact not only on intelligence, productivity and future performance after adulthood.

Methods: The study in 10 villages in Purwojati Subdistric, Banyumas district, Central Java, Indonesia in 2017. The cross-sectional study design with population is households that have children aged 6-35 months. A sample of 348 children aged 6-35 months was taken by the cluster whit design effect of 2.

Results: Respondents consisted of 52.3% boys, 45.4% aged 12-23 months. Most of the energy, protein, fat and carbohydrate intake is more than 80% of the recommended dietary allowance and a small proportion of children suffer from measles, Acute Respiratory Infection and diarrhoea. For sanitation 68.4% of the houses are in the poor, poor waste management is 92%, non-plumbing sources 68.9%, dirty latrine 19.3% and the latrine was not cleaned is 92.2%. There was no average difference in z-score H/A based on nutrient intake, house status, waste management and water sources, but there were significant differences ($p=0.032$) on average z-score H/A based on cleaning the latrine. There was no average difference in z-score H/A based on nutrient intake, house status, waste management, and water sources, but there were significant ($p=0.032$) on average z-score H/A based on cleaning the latrine.

Conclusions: Sanitation is related to height, there were significant differences on average z-score H/A based on cleaning latrine.

Keywords: Stunted, Sanitation, Infection

INTRODUCTION

Stunted as a problem of chronic malnutrition caused by insufficient nutrition in a long time due to feeding that is not in accordance with nutritional needs. The indicators used to identify short children under five are based on the height index according to age (H/A) according to WHO standard child growth standards with criteria if the H/A z score H/A <-2 standard deviation (SD)¹. Short of starting

fetus is still in the womb and only appears when the child is two years old. Malnutrition at an early age increases the mortality rate of infants and children, causing the sufferer to get sick and have a posture not maximum when adulthood. Cognitive ability is reduced, resulting in long-term economic losses. The impact is very broad ranging from the economic dimension, intelligence, quality, and national dimensions that have an effect on the future of children. Nearly 70% of brain cell formation

occurs since the fetus is still in the womb until the child is 2 years old. If the brain has growth barriers, the number of brain cells, brain cell fibres, and connective brain cells are reduced. Children with a severe short age of 3 years ($-3 < Z\text{-Score} \leq -2$) in men have a lower reading ability of 15 points and women have 11 points compared to mild ones ($Z\text{-Score} > -2$). This results in a decrease in intelligence (IQ), so learning achievement is low. Because of that, children who suffer short impact not only on the shorter physical course but also on intelligence, productivity and future performance after adulthood, so that it will become a burden on the state. Short on toddlers can inhibit child development, with negative impacts that will take place in later life such as intellectual decline, susceptibility to non-communicable diseases, decreased productivity to cause poverty and the risk of giving birth to babies with low birth weight.²

Environmental sanitation and hygiene factors affect the health of pregnant women and child development because children under two years are susceptible to various infections and diseases. Continuous exposure to human and animal feces can cause chronic bacterial infections. The infections were caused by poor sanitation and hygiene practices are poor, making it difficult nutrients absorbed by the body. The low sanitation and environmental hygiene trigger digestive tract disorders, which makes energy for growth diverted to the body's resistance to infection. A study found that the more often a child suffers from diarrhea, the greater the short threat. In addition, when children are sick, their appetite is usually reduced, so that nutritional intake is lower. So, brain cell growth that should be very rapid in the first two years of a child becomes obstructed. The impact, the child is in danger to suffer short, resulting in impaired mental and physical growth, so that his potential cannot develop optimally.³

Short toddlers child describes the existence of chronic nutritional problems, influenced by maternal/prospective maternal conditions, fetal and infancy period, including illnesses during infancy. Like other nutritional problems, not only related to health problems but also influenced by various other conditions that indirectly influence health. Specific nutrition interventions are generally carried out in the health sector, but only contribute 30%, while 70% is the contribution of sensitive nutrition interventions that involve various sectors such as food security, availability of clean water and sanitation, poverty alleviation, education, social, etc.⁴

Indonesia ranks fifth in the world for the number of children stunted. More than a third of children under the age of five in Indonesia are below average. Basic Health Research in 2013 noted the prevalence of national stunted reached 37.2 percent, an increase from 2010 (35.6%) and 2007 (36.8%). That is, the growth not optimal afflicts about 8.9 million children in Indonesia, or one out of three children in Indonesia. Stunted prevalence in Indonesia is higher than other countries in Southeast

Asia, such as Myanmar (35%), Vietnam (23%), and Thailand (16%).³

Prevalence stunted and severely stunted children under five years of 0-59 months, West Java Province amounted to 29.2%, while to District Banyumas prevalence stunted and severely stunted by 20.0%.⁵ This study aims to determine the difference in z-score H/A in Subdistrict Purwojati, District Banyumas, Central Java, Indonesian. While the research hypothesis there is there is a difference average z-score H/A based nutrient intake, infections and sanitary aspects..

METHODS

The research was conducted on 10 villages in Subdistrict Purwojati, District Banyumas, Java Central Indonesia in 2017. The cross-sectional study design with population is households that have children aged 6-35 months. A sample of 348 children aged 6-35 months was taken by the cluster using a design effect of 2. As an exclusion criterion is a child who experiences body posture abnormalities so that he cannot measure height. The length of the child's body is measured used a longboard capacity of 200.0 cm accurate 0.1 cm and height be measured microtoise capacity 200.0 cm with accurate 0.1 cm. Analyzed using software Anthro WHO, 2006. Nutritional intake was measured by recall method 24 hours ago in a row, nutrients analyzed by Nutri Survey software. Data on infectious diseases were measured by asking the mother of the child about an infectious disease suffered by a child in the past month, while sanitation was measured through observations and interviews. To prove hypothesis research used two unpaired samples of a t-test.

RESULTS

Gender and age of a child

Most of the respondents were male, while for the majority of ages 12-24 months (Figure 1).

Education and work of parents

Most mothers finish at the secondary level. For most mothers work as households, and fathers mostly work as labourers (Figure 2).

Zscore H/A and respondent's nutrient intake

Zscore H/A ranges between - 4:28 to 5:27, energy intake ranged 210.0 until 1783.06 kcal, protein intakes ranges from 8.2 to 124.00 grams, fat intake ranges from 10.00 to 161.0 grams, while carbohydrate intake ranges from 10.30 to 204.0 gram. Zscore and the intake of nutrients in Table 1 are as follows:

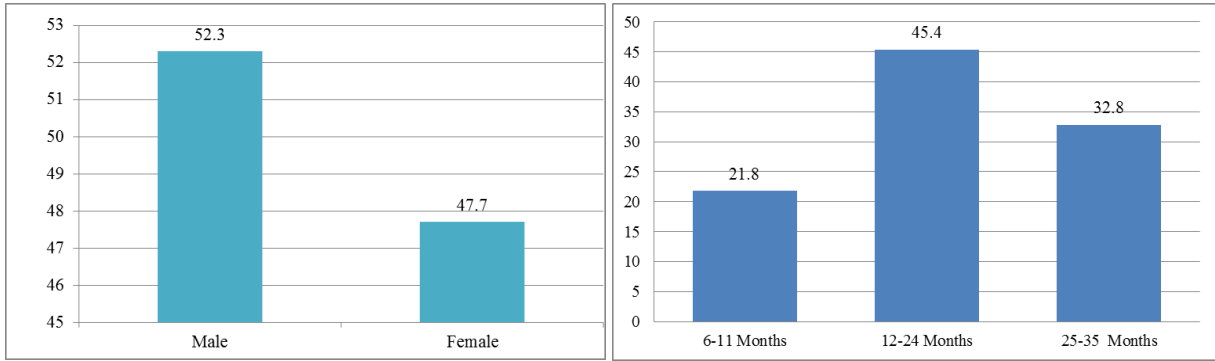


Figure 1: Percent gender and age of a child.

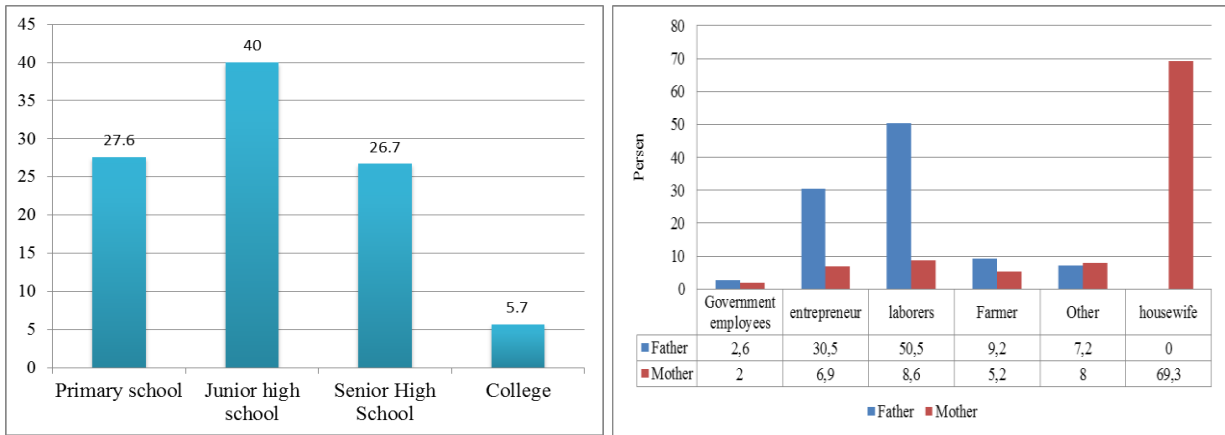


Figure 2: Percent older education and employment.

Table 1: Value of Zscore H/A and intake of macro nutrients.

| Variables | Min | Max | Average±SD | Std Error | 95% confidence interval |
|------------------|-------|---------|---------------|-----------|-------------------------|
| Zscore H/A | -4.28 | 5.27 | -0.5722±1.646 | ± 0.088 | -0.7504 to -0.4083 |
| Energy (kcal) | 210.0 | 1783.06 | 860.77±286.10 | ± 15.336 | 832.14-890.54 |
| Protein (g) | 8.20 | 124.00 | 29,8116±15.09 | ± 0.880 | 28.34-31.47 |
| Fat (g) | 10.90 | 161.00 | 80.44±17.77 | ± 0.953 | 38.64-42.23 |
| Carbohydrate (g) | 10.30 | 204.30 | 99.35±35.86 | ± 1.922 | 95.59 – 103.31 |

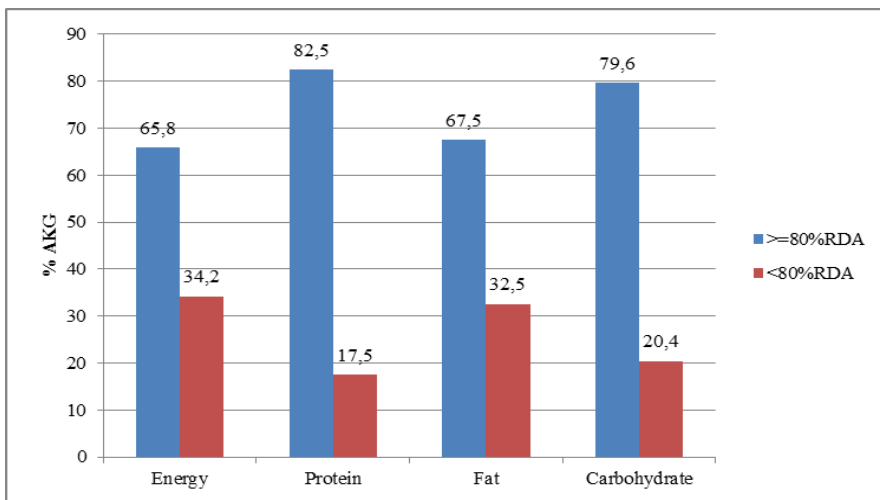


Figure 3: Percent adequacy of macronutrient intake.

In general, the average intake of macronutrients is close to the amount of Adequacy Recommended for Indonesians in 2013.⁶ Only a small percentage of respondents who have a low intake of macronutrients is 80% RDA as shown in the Figure 3.

Disease and sanitation infections

The analysis showed that in the last month their children who suffer from the disease of measles, diarrhea and above Acute Respiratory Infection. For sanitation shows that most of the houses are the less healthy category, most families manage waste categories less, there are still family-storey houses made of a floor made of cement and there are still families who that rarely clean latrines.

Table 2: Infection in children and house sanitation.

| Parameter | N | % |
|---------------------------------|-----|------|
| Infectious disease | | |
| Measles | | |
| Yes | 20 | 5.7 |
| No | 328 | 94.3 |
| Diarrhea | | |
| Yes | 44 | 12.6 |
| No | 304 | 87.4 |
| Upper tract infection | | |
| Yes | 45 | 12.9 |
| No | 303 | 87.1 |
| Sanitation | | |
| Home status | | |
| Healthy | 110 | 31.6 |
| Unwell | 238 | 68.4 |
| Waste management | | |
| Good | 28 | 8.0 |
| Poor | 320 | 92.0 |
| Clean the latrine | | |
| Yes | 316 | 90.8 |
| No | 32 | 9.2 |
| Drinking water resources | | |
| Drinking water company | 108 | 31.1 |
| No drinking water company | 240 | 68.9 |

The difference in the average Z-score is based on nutrient intake

On average z-score H/A based on intake of energy, protein, fat and carbohydrates. The analysis showed an average z-score H/A based on intake of energy that groups of children with $\geq 80.0\%$ RDA. Daily intake of energy, the average position z-score H/A closer to the median than the group of children energy intake $< 80.0\%$ RDA. While the average position of z-score H/A in the group of children on protein intake and fat intake $\geq 80.0\%$ RDA that the average position of z-score H/A is closer to the median compared to the group of children with energy intake and fat intake $< 80.0\%$ RDA. While the average position of the median z-score H/A group of children on carbohydrate intake $\geq 80.0\%$ RDA almost equal to the average position of the median z-score H/A compared with the group of children intake carbohydrates $< 80.0\%$ RDA. In whole was no significant difference ($p > 0.05$) average z-score H/A based on the intake of energy, protein, fat and carbohydrates (Table 3).

Average Z-Score H/A based on infectious diseases

The analysis showed that the average z-score position of the group of children suffering from measles was further to the median compared to the average position of z-score children who did not suffer from measles. Whereas the average position of z-score children who do not suffer from diarrhea and ARI, the average z-score is closer to the median. However, statically there were no significant differences ($p > 0.05$) on average zscore H/A based on measles, diarrhea and upper respiratory tract infection (Table 4).

Average z-score H/A based on sanitation

The results of the analysis show that the average position of z-score children who live in a healthy house status, good waste management method and type of ceramic house floor, the average position of z-score H/A is closer to the median compared to a less healthy home status, waste management is not good and the home floor is made of cement (Table 5).

Tabel 3: Average H/A children aged 6-35 months based on nutrient intake.

| Indicator of intake | N | Average zscore H/A \pm SD | Std.Mean error | Average difference | df | Sig |
|----------------------------|-----|-----------------------------|----------------|--------------------|-----|-------|
| Energy intake | | | | | | |
| $\geq 80\%$ RDA | 117 | -0.559 \pm 1.668 | \pm 0.155 | 0.030 | 346 | 0.871 |
| $< 80\%$ RDA | 231 | -0.589 \pm 1.639 | \pm 0.107 | | | |
| Protein intake | | | | | | |
| $\geq 80\%$ RDA | 287 | -0.608 \pm 1.603 | \pm 0.338 | 0.207 | 346 | 0.371 |
| $< 80\%$ RDA | 61 | -0.400 \pm 1.838 | \pm 0.334 | | | |
| Fat intake | | | | | | |
| $\geq 80\%$ RDA | 235 | -0.563 \pm 1.674 | \pm 0.109 | 0.028 | 346 | 0.882 |
| $< 80\%$ RDA | 113 | -0.591 \pm 1.593 | \pm 0.149 | | | |
| Carbohydrate intake | | | | | | |
| $\geq 80\%$ RDA | 277 | -0.611 \pm 1.608 | \pm 0.096 | 0.191 | 346 | 0.382 |
| $< 80\%$ RDA | 71 | -0.419 \pm 1.789 | \pm 0.212 | | | |

Table 4. Average H/A children aged 6-35 months based on the intake of infectious diseases.

| Infection indicator | N | Average Z-score H/A±SD | Std. Mean error | Average difference | df | Sig |
|---------------------|-----|------------------------|-----------------|--------------------|-----|-------|
| Measles | | | | | | |
| Yes | 5 | -0.6760±1.233 | ±0.5514 | 0.105 | 346 | 0.887 |
| No | 343 | -0.5706±1.657 | ±0.089 | | | |
| Diarrhea | | | | | | |
| Yes | 44 | -0.411±1.488 | ±0.224 | 0.183 | 346 | 0.489 |
| No | 304 | -0.595±1.668 | ±0.095 | | | |
| ARI | | | | | | |
| Yes | 45 | -0.394±1.636 | ±0.243 | 0.203 | 346 | 0.439 |
| No | 303 | -0.598±1.648 | ±0.094 | | | |

Table 5: Average H/A children aged 6-35 months based on sanitation.

| Sanitation indicators | N | Average z-score H/A±SD | Std. mean error | Average Difference | d f | sig |
|---------------------------------|-----|------------------------|-----------------|--------------------|-----|--------|
| Home status | | | | | | |
| Healthy | 110 | -0.372±1.577 | ±0.150 | 0.291 | 346 | 0.124 |
| No healthy | 238 | -0.664±1.672 | ±0.108 | | | |
| Waste disposal | | | | | | |
| Good | 28 | -0.361±1.871 | ±0.353 | 0.481 | 346 | 0.481 |
| Poor | 320 | -0.590±1.626 | ±0.090 | | | |
| Clean the latrine | | | | | | |
| Yes | 316 | -0.512±1.633 | ±0.091 | 0.652 | 346 | 0.032* |
| No | 32 | -1.164±1.677 | ±0.296 | | | |
| Drinking water resources | | | | | | |
| Drinking water company | 108 | -0.3459±1.690 | ±0.162 | 0.328 | 346 | 0.085 |
| No drinking water company | 240 | -0.9162±1.618 | ±0.104 | | | |

*p<0.05

Children who live in families who clean toilets are obtained on average z-score H/A of -0.512±1.633 higher in the bins with an average z-score of -1.164±1.677. The results of the t- test showed that there were significant differences (p=0.032) on the average score of H/A based on the status of maintaining the cleanliness of the latrines.

DISCUSSION

About nutrient intake, the research results do not match the findings of Chastity that protein deficiencies will give effect to height or short growth disorders. Growth disruption is a nutritional problem that is affected by poor consumption for a long time.⁷ Likewise for infections, the results of this study are in accordance with the study of Nurcahyo that the incidence of upper respiratory tract infection in children under five years not related to the nutritional status of H/A. In contrast to Anshori's (2013) study which states that children with a history of infectious diseases such as ARI are 4 times more likely to have a short (p=0.023) than children without a history of infectious diseases.⁸ While Scrimshaw et al stated that there is a very close relationship between infection (bacteria, viruses and parasites) and malnutrition. They

emphasize the synergistic interaction between wrong nutrition and infectious diseases, and also infections will affect nutritional status and accelerate malnutrition.⁹

The overall sanitation of the home environment is seen based on the components of the house of the sky (ceiling, walls, floors, bedroom windows, living room windows, ventilation, kitchen smoke disposal facilities, lighting) and sanitation facilities (clean water facilities, latrines, waste disposal facilities and garbage disposal facilities).¹⁰ The results of the analysis showed that there was a significant relationship (p=0.017) between short events with maternal sanitation hygiene behaviour. Food sanitation hygiene has a positive impact on the state of children's nutritional status. children who consume food with poor hygiene due to contamination from toilets that are not cleaned can cause infectious diseases. This condition can reduce the nutritional state of children and have bad implications for the child's growth progress, which can manifest shortly.¹¹ Another study stated there meaningful relationships between facilities defecation and the type of latrine used with short events in children under two years old. From the OR value, it can be concluded that families who use defecation facilities are

not feasible, children have a risk to suffer short 1.2 times higher than children from families who use good defecation facilities. Types of latrines that are not suitable for use increase the risk of children to suffer short 1.3 times higher compared to families who use decent latrines.¹² The results of path analysis showed that the nutritional intake, history of infections, maternal nutrition knowledge, healthy hygienic behaviour and conscious nutrients have a positive influence and significant against short events.¹³ The results of the multiple logistic regression model show that after the movement by the age of children under 2 years of age, children from families with unreached water sources and inappropriate types of latrines are at risk for short-lived 1.3 times higher than children from families with protected water sources and types of latrines clean.¹² Research conducted by Torlesse, Cronin, Sebayang and Nandy (2016) found that the opportunity to experience short in households that drink water not treated more than three times higher if the household uses container inadequate water, while households that drink treated water short the possibility of 27% higher if the household uses inadequate latrines.¹⁴ Dean et al also concluded that the effects of poor sanitation have an impact on growth in India.¹⁵ Furthermore, Joe explained that inflammation caused by infection due to lack of clean water and poor sanitation contributes to stunting.¹⁶ While the results of research by Zeritu et al in the Butajira Town and Surrounding District, Gurage Zone, Southern Ethiopia stated that children aged 24-59 months who experienced repeated attacks of acute respiratory infections risk 2 times stunting; OR=2.07 (95% CI=1.13, 3.56).¹⁷ Whereas Cumming and Cairncross in South Asia and Sub-Saharan Africa found that water, sanitation and hygiene interventions were strategies to reduce stunting, that poor water, sanitation and hygiene conditions had a significant effect on children's growth and development.¹⁸ Spears explain that open defecation, which is exceptionally widespread in India, can account for much or all of the excess stunting in India.¹⁹

CONCLUSION

Respondents consisted of 52.3% of boys, 45.4% of 12-23 months of age, 30% of respondent fathers working as entrepreneurs, 67.5% of mothers as housewives, 39.9% of junior high school mothers. Most of the energy, protein, fats, and carbohydrates intake over the 80% of then Recommended Dietary Allowance/RDA and a small proportion of children suffering from measles, upper tract infection/acute respiratory infection and diarrhea. For sanitation 68.4% of houses are in poor condition, waste management is poor 92%, non-plumbing sources 68.9%, dirty latrine conditions 19.3% and toilets not cleaned 92.2%. There was no average difference in Z-score H/A based on nutrient intake, house status, waste management, and water sources, but there were significant differences ($p=0.032$) on average z-score H/A based on maintaining toilet cleanliness.

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