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Determinant of stunting in children aged 12-24 months during the COVID-19 pandemic era in Makassar City

Determinante del retraso en el crecimiento en niños de 12 a 24 meses de edad durante la era de la pandemia de COVID-19 en la ciudad de Makassar

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SUMMARY

Objective: *The prevalence of stunting in Sulawesi Selatan after the pandemic has decreased. This is because the COVID-19 pandemic situation has made it difficult to conduct anthropometric measurements owing to a number of regulations enacted by the government to suppress the cases of COVID-19. The Sudiang Public Health Center is one of the biggest contributors to stunting in Makassar City with a prevalence of 11.06 %. This study aimed to assess the degree of risk of Low Body Weight (LBW), pregnancy checkups <4 times, incomplete basic vaccinations, non-exclusive breastfeeding, Acute Respiratory Infection (ARI)/ diarrhea infections, household income, and contaminated water sources on stunting during the pandemic.* **Methods:** *This study was an observational study with a control case epidemiology design. The sample was 140 respondents, namely 70 case children (stunting) and 70 control children (non-stunting). The statistical analysis used was the Chi-Square test and multiple logistic regression test. The results were expressed in the ODDS ratio.* **Results:** *The results of this study showed that there is a relationship between LBW (OR=4.0, 1.502-10.911, CI=95 %; ϱ=0.006), pregnancy checkups <4 times (OR=3.3, 1.319-8.753, CI=95 %; ϱ=0.011), non-exclusive breastfeeding (OR=2.4, 1.045-5.645, CI=95 %; ϱ=0.039), and ARI/ diarrhea infections (OR=4.3, 1.839-10.222, CI=95 %; ϱ=0.001) and stunting in children aged 12-24 months during the COVID-19 pandemic in Makassar City. The history of infectious disease is the most influential variable in the incidence of stunting.* **Conclusions:** *It is concluded that the risk of stunting is the highest in LBW children, with pregnancy checkups less than 4 times, non-exclusive breastfeeding, and infectious diseases such as ARI/diarrhea in the last three months.*

Keywords: *Determinant, stunting, children, COVID-19.*

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RESUMEN

Objetivo: *La prevalencia del retraso del crecimiento en Sulawesi Selatan después de la pandemia ha disminuido. Esto se debe a que la situación de la pandemia de COVID-19 ha dificultado la realización de mediciones antropométricas debido a una serie de regulaciones promulgadas por el gobierno para suprimir los casos de COVID-19. El Centro de Salud Pública de Sudiang es uno de los mayores contribuyentes al retraso del crecimiento en la ciudad de Makassar, con una prevalencia del 11,06 %. Este estudio tuvo como objetivo investigar el grado de riesgo de Bajo Peso Corporal (BPC), controles de embarazo <4 veces, vacunas básicas incompletas, lactancia materna no exclusiva, Infección Respiratoria Aguda (IRA)/infecciones diarreicas, ingreso familiar <UMR y efecto de la contaminación de las fuentes de agua sobre el retraso del crecimiento durante la pandemia.* **Métodos:** *Este estudio fue un estudio observacional con un diseño de epidemiología de casos control. La muestra fue de 140 encuestados, a saber, 70 casos de niños (retraso en el crecimiento) y 70 niños de control (sin retraso en el crecimiento). El análisis estadístico utilizado fue la prueba de Chi-cuadrado y la prueba de regresión logística múltiple. Los resultados se expresaron en ODDS ratio.* **Resultados***: Los resultados de este estudio mostraron que existe una relación entre BPC (OR=4,0, 1,502-10,911, IC=95 %; ϱ=0,006), controles de embarazo <4 veces (OR=3,3, 1,319-8,753, IC= 95 %; ϱ=0,011), lactancia materna no exclusiva (OR=2,4, 1,045-5,645, IC=95 %; ϱ=0,039), infecciones IRA/diarreicas (OR=4,3, 1,839-10,222, IC=95 %; ϱ=0,001) y retraso del crecimiento en niños de 12 a 24 meses durante la pandemia de COVID-19 en la ciudad de Makassar. La historia de enfermedades infecciosas es la variable más influyente en la incidencia del retraso del crecimiento.* **Conclusiones:** *Se concluye que el riesgo de desnutrición crónica es mayor en niños con BPC, con controles de embarazo menores a 4 veces, lactancia no exclusiva y enfermedades infecciosas como IRA/diarrea en los últimos tres meses.*

Palabras clave: *Determinante, retraso en el crecimiento, niños, COVID-19.*

INTRODUCTION

Stunting is a condition where the child's height/length by age is below -2 SD based on the World Health Organization (WHO) child growth standard curve, describing chronic malnutrition during the early period of growth and development. During the COVID-19 pandemic, children are invisible victims, considering the short-term and long-term impacts on the health, well-being, development, and future of children (1).

In 2017, there were 22.2 % or around 150,8 million children under five in the world categorized as stunted, more than half of these were in Asia (55 %) and another third in Africa (39 %). Of the 86.3 stunted children in Asia, the highest proportion came from South Asia (58.7 %) and the rest came from Central Asia (0.9 %). The stunted children prevalence data gathered by the WHO published in 2018 stated that Indonesia ranked third with the highest prevalence in the Southeast Asia region after Timor Leste (50.5 %) and India (38.4 %) with 36.4 % (2). Based on the Indonesian Child Nutritional Status Survey 2019 (ICNSS), the stunting prevalence is still relatively high, with a prevalence of 27.67 %. Indonesia is one of the countries with double burden conditions or multiple nutritional problems, which is characterized by the high prevalence of stunting and anemia in pregnant women. Based on United Nation International Children's Emergency Fund (UNICEF) World Bank stunting data for 2020, Indonesia's prevalence of stunting ranks 115th out of 151 countries in the world.

According to the ICNSS 2019, the prevalence of stunted children under five in South Sulawesi was 30.59 %. However, due to the COVID-19 pandemic, ICNSS 2020 could not take place as planned. This refers to health protocols that do not encourage physical contact; thus, anthropometric measurements for children cannot be carried out and data from the child survey for 2020 could not be obtained and the stunting rate for 2021 showed a decreased value to 27.4 % (3).

South Sulawesi itself is the sixth-ranked province contributing to the number of COVID-19 incidence in Indonesia. There were 61 419 confirmed cases in South Sulawesi or 3.7 % of the total national confirmed cases, with 931 deaths per day, or 1.5 % of the province's confirmed cases. The prevalence of stunted children under five in Makassar City in 2018 was 5.04 %. It increased to 8.16 % in 2019 and decreased to 7.14 % in 2020. In 2021 it was 5.23 %. One of the biggest contributors to stunting cases in Makassar City in 2021 was the

Sudiang Public Health Center with a stunting prevalence of 11.06 % (4).

Secondary data on the incidence of stunting in children aged 24-59 months in the working area of the Sudiang Public Health Center of Makassar City showed 49 very short children and 258 short children in 2020, while in 2021 showed 33 very short children and 227 short children. Incidences of stunting in children aged 12-24 months included 30 very short children and 165 short children in 2021, while until March 2022 there were 22 very short children and 107 short children across the working area of the Sudiang Public Health Center of Makassar City (5).

The upsurge in COVID-19 cases based on the data gathered leads to a decrease in stunting incidence, even though the increase in COVID-19 infection should also increase the risk of stunting in children. This decrease in stunting incidence is attributable to the constrained implementation of anthropometry measurements due to regulations that limit physical contact so that not all children were recorded because centers for pre-and postnatal health care and information were halted for 2 years, and parents were also afraid to bring their children to public health centers.

The COVID-19 pandemic that has been going on since 2 March 2020 in Indonesia has the potential to hinder access for mothers and children to optimal health services. Based on the case study by Saputri (6), in five regions (East Jakarta City, Bekasi Regency, Maros Regency, Bandung Regency, and Kupang City) in Indonesia for the period May-June 2020, there was a decrease in the number of K1 visits, to K4 visits, and distribution of Blood Supplement Tablets (BSTs) to pregnancy check services during the COVID-19 pandemic. The most significant decrease in K1 visits was seen in Maros Regency namely from 666 visits to 438 visits (34.23 %). A significant decrease in K4 visits was seen in East Jakarta (31.65 %), while Maros Regency did not report any decrease in the distribution of BSTs, unlike the other four regions. The decrease in the number of visits was influenced by service restrictions at the Public Health Centers. In addition, the components of maternity services were reduced to shorten the visit time. Mothers with anemia who did not receive blood supplement tablets are more likely to suffer childbirth complications and give birth to low-birth-weight babies.

The evidence showed that there was widespread anxiety during the pandemic among pregnant women, especially since they were worried about contracting the COVID-19 virus. They were afraid to travel despite needing mandatory regular checkups for mother and baby health. Since March 2020, the implementation of centers for pre-and postnatal health care and information was halted to control the spread of COVID-19. This restriction greatly affects basic immunization services and weighing of infant and toddler services. The pandemic has also resulted in changes in hospital rules and policies regarding the implementation of early breastfeeding, direct breastfeeding, as well as roaming-in newborn babies (7).

During the pandemic, the community had been aware of symptoms of respiratory infections in children. This becomes increasingly important because their low immunity makes them more susceptible to virus infections such as COVID-19. Therefore, it is important to recognize as early as possible the symptoms of ARI- COVID-19 in children. In addition to infectious diseases, the COVID-19 pandemic has also caused reduced labor supply, unemployment, reduced income, increased costs of doing business in each sector, reduced consumption due to shifts in consumer preferences for each item, people's vulnerability to disease and vulnerability to changes in economic conditions. Social restrictions enacted by the government affected all levels of society, especially lower middle-income groups, and daily workers. In fact, people who were not originally categorized as poor are now poor because of these large-scale social restrictions.

Another impact is the disrupted supply of drinking water and clean water. This is allegedly related to changes in people's lives along with Working from Home (WFH). The need for clean water has increased along with changes in people's behavior during the COVID-19 pandemic.

Based on the findings (8) of the study conducted in the Bojongsari Public Health Center of Depok City, there was a relationship between birth weight, exclusive breastfeeding, immunization status, and feeding of infants and children and stunting incidence in children under five. Furthermore, according to the study (9) on the determinants of stunting by geographic

region in Indonesia, factors related to the incidence of stunting include income, occupation, history of exclusive breastfeeding, and low birth weight. This study aimed to investigate the determinants of the degree of risk of LBW, such as pregnancy checkups <4 times, incomplete basic vaccinations, non-exclusive breastfeeding, ARI/ diarrhea infections, household income <UMR, and contaminated water sources on stunting incidence in children aged 12-24 months during the COVID-19 pandemic in Makassar City.

METHODS

This study was conducted in Pai Village, which was in the working area of the Sudiang Public Health Center in Makassar City between August and September 2022. It was an observational study with a control case study epidemiology design. The cases were children born during the COVID-19 pandemic and aged 12-24 months with a height-for-age with a z-score <-2 standard deviations (stunting), while control was children under five born during the COVID-19 pandemic and aged 12-24 months with a height-for-age with a z-score ≥-2 standard deviations (non-stunting) which were registered in the nutritional status monitoring register book of the Sudiang Public Health Center of Makassar City.

The population in this study was all children aged 12-24 months in Pai Village in Makassar City, totaling 1 046 children. The samples were 140 respondents, namely 70 stunted children and 70 control children (non-stunting). The researchers used probability sampling with the simple random sampling method, namely a random sampling technique from the existing population. The inclusion criteria for the case group were children aged 12-24 months categorized as stunted and registered in the Public Health Center registered book, domiciled in Pai Village, owning a Health Card, or born in the Sudiang Public Health Center of Makassar City. The inclusion criteria of the control group were non-stunted children, without wasting and obesity. While the exclusion criteria included children aged 12-24 months that were sick at the time of study and children switching domicile to another area in the last five months.

This study used samples from the population environment. The samples were divided into two groups, namely case, and control. Furthermore, data collection was carried out by visiting each respondent's house. In collecting data, the researcher was accompanied by Public Health Center cadres. The case group consisted of children aged 12-24 months who were categorized as stunted according to results of measurements by nutrition officers, registered in the Public Health Center register book, domiciled in Pai Village, own a Growth 20, Chart (GC) and were not sick at the time of the study, while the control group consisted of non-stunted children without wasting and obesity who were domiciled in Pai Village and own GC. Data collection was carried out through observation, of the health care book, as well as interviews using a questionnaire. The questionnaire used contains determinants of stunting which included data on the characteristics of children, socioeconomic characteristics of families of toddlers, cultural characteristics, history of low-birth-weight events, pregnancy checks, the immunization status of children, history of exclusive breastfeeding, history of infectious diseases, household income, and drinking water sources. 128 stunted children aged 12-24 months were registered in the nutritional status monitoring register book, of which 70 children were taken as samples using a probability sampling technique with a simple random sampling approach. The children in the control group were non-stunted children aged 12-24 months in the same Public Health Center location as the cases and living not far from the case houses.

Data were analyzed using the Statistical Package for Social Science (SPSS) version 26. Univariate analysis was performed to determine a descriptive description of each of the variables studied. Bivariate analysis was carried out to test the hypotheses which were carried out using the Chi-Square test to determine the Odds Ratio (OR) to identify the risk factors for each variable. Multivariate analysis was performed to determine the adjusted OR value of the risk. The adjusted OR value was the risk value where the effect value of other variables was controlled. The multivariate analysis used in this study was logistic regression analysis to determine the adjusted OR value. The variables included in the multivariate analysis were those that have a p-value <0.25.

RESULTS

The study was conducted in Pai Village, in the working area of the Sudiang Public Health Center of Makassar City between August and September 2022.

As shown in Table 1, much of the case and control children were female, with 37 female children (52.9 %) and 36 female children (51.4 %), respectively. The age group with the most respondents was the 20–24-month group, with 38 children (54.3 %). Most of the case and control children were in the working area of the Batara Bira public health center namely 27 children (38.6 %). The first treatment place visited for most respondents was the nearest clinic, with 33 case children (47.1 %) and 41 control children (58.6 %).

Bivariate analysis results with the Chi-Square test shown in Table 2, indicate that LBW, pregnancy checkups <4 times, incomplete basic vaccinations, non-exclusive breastfeeding,

Table 1. Frequency Distribution of Characteristics of Children Aged 12-24 Months During the COVID-19 Pandemic in Makassar City

Characteristics	Case (n = 70)		Control (n = 70)	
	n	%	n	%
Gender				
Female	37	52.9	36	51.4
Male	33	47.1	34	48.6
Age (Months)				
12-15	16	22.9	16	22.9
16-19	16	22.9	16	22.9
20-24	38	54.3	38	54.3
Posyandu Area				
Kampung Asang	22	31.4	22	31.4
Bulurokeng	5	7.1	5	7.1
Daeng Ramang	3	4.3	3	4.3
Batara Bira	27	38.6	27	38.6
Daeng Matua	3	4.3	3	4.3
Batu Tambung	10	14.3	10	14.3
Treatment Place				
Public Health Center	32	45.7	21	30.0
Midwife	0	0.0	2	2.9
Hospital	1	1.4	6	8.6
Doctor's Practice/Clinic	33	47.1	41	58.6
Ustadz	4	5.7	0	0.0

Table 2. Determinants of Stunting Incidence in Children Aged 12-24 Months during the COVID-19 Pandemic in Makassar City

No	Variable	Stunting Incidence				Unadjusted OR (95% CI)	p
		Case		Control			
		n	%	n	%		
1.	LBW						
	Yes	28	40.0	10	14.3	4.000	0.001
	No	42	60.0	60	85.7	(1.757-9.107)	
2	Pregnancy Checkups <4 Times						
	Yes	30	42.9	12	17.1	3.625	0.001
	No	40	57.1	58	89.2	(1.660-7.918)	
3	Incomplete Basic Vaccinations						
	Yes	28	37.1	13	18.6	2.591	0.014
	No	44	62.9	57	81.4	(1.196-5.614)	
4	Non-Exclusive Breastfeeding						
	Yes	39	55.7	22	31.4	2.745	0.004
	No	31	44.3	48	68.6	(1.376-5.476)	
5	Acute Respiratory Infection /Diarrhea Infections						
	Yes	47	67.1	19	27.1	5.485	0.0001
	No	23	32.9	51	72.9	(2.655-11.330)	
6	Household Income <Regional Minimum Wage (RMW)						
	Yes	49	70.0	30	42.9	3.111	0.001
	No	21	30.0	40	57.1	(1.550-6.244)	
7	Contaminated Water Sources						
	Yes	15	21.4	6	8.6	2.909	0.033
	No	26	78.6	64	91.4	(1.056-8.011)	

Source: Primary Data 2022.

ARI/diarrhea infections, household income <RMW, and contaminated water sources showed significant values, with p-value <0.05.

In accordance with the unadjusted OR analysis results, infectious ARI/diarrhea showed the highest unadjusted OR value with 5.485. The result means that children under five with a history of infectious ARI/diarrhea have a 5.5 times higher risk of being stunted than those without a history of infectious ARI/diarrhea.

Table 3 shows that based on the results of logistic regression analysis of the determinants of stunting incidence in children aged 12-24 months during the COVID-19 pandemic, there is a difference or change in the risk value or the unadjusted OR and adjusted OR values. Of all the independent variables included in the multivariate analysis, only four variables remained the main significant risk factors for stunting, namely low birth weight, pregnancy checkups <4 times, non-exclusive breastfeeding, and ARI/diarrheal infections. ARI/diarrheal infections retained the highest risk value among other variables, despite a decrease in the OR value.

Table 3. The Comparison of OR (Unadjusted and Adjusted) of Determinants of Stunting Incidence in Children Aged 12-24 Months during the COVID-19 Pandemic in Makassar City

Variable	Unadjusted		Adjusted	
	OR	95 %CI	OR	95 %CI
LBW	4.000	1.757-9.107	4.048	1.502-10.911
Pregnancy checkups <4 times	3.625	1.660-7.918	3.398	1.319-8.753
Incomplete basic vaccinations	2.591	1.196-5.614	1.783	0.689-4.614
Non-exclusive breastfeeding	2.745	1.376-5.476	2.429	1.045-5.645
ARI/diarrhea infections	5.485	2.655-11.330	4.336	1.839-10.222
Household income <UMR	3.111	1.550-6.244	2.011	0.841-4.809
Contaminated drinking water sources	2.909	1.056-8.011	2.809	0.837-9.427

Source: Primary Data 2022

DISCUSSION

Infectious diseases are correlated directly with the nutritional status of children; in effect, this study found that LBW has a relationship with stunting during the COVID-19 pandemic in Makassar City. These results are in line with the study (11) in the central region of Mozambique which showed that a history of LBW was a significant risk factor for stunting with an OR months of age 23.86. This means that children under five who have a history of LBW were 23.86 times more at risk of being stunted than those without a history of LBW (11). Another study showing similar results as this study is the study in Gunung Kaler, Tangerang, showing that a history of LBW has a significant relationship with stunting incidence, where children under five, aged 24 to 59 months, with a history of LBW were 4.57 times more at risk of being stunted (12). Babies born with LBW are more vulnerable to morbidity, mortality, infectious diseases, being underweight, and stunting in the early neonatal period until childhood (12).

The COVID-19 pandemic in Indonesia has the potential to hinder access for mothers and children to optimal health services. The case study in five regions in Indonesia during the pandemic showed found the decreased provision of blood-supplement tablets to pregnancy check-ups during the COVID-19 pandemic. This is due to restrictions on services in public health centers to shorten visiting duration; thus, pregnant women with anemia who do not get iron tablets have a greater risk of experiencing labor complications and giving birth to babies with low birth weight (6).

Our present results indicate that pregnancy checkups less than 4 times are correlated with stunting during the COVID-19 pandemic in Makassar City. In the case group, out of 30 respondents who had less than 4 prenatal checkups, 17 respondents (56.7 %) said that fear of contracting COVID-19 was the reason they did not have their pregnancies checked, while 8 respondents (26.7 %) said that during their previous pregnancies, they had never done an examination anyway. These results agree with the study in Kuningan Regency showing that inadequate pregnancy checkup visits contribute to stunting incidence (13).

Multiple factors influence stunting in Indonesia, among others is the early growth of the child's life in the mother's womb. This can be determined by the number of visits the mother makes during pregnancy and the quality of each antenatal care (ANC) visit. ANC is a routine control activity carried out by pregnant women to determine the condition of the fetus and the physical condition of the mother aimed at early detection of comorbidities in the mother and fetus so that they can be anticipated as soon as possible. The minimum number of visits by pregnant women to the health center is 4 times according to the guidelines for maternal and child health services (14). However, during the COVID-19 pandemic, pregnancy checkup visit to the health center is limited and every pregnant woman is required to register online when she wants to go to the health center. This discourages them to have their pregnancy checkups, in addition to the fear of contracting COVID-19.

It was demonstrated that non-exclusive breastfeeding is correlated with stunting incidence during the COVID-19 pandemic in Makassar City, in concordance with the study of Teferi et al. (15) who demonstrated that children under five who did not receive exclusive breastfeeding had a 3.78 times greater risk of being stunted than those who received exclusive breastfeeding. According to the WHO, breast milk does not transmit COVID-19. When mothers with COVID-19 refrained from exclusively breastfeeding their babies, this is due to the thought or assumption that the mother will transmit the virus to her baby (16).

This study found that the proportion of ARI/ diarrheal infections is correlated with stunting incidence during the COVID-19 pandemic in Makassar City. ARI and diarrhea are the most common infectious diseases among children aged 12-24 months in the working area of the Sudiang Public Health Center. Indeed, several respondents admitted that their child had just been discharged from hospitalization because of diarrhea. Similarly, it was shown that infectious diseases are a risk factor for stunting in toddlers in Nepal (17). In addition, in Ethiopia toddlers with diarrhea in the last 2 weeks were 2.71 times more at risk of being stunted than those who don't have diarrhea (18).

Poor environment and sanitation are the main causes of infectious diseases (ARI and diarrhea). In effect, most of the respondents in the case group their water source was a well shared with several families with poor sanitation around the well, thereby increasing the risk of transmitting infectious diseases. During the COVID-19 pandemic, ARI symptoms appear in children that need to be watched out for because of their low immunity so they are more likely to be infected with viruses such as COVID-19. ARI and diarrhea may cause decreased appetite in children, leading to a lack of intake of food and drink in the body and resulting in malnutrition (12).

Incomplete basic vaccinations, family income below the minimum wage, and contaminated drinking water sources have no significant relationship to the incidence of stunting. This can be seen from the Lower limit (LL) and Upper limit (UL) values which include the number one, so the amount of risk or OR value obtained is not statistically significant. In the case group, 62.9 % of children had complete basic vaccinations, while 37.1 % had incomplete basic vaccinations, as evidenced by a few missed months in their KIA books as well as postponed vaccination due to fever. Incomplete vaccinations may result in a weakened child's immunity, so they are susceptible to infection. Infections in children are left unchecked, and stunting is likely to happen. On the other hand, just because children's vaccination status is complete, it does not mean they are free from stunting because several other factors can cause stunting.

Immunization or vaccination is intended to create immunity in children until adulthood. Complete basic vaccination is mandatory immunization given to children under five.

According to the Child identity card books, some children had complete vaccination, but some did not. One of the reasons is the postponement of the immunization schedule because the baby had a fever on the day of immunization and in the following month a new immunization is given while last month's immunization was missed. Some children got immunizations not according to their schedule, such as the BCG vaccine which should be given in the first month but is given in the fourth month. In addition to fever, the shutdown of public health centers for two years due to the pandemic is also the reason for late immunization because the procedure for immunization at the public health center became too complicated for some respondents.

Low family income affects the choice of food consumed, causing a lack of variety and quantity of food, especially vitamins and minerals, thereby increasing the risk of stunting (12). However, between income and nutrition, the relationship is not significant because nutrition is not necessarily limited to pricier food. Likewise, with the reduction in employees that occurred during the pandemic, it had no significant impact because the majority of respondents' family heads work as daily laborers.

Currently, in Indonesia, contaminated water and drinking water sources do not meet people's requirements. Water is considered to be clean, according to the Ministry of Health of the Republic of Indonesia (1990), when they meet health requirements and have a maximum permissible level of microbiological requirement, including water free from germs that can interfere with health, and when the water physical quality includes colorless water, smells, and tastes (19). Most of the respondents have clean water sources. Although some cover one of the conditions, unclean categorization is when all conditions are not met. In the studied location, it was found that there were only 8 houses in the case group that used municipal water works as a source of clean water and 14 houses in the control group. This is due to the uneven distribution of clean water. Most respondents source their water from drilled/pump wells, as well as protected wells. In the case and control groups, 32 respondents (45.7 %) and 50 respondents (71.4 %), respectively, admitted using bottled water for drinking but for other needs such as cooking, they still used water from wells.

CONCLUSIONS

LBW, pregnancy checkups <4 times, incomplete basic vaccinations, non-exclusive breastfeeding, and Acute Respiratory Infection/diarrhea infections are correlated with stunting incidence in children aged 12-24 months during the COVID-19 pandemic in Makassar City. History of ARI/diarrhea infections is the most influential variable on the incidence of stunting. This requires joint efforts of various parties to quickly come up with prevention measures for ARI and diarrhea in children, especially during the COVID-19 pandemic. Prevention efforts require contributions from various parties, including the physical environment, family environment, and health service support. More importantly, stakeholder policies are expected to have a significant impact on the prevention of ARI and diarrhea in children under five during the COVID-19 pandemic.

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Author's Contribution

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Conflict of Interest

The authors declare no potential conflicts of interest regarding the authorship and/or publication of this research article.

Availability of Data and Materials

All data generated or analyzed during this study are included in this published article.

Ethical Approval

This article received ethical approval from the Health Research Ethics Commission, Faculty of Public Health, Universitas Hasanuddin on 29 July 2022, number: 8576/UN4.14.1/TP.01.02/2022

Significance for Public Health

Stunting still poses a serious threat to children as the future generations of a nation. Based on this study, it can be concluded that the most influential factor in the incidence of stunting during the COVID-19 pandemic is Acute Respiratory Infection /Diarrhea infections. Education to the public regarding the prevention and impact of infectious diseases (Acute Respiratory Infection /Diarrhea) on children is especially needed during a pandemic like today.

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