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Impact of socioeconomic change and hygiene sanitation during pandemic COVID-19 towards stunting

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ABSTRACT

The global COVID-19 pandemic has raised the risk of malnutrition in children under five years, including stunting. Stunting is common in low-income regions, when families cannot afford nutritious meals. Stunting may become more common as a result of changes in family socioeconomic circumstances, personal cleanliness, and environmental sanitation during the pandemic. This study determined the effect of socioeconomic factors and hygiene sanitation during COVID-19 pandemic on the incidence of stunting in coastal areas. This was analytical survey research with cross sectional approach. The total sample was 3886 families who had toddlers aged 0-59 months in the coastal areas in Surabaya City, Indonesia. The study found that low family income, hand-washing habits, clean water sources, sewer access, waste management, and healthy latrine have significant impact to malnutrition, especially stunting.

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1. INTRODUCTION

During the COVID-19 Pandemic, millions of people over the world were endangered by health concerns and a food security crises that affected the adequacy of nutritional demands. In the long run, a food emergency situation that may arise during the COVID-19 pandemic could compromise the global food system's function. Due to the COVID 19 outbreak, food security data suggests that 135 million people are in a food crisis, with 49 million falling into the very poor group. During the epidemic, 47 million children in the wasting group are affected, 144 million children under the age of five are having delayed growth as a result of the food crisis [1].

In fact, even before the pandemic, Indonesia was faced with the problem of stunting and was among the top five countries with the largest cases of stunting under five in the world. Since 2007, according to the results of basic health research, the prevalence of stunting under five has reached 36.8% and increased to 37.2% in 2013. New hope emerged when the prevalence of stunting was successfully reduced in 2018 to 30.8%. Even though it is still categorized as "high" according to the WHO classification, this decrease indicates that the interventions carried out by the government are starting to show results. The results of the Nutrition Status Monitoring by the Surabaya Health Service in 2018 stated that the %age of stunting under five was 8.92%, with very short details was 2.04% and short was 6.88% [2]. Based on the screening carried out in 2021 in a coastal area in the city of Surabaya, it was found that the incidence of stunting under five was found to be 23%.

Stunting is a central issue because it is a reflection of the next generation of the Indonesian nation. Stunting children not only experience growth delays, but also their brain development. Children are also susceptible to disease and as adults are at risk of developing diseases such as heart disease and diabetes mellitus. As is known, heart disease and diabetes are two of the three major causes of death in Indonesia. You can imagine, if currently many Indonesian children suffer from stunting, it will be difficult to compete with other nations in facing the global era.

Efforts made by the government in handling malnutrition prior to the COVID-19 pandemic could be carried out by monitoring the growth and development of children at the posyandu, but during the COVID-19 pandemic, posyandu activities in an effort to monitor child growth and development were stopped (priority was only for toddlers who had a high risk of malnutrition) so that This makes it difficult for mothers of toddlers to access health information, especially related to child feeding patterns.

Another cause of stunting is low hygiene and environmental sanitation [3]. The central government finally focused on completing sanitation so as to encourage regions to also accelerate the process of achieving 100% community sanitation even though they had to revise the completion from 2019 according to the MDGs to 2020. Around 23.09% of Indonesians are practicing open defecation; 9.37% of the people use defecation facilities in the form of piers; and only around 67.5% of the community has proper sanitation facilities in the form of septic tanks. The achievement of hygiene and sanitation is proclaimed by the government in a Community-Based Sanitation Program, which includes: open defecation free (ODF), hand washing with soap, household drinking water treatment, household waste treatment and waste water management facilities [4].

Based on this background, an in-depth study was conducted on the relationship between socioeconomic factors and sanitation hygiene on the incidence of stunting in children under five who live in the coastal city of Surabaya. This research is expected to be an input in order to improve the health status of the community, especially for toddlers in the midst of the COVID-19 pandemic. The determining socio-demographic risk factor and hygiene sanitation that contributed to the declined stunting children during COVID-19 Pandemic are inputs for health workers to find the right solution in handling stunting. Solutions could be conducted to overcome the risk factors that were invented in this research.

2. RESEARCH METHOD

This study employed a case control design, which is an analytical study that analyzes causal relationships using reverse logic, i.e. determining the disease (outcome) before determining the cause (risk factor). The population of this study was mothers who had toddlers aged 0-59 months in the coastal areas in Surabaya City, Indonesia. Determining sample by nutritional status screening was undertaken from 3,886 children under five. Nutritional status was measured height by age and divided into two groups such as stunting and normal. The screening resulted 897 children severe with stunting.

Respondents in this study were mothers of children under five. To evaluate independent variables towards stunting, the researchers used a Google Form to fill out a questionnaire on socioeconomic and hygiene sanitation parameters. The sample filled the instruments were divided into two groups of 897 families with stunting children and 897 families with normal children. Instrument contents were adopted from Questionnaire Baseline 2020 by Society Welfare Section of Surabaya Government [5]. The Questionnaire used a reliability test with Cronbach's alpha coefficient of 0.919 and a validity test with Pearson Corelation r >0.05 for each content.

3. RESULTS AND DISCUSSION

3.1. Socio-economic conditions on the nutritional status of stunting toddlers

Beyond the health sector, the COVID-19 pandemic in Indonesia has had a significant socioeconomic impact. The impact is multi-sectoral, and its consequences will be felt for a long time, disproportionately affecting the poor and vulnerable. At this moment, estimating the extent of the damage is difficult. While the government is working to mitigate the effects, the pandemic will have a significant impact on households, particularly the poor and most vulnerable. Female-headed households, as well as their children, will be disproportionately impacted. The first stage in gathering data and generating evidence to assist mitigate the impact of the epidemic is to monitor sand assess the socioeconomic impact on stunting. Socioeconomic status has been defined in a number of ways, the most frequent of which are gender, maternal education, maternal employed status, and family income.

3.1.1. Gender

One of the factors that can influence parenting is gender preference. In some countries, mothers provide parenting with different priorities based on their gender. For example, mothers prefer to give the best food to boys than girls; mothers give the best care to boys only. It can be seen in Figure 1. Toddlers as the research sample consisted of 51.8% male and 48.2% female. There are 25.5% male stunting toddlers and 24.5% stunting female toddlers. Gender is usually associated with physical activity, where in general boys tend to be more active than girls so that boys' food consumption requires more energy.

3.1.2. Maternal education

Higher education is based on the mother's education level of at least high school, while low education if the mother has not graduated from high school or is below high school. Based on this research, the distribution of respondents' education level based on the nutritional status of children under five is as follows as shown in Figure 2. The data shows that 57.91% of mothers under five have low education and 42.09% have high education. The case of stunting toddlers was 31.49% of toddlers with mothers with low education, while children with good nutrition 26.42% had mothers with low education.

Figure 1. Gender with stunting in the coastal area during the COVID-19 pandemic

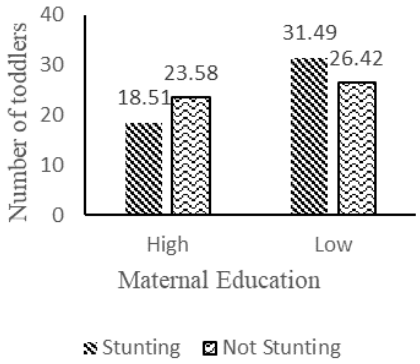

Figure 2. Maternal education with stunting on the coastal during the COVID-19 pandemic

3.1.3. Maternal employed status

Before the pandemic, the mother's work factor showed a focus on eating and maternal health care for toddlers. Working mothers tend to have limited time to pay attention to the upbringing of their children. The role of parenting will be dominated by caregivers such as housemaids, relatives or grandmothers who take care of toddlers while the mother is working. Based on the previous research conducted before the COVID 19 pandemic in 2019, it showed that there was an influence between working mothers and the nutritional status of toddlers [5]. In research during this pandemic, the following correlations were produced. Maternal employed status with stunting in the coastal area during the COVID-19 pandemic can be shown in Figure 3.

Figure 3 shows that majority (77 %) of mothers under five do not work, as many as 11.9 % of mothers with stunting toddlers who work. The number of mothers under five who do not work due to a reduction in the workforce due to several industrial and economic sectors closing their businesses. This has resulted in high unemployment rates during the COVID-19 pandemic.

3.1.4. Family income

Economic conditions are one of aspect that is measured in determining success of a country. One of the characteristics of the family is the level of family income. Family with middle to lower economic status, enable the consumption of food and nutrition especially in toddlers is low and it affects nutritional status of toddlers as shown in Figure 4. The figure shows that the level of family income is mostly low income with a age of 81.8% and a small portion of high income with a %age of 18.2 %. The results of the research above show that people who have low incomes or below minimum wage from their work only to meet their daily needs.

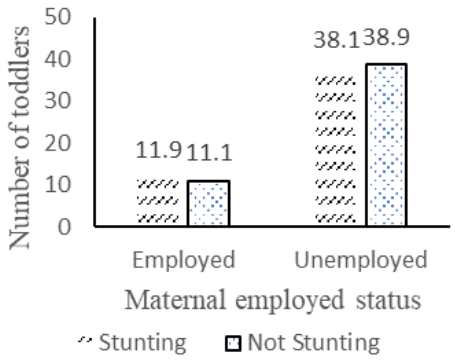

Figure 3. Maternal employed status with stunting toddlers during the COVID 19 Pandemic

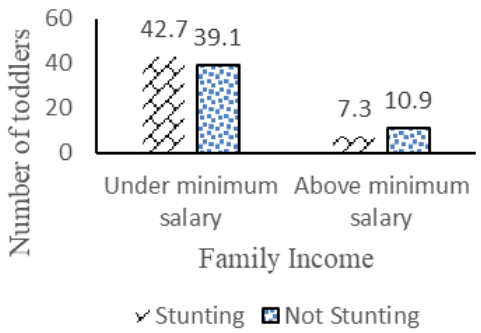

Figure 4. Family income with stunting incidents in during the COVID-19 pandemic

3.2. Factors of hygiene sanitation on stunting

Personal hygiene is evidenced by the mother's habit of hand-washing properly before eating and before caring for toddlers. Healthy sanitary is indicated by observations on the availability of clean water sources, sewer, waste management, and healthy latrine. Data shows hand washing has a big impact, one of which is stunting or problematic intake/nutrition can be seen in Table 1.

Table 1. Variables of hygiene sanitation on stunting on the coastal area during the COVID-19 pandemic

Variables	Stunting %	No stunting %
Hand-washing		
Yes	33.1	42.0
No	16.9	8.0
Clean water sources		
Qualified	44.8	48.3
Not qualified	4.8	1.4
Not available	0.4	0.3
Sewer		
Qualified	44.9	48.8
Not qualified	4.7	0.9
Not available	0.3	0.3
Waste management		
Qualified	37.1	43.1
Not qualified	11.4	5.9
Not available	1.5	1.0
Healthy latrine		
Available	45.6	48.9
Not available	4.4	1.1

The table shows that most of normal toddler (not stunted) wash hand correctly, having clean water sources, proper sewer, qualified waste management, and having healthy latrine. Nevertheless, most of the respondents have healthy latrines, which is 94.5%. However, stunting cases are more common in toddlers who live in an environment where there are no hand-washing, no clean water, no sewer, no waste management and no healthy latrines.

3.3. Risk factors on influential determinants

An OR is the ratio of odds of an outcome between two groups. "Odds" are defined as the ratio of the chance of an outcome occurring to the probability of that result not occurring. Although the magnitude of change in result as a function of change in predictor does not simply convert into vernacular effect sizes, several commentary on how to interpret the magnitude of change in outcome as a function of change in predictor have been published [6]. Standardised reporting rules were developed in response to concerns about the accuracy of statistical reporting that guides medical and public health practice (eg, strengthening the reporting of observational studies in epidemiology). We omitted bivariable studies without covariates (almost always trials), in which authors may rely on descriptive results to depict effect size and utilize ORs as statistical tests by using logistic regression to estimate effect sizes. The result is shown in Table 2.

Stunting rate in Indonesia is still fairly high (37%). In comparison, the WHO norm is less than 20%. According to this study, stunting is prevalent in coastal areas at a rate of 23%. Furthermore, the government must address this issue in order to lower stunting rates [7].

In order to investigate the effect of son preference on the phenomenon of stunting, we test two independent models, one with ideal number of boys as the intervening variable and the other with ideal number of girls as the intervening variable. These two intervening variables are evaluated separately for two sub-samples of mothers with a current boy kid and another sub-sample of mothers with a current girl child at the time of the survey, as well as their direct impacts on stunting scores.

Table 2. Logistic regression of socioeconomic and hygiene sanitation towards sunting

Variable	p value	OR	Note
Gender	0.320	0.4	Not significant
Maternal education	0.198	3.6	Not significant
Maternal employed	0.521	0.7	Not significant
Family income	0.002	15.4	Significant
Hand-washing	0.000	75.3	Significant
Clean water sources	0.001	29.1	Significant
Sewer	0.007	36.9	Significant
Waste management	0.001	33.8	Significant
Healthy latrine	0.001	37.2	Significant

The economic factors in families of children under five are categorized into two, namely: income below the minimum wage and above the minimum wage in Surabaya City area. Income below the minimum wage is categorized as low income and above the minimum wage is called high income. The higher the income of a family, the higher the health status of the family. In accordance with the East Java Governor's Decree number 188/498/KPTS/013/2020, the minimum wage for the City of Surabaya is IDR 4,300,479.19 [8]. The following are the results of family income research on stunting toddlers.

TheChi-square test resulted that there is a significant link between family income and nutritional status of toddlers according to height based on age in toddlers in the coastal area, with p value=0.002 and OR=15.4. The odds ratio shows that family income has higher impact to stunting between the other socioeconomic determinants. Table 2 shows logistic regression test results which also proved that most of socioeconomic changes during pandemic COVID-19 have no impact to increasing of stunting status in coastal areas, but only family income has impact in increasing stunting. The previous study were consistent that proved stunting in toddlers aged 24-59 months and identified a significant link between family income and the prevalence of stunting with a p-value of 0.08 [9].

The COVID-19 epidemic had a significant influence on family income. As a precaution against the spread of COVID-19, physical separation, local lockdown, and school closure were implemented [10]. There were reductions or closures of business activities in various industries, and some workers had salary reductions or delays, while many others were laid off from their jobs. Almost all families had to alter their lifestyles as a result of the difficult economic environment. Many families were forced to rethink their buying choices. People will just purchase what they require and may choose for lower-quality things. This circumstance also influence families' choices of nutritious foods for their children's growth and development.

The purchasing power of families for healthy food is influenced by family income, according to latest research during pandemic, because the type of food to be purchased is determined by the degree of income. The purchase power of a family's food is proportional to its income [11]. It is possible to meet the food needs of all family members with a large salary. On the other side, poor household food purchasing power is a result of low family income. Food goods with limited purchasing power do not meet the nutritious foods of children under the age of five.

Gender inequality in children's health, nutrition, and education has been documented in South Asia, according to the research [12]. Nuclear family children are more likely to be stunted than non-nuclear family children, but the effect is more severe for female children. The education of mothers has emerged as one of the most important factors in reducing the risk of stunting in both male and female offspring. Male children appear to benefit more from the effect than female youngsters. The likelihood of malnutrition in male and female children is unaffected by household income status or the living situation index.

People with greater levels of education are more proactive in their approach to prevention, are more knowledgeable about health issues, and have better health [13]. Mother's education plays a role in determining the nutritional status of children, because mothers with a good level of education are considered to have sufficient knowledge to choose the right menu for their children.

The statistical test revealed that there is no link between working moms' status and the incidence of stunting in children under the age of five. Previous research conducted prior to the 2017 pandemi found no link between the status of working mothers and stunting. It is possible that working mothers have provided good education to caregivers in terms of feeding and parenting patterns. However, for mothers of children under five who do not work and take care of their own children, but the child is in a state of stunting nutritional status, it is necessary to examine in depth other factors that cause stunting that may occur. Indeed, the majority of mothers of children under five in coastal areas do not work, they are expected to be able to take better care of toddlers, but it turns out that stunting cases in coastal areas are still common [14].

The socioeconomic status of the family is one of the factors that influence a person's nutritional status. Socio-economic status in the family is a combination of social factors and social economic factors in socio-economic status including the state of the population of a community, family circumstances, parents' education level, and home conditions. While the economic data factors in socioeconomic status include parents' occupations, family income, family expenditures, and food prices which depend on the market and seasonal variations [15]. Family income has an impact on a person's ability to get particular foods, which has an impact on children's nutritional status. Family income is related to family food security. Someone with low socioeconomic status has limited ability to access certain foods, so they are at risk of consuming less food. Inadequate food security in families can lead to nutritional problems in children, one of which is stunting.

Meanwhile, it is linked to a lack of access to various facilities and opportunities, discrimination, and a weak position in the decision-making process from a political standpoint [16]. For families with high incomes, they are more focused on fulfilling proper basic needs such as food, clothing, housing, education and others [17]. A family's degree of education, particularly that of the mother, might have an impact on the nutritional health of its children. The absence of parental attention to child nutrition is one of the causes of malnutrition in children. This is related to family parenting, especially mothers, which will determine feeding to children including exclusive breastfeeding behavior, giving complementary feeding, and determining the choice of food given to children.

Other factors such as sanitation and food safety are also known to increase the risk of infectious diseases [18]. In 2021, based on data from the Joint Child Malnutrition Estimate, countries with a high number of upper middle-class people could reduce stunting rates by 64%, while in lower middle-class countries it was only reduced by around 24%. Hand-washing showed hygiene personal, meanwhile sanitation are performed by variables such as clean water sources, sewer, waste management and healthy latrine [19].

Diarrhea is a common illness among children. Recurrent diarrhea in a child, especially in the first 1,000 days of life, indicates that he or she is not obtaining enough nourishment. Stunting in children is caused by malnutrition. Based on the information presented above, it is reasonable to assume that if a child is attentive in washing his hands, he can lower his risk of diarrhea. If toddlers don't get diarrhea, the nutrients will be better absorbed and lowering risk of stunting. The relationship between soapy hands and stunting is proved.

Stunting is more than just a lack of adequate food or access to facilities. But it comes from the people themselves. This is a problem that affects everyone, not just the impoverished. The rate of stunting among the wealthy remains high. As a result, it is vital to continue to run ads to remind people about the significance of washing their hands with soap to avoid stunting.

One of the most effective ways to protect yourself and others from disease is good personal hygiene. In this case hand-washing, bathing, not coughing or sneezing on others, cleaning things that are touched if unsanitary (in this case infectious diseases), throwing garbage in its place, and using proper personal protective equipment (such as gloves, cup) when we may be at risk of contracting an infectious disease. Hand-washing with soap is a sanitary measure to break the chain of germs and viruses. One of the diseases that can be prevented is diarrhea. Agus said, diarrhea can be prevented up to 45% if hand-washing with soap is done properly. This diarrheal disease is also very influential on other health problems that can have an impact on the problem of malnutrition [20].

Most communities are aware that lack of hand hygiene, “poor” eating and drinking habits, ingesting soil or animal waste are risks of enteric infection for young children, but they fail to stop the specific pathways of exposure to faecal pathogens (i.e. excreta and animal waste exposure), and environmental sanitation (i.e. hand-washing with soap, boiling water) [21]. Some unsafe hygiene behaviors, defined as household hygiene and personal hygiene behaviors that may pose an additional risk of exposure to faecal pathogens and enteric infections in infants. Unsafe food hygiene behavior in the presence of local preferences for cooking and eating practices that can increase the risk of exposure to faeces in infants.

Most stunting toddlers are in an environment with proper waste disposal. However, the number of stunting toddlers who have sewers that do not meet the requirements is much higher than those with normal nutrition. Disposal of waste that meets the requirements will prevent the occurrence of ongoing infectious diseases of children under five which in turn will worsen the condition of nutritional status. Based on the Chi

Square test, it was found that there was a relationship between the eligible sewers and the incidence of stunting. This is also one of the indicators in the water, stunting, sanitation, and hygiene (WASH) integrated program.

There is some evidence of a relationship between environmental factors like access to water and sanitation and lower rates of diarrhea, which is also a predictor of child nutrition. A multi-village initiative in Ethiopia, for example, selected 11 communities for health, education, WASH treatments, or an integrated strategy combining health, education, and WASH. Stunting was reduced significantly in the intervention group that received integrated health, education, and WASH activities, which was linked to greater access to WASH services and mother awareness about diarrhea causes and hygiene practices [22]. Environmental cleanliness, the presence of toilets, and other environmental elements such as wetness and dryness can all influence hygiene practices (although the latter is beyond the scope of the factors investigated in this review). This finding is in line with a population-based sample study of mothers in their third trimester who were followed up on until their baby became 12 months old.

In Ethiopia, open defecation was found to be substantially linked with stunting when combined with the lack of a proper toilet and/or insufficient toilet use. Randomized controlled trials, such as the large-scale sanitation hygiene infant nutrition efficacy (SHINE) project, have found no link between WASH and stunting [23]. Some researchers speculate that most trial participants already had access to basic latrines and better sources of drinking water, and that low rates of open defecation may have resulted in a weaker link between WASH and stunting [24].

Clean and healthy living behavior is defined as a set of behaviors that are practiced on the basis of awareness as a result of learning and that enable a person, family, or community to help themselves (independently) in the health sector and play an active part in achieving health [25]. A family's lifestyle that always pays attention to and maintains the health of all family members reflects clean and healthy living habits. Prevention is better than cure, this health principle is the basis for implementing the Health Behavior Program. Health behavior can be done at home; in public place; at school. Access to sanitation, especially the use of healthy latrines, is currently still a serious problem in many developing countries, such as Indonesia. The high number of open defecations in any place or open defecation is one indicator of this low access.

Another important factor that must be considered is that in determining the distance between the latrine and the source of clean water, it is recommended that it be 10 meters so that the clean water is not contaminated [26]. Maintenance of a good healthy family latrine is that the latrine floor should always be clean and there is no standing water, clean the latrine regularly so that the latrine space is always clean, inside the latrine there is no visible dirt, no insects (cockroaches, flies) and rats roaming around, available cleaning tools and if there is damage immediately repaired.

This study proves that the ownership of healthy latrines significantly affects the incidence of stunting. The function of the latrine from the aspect of environmental health, among others, can prevent the development of various diseases caused by human waste. Meanwhile, the serious impact of disposing of waste in any place causes soil, water and air pollution because it causes odors. Disposal of feces that is not managed properly has a worrying impact, especially on health and water quality for household and commercial purposes.

According to previous research, giving access to better drinking water sources and better household solid waste management could avoid 21.58% of stunting among children aged 0 to 5 in rural regions. This research reaffirms the importance of water and sanitation in preventing stunting [27], [28]. Base on data from the 2013 Indonesian Basic Health Research and discovered that home waste management is a significant factor of stunting [29]. Rahman and colleagues conducted a case-control research in Petobo village, Palu, Indonesia, and discovered a link between environmental sanitation and stunting [30]. Despite the fact that this study found a substantial link between environmental variables and stunting, it did not assess how much environmental factors influence stunting burden in rural Indonesia.

4. CONCLUSION

Low family income, hand-washing habits, clean water sources, sewer access, waste management, and a healthy latrine were all major social predictors of malnutrition. In both the research and control groups, there appears to be a decrease in the number of extra negative socio-demographic characteristics. These findings imply that in order for at-risk families to get social care and social protection intervention, multidisciplinary teams made up of health experts, social workers, and/or key workers should be integrated in preventative and optimal management. This can aid in the management of malnutrition, the prevention of recurrence, the protection of future children, and the treatment of maternal malnutrition.

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