Case study

A Case Study: Stunting, Low Birth Weight, Maternal Mortality and Infant Mortality in Semarang City, Central Java-Indonesia

ABSTRACT

Background and Objective: Stunting, low birth weight, maternal mortality, and infant mortality have all become health issues in recent years, particularly in Semarang, Central Java, Indonesia. The researchers wanted to see if they could predict incidences of stunting, low birth weight, and maternal and infant death in Semarang. **I**n cases of stunting, low birth weight (LBW), and maternal-infant mortality in the city of Semarang in 2019-2021, this study combines descriptive quantitative research methodologies with a secondary data analysis approach from the Semarang City Health Office. **Results:** According to the results of the linear equation y = 35.236 x + 361.77, the trend of stunting in 2019-2021 is increasing, the trend of LBW incidence is decreasing y = - 0.5425x+60.008, the trend of maternal mortality is increasing y = 0.0218x+1.2921, and the trend of child mortality is down y =-0.0028x+2.202. **Conclusion.** The increasing trend in stunting cases and infant mortality is possible due to pandemic conditions that affect the family's socioeconomic situation, as well as the effect of decreasing hospital and doctor services due to social distancing policies and concerns about COVID-19 transmission, whereas the decreasing trend in LBW cases and maternal deaths is possible because government programs are still in place. even in the event of a pandemic

Keywords: Stunting, Low birth weight, Maternal mortality, Infant mortality, Covid-19 pandemic

INTRODUCTION

Malnutrition in the womb and at a young age will damage brain development and cognitive capacities, affecting children's achievement and educational success.[1] Short Toddler (Stunting) is a nutritional status based on the PB/U or TB/U index, where the measurement results are in the threshold (Z-Score) -2 SD to -3 SD (stunted) and -3 SD (stunted) in the anthropometric standard for measuring children's nutritional status (severely stunted). Stunting affects roughly 162 million children under the age of five, and if current trends continue, 127 million children under the age of five are expected to be affected by 2025.[2] More than half of stunted children (56%) live in Asia, and more than a third (37%) live in Africa, according to the United Nations Children's Emergency Fund (UNICEF) [3] After India, China, Nigeria, and Pakistan, Indonesia has the fifth greatest prevalence of stunting. Stunting affects around 38% of children under the age of five in South Asia [4] According to the WHO, if the prevalence of stunting in children under the age of five reaches

20% or above, it becomes a public health issue. As a result, Indonesia's percentage of short toddlers remains high, indicating that this is a public health issue that must be addressed [5]

Stunting in children is a severe issue since it is linked to increased morbidity and mortality, future obesity and noncommunicable diseases, short adults, poor cognitive development, and reduced productivity and income. Malnutrition is responsible for around 10.5 million child deaths per year. In developing nations, 98 percent of these deaths are reported. Stunting can be caused by a variety of circumstances, including low birth weight. If a baby's birth weight is less than 2,500 grams, he or she is at risk of mortality, stunted infant growth, and even being short if not handled properly.[6]. When compared to developed countries, infants with low birth weight (LBW) are more likely to undergo intrauterine development retardation due to poor maternal nutrition and higher infection rates.[7]

Maternal and newborn mortality are two separate yet connected phenomena. The maternal mortality rate and infant mortality rate are used to determine and measure the success of health-care implementation. According to the 2012 Indonesian Demographic and Health Survey (IDHS), the infant mortality rate (IMR) in Indonesia was 32 per 1000 live births.[8]. The 2012 survey's infant death rate was lower than the 2007 survey's figure of 35 per 1000 live births. In the last five years, infant mortality has decreased. This result, however, falls well short of the 2015 Millennium Development Goals (MDGs) goal of reducing infant mortality to 23 per 1000 live births. [9] Maternal death occurs when a woman dies while pregnant or up to 42 days after giving birth, regardless of the length or location of the pregnancy, from any cause connected to pregnancy complications or care. [10].

Based on the aforementioned health problems, a projection is required to identify the number of cases spreading throughout multiple places, one of which is Semarang, in order to aid the Semarang city government in dealing with these issues. The government can implement various policy plans and preparations to deal with the surge or decline in cases of health problems such as stunting, LBW, and maternal-infant mortality in the city of Semarang with a prediction, especially for several cases of health problems such as stunting, LBW, and maternal-infant mortality.

A history of LBW, history of exclusive breastfeeding, history of complementary feeding, maternal age during pregnancy, gestational age, maternal nutritional status during pregnancy, birth spacing, maternal educational status, and history of upper respiratory infections were all linked to the incidence of stunting. In order to limit the number of cases of stunting, proper handling is required.[11]. Stunting can be addressed by utilizing mass media and print media to increase prospective married couples' knowledge, as well as providing parenting education to parents, early

childhood education, community nutrition education, and reproductive health and nutrition education to prospective husbands. After that, the Semarang municipal government devised a strategy to address the rise in stunting cases. As a result, in the years 2021-2022, a study was conducted in Semarang to forecast incidences of stunting, low birth weight, and maternal-infant death.

METHODS

The method used in this study is a descriptive quantitative research method, with a secondary data analysis approach from the Semarang City Health Office in cases of stunting, LBW, and maternal-infant mortality in the city of Semarang in 2019 to 2021. Secondary data is information retrieved or gathered from previously published sources, and this study uses data from Semarang to forecast the expansion of stunting, LBW, and maternal-infant fatalities in the years 2021-2022. To determine the prediction of addition and subtraction, this study applies a basic linear regression prediction formula. [12]

The following is a simple linear regression formula for determining predictions:

$Yn = a \pm b.x$

• Yn = the number of predicted results, In a certain time period,

• a = yearly average number of items $=\sum y/\boldsymbol{n}$

b = yearly trend of increase/decrease

$=\sum \boldsymbol{XY}/\sum \boldsymbol{X2}$

x = year prediction order

RESULTS AND DISCUSSION

Based on secondary data from the Semarang City Health Office on cases of stunting, LBW, and maternal-infant mortality in the city of Semarang from 2019 to 2021

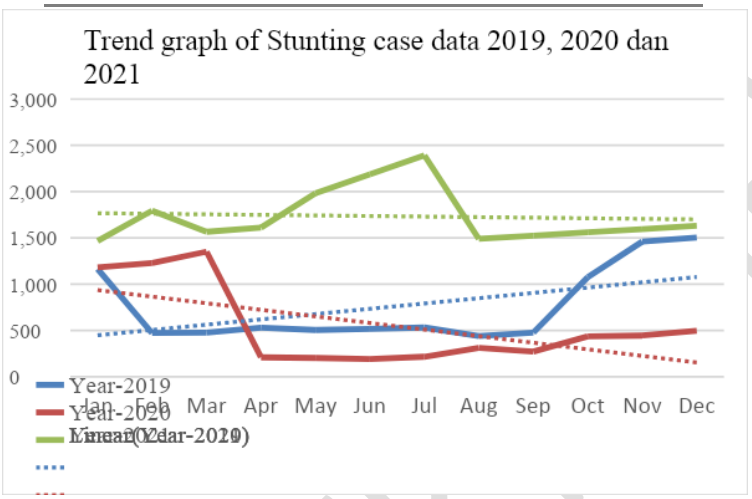
In the city of Semarang, there has been an increase in the number of cases of stunting [13], for the period 2019 to 2021, Table 1 presents the following data on the incidence of stunting cases in the city of Semarang:

1. **Stunting case data**

Table 1. Stunting case data

Month	Year-2019	Year-2020	Year-2021
Jan	1.165	1.181	1.467
Feb	472	1.229	1.794
Mar	476	1.351	1.566

Apr	530	210	1.611
May	505	203	1.982
Jun	517	191	2.187
Jul	532	216	2.392
Aug	440	312	1.489
Sep	476	271	1.525
Oct	1.075	436	1.560
Nov	1.460	445	1.595
Dec	1.504	496	1.630



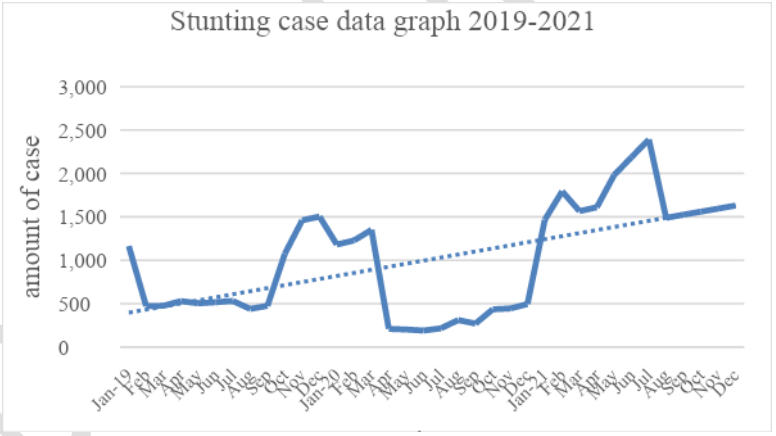


Figure 1 Trends in stunting case data 2019, 2020 and 2021

In 2019, the trend of stunting case data was positive (y=57,217x+390.76), whereas the biggest negative trend occurred in 2020 (y=-71.115x+1007.3), followed by a negative trend in 2021 (y = -6.0970+1772). Dari grafik tersebut dapat kita ketahui bahwa penurunan kasus tertinggi terjadi pada tahun 2020 dan 2021, tetapi jika dilakukan prediksi mulai 2019 hingga 2021 maka trend prediksi menunjukan trend positif (y = 35,236x + 361,77). Because the value of the stunting drop trend in 2021 and 2020 is insufficient to cover the stunting growth trend in 2019, this happens. To get a prediction of stunting events in 2019, 2020, and 2021, only data from the previous three years, namely 2019, 2020, and 2021, will be used, as well as predictions for LBW cases, maternal, and

child deaths.

According to the Semarang City Regional Development Planning Agency, Semarang City's stunting rate was 2.5 percent in 2018. During the pandemic, this number increased to 2.57 percent in 2019, or 2,759 children out of a total of 107,071 youngsters. Then, in 2020, stunting cases grew to 3.13 percent, or 3,143 percent, of a total of 100,446 children. There are up to 25 sub-districts that have become the focal point of the Semarang City Government's stunting cases. [14]. The city of Semarang's stunting prevalence rate has become a source of worry for the local government, prompting the creation of the Integrated Stunting Reduction Intervention [15]. If the height and body length are less than 2 from the Multicentre Growth Reference Study standard or the median standard deviation of the child's growth standard, the WHO Stunting Standard applies [16] A child under the age of five who has a z-score of less than -2SD/standard deviation (stunted) and less than -3SD is considered stunted [17]. Childhood stunting is the most accurate reflection of socioeconomic inequality and the best overall indicator of children's well-being. The increasing socioeconomic conditions during the epidemic are to blame for the rise in stunting rates. The pandemic phase in 2020 leads the global poverty rate to rise, affecting socio-economic conditions and, of course, causing a slew of negative consequences, including the birth of stunted newborns. According to the latest estimates, the COVID-19 pandemic will result in a 14.3 percent increase in cases of wasting, a life-threatening form of malnutrition, over the world. An additional 6.7 million youngsters are malnourished as a result of this. [18]. This demonstrates that the COVID-19 pandemic has an impact on stunting, particularly in low- and middle-income nations. [19]. If this situation persists, the community's economy will deteriorate, resulting in an increase in stunting instances. [20]. Semarang Mayor Decree Number 443/227 of 2020 on Determination of Emergency Response Status for the Corona Disease Virus (COVID-19) Outbreak in Semarang City in March 2020, so that many hospitals and healthcare centers focus more on handling Covid patients, even during a pandemic such as the Semarang City Government continues to make efforts to reduce the number of malnourished people (stunting and wasting). Stunting is being addressed through cross-sectoral and cross-programme collaboration by all stakeholders, as research shows that stunting is linked to poverty, a lack of education, a high disease burden, and a lack of women's empowerment. [21].

2. Low birth weight case data

Low birth weight (LBW) is a public health issue that requires special attention in a number of countries, particularly in emerging or low-income countries. [22]. As a result of the Covid-19 pandemic, Indonesia's Gross National Income per capita decreased during the pandemic. This decline was caused by the impact of the Covid-19 pandemic, which caused the Indonesian economy

to contract -2.07 percent in 2020.[23] The Semarang city government is concerned about this, particularly in budget projections to address the incidence of infants born with low birth weight (LBW). The following are the case data for infant with LBW, as shown in Table 2.

Table 2. Low Birth Weight (LBW) Case Data

Month	2019	2020	2021
Jan	67	28	27
Feb	56	53	40
Mar	55	64	26
Apr	70	56	59
May	72	54	52
Jun	61	74	39
Jul	44	50	37
Aug	57	77	43
Sep	45	82	42
Oct	38	66	42
Nov	40	28	41
Dec	35	39	40

The following Low birth weight (LBW) case data is forecasted depending on the year of occurrence, namely 2019, 2020, and 2021:

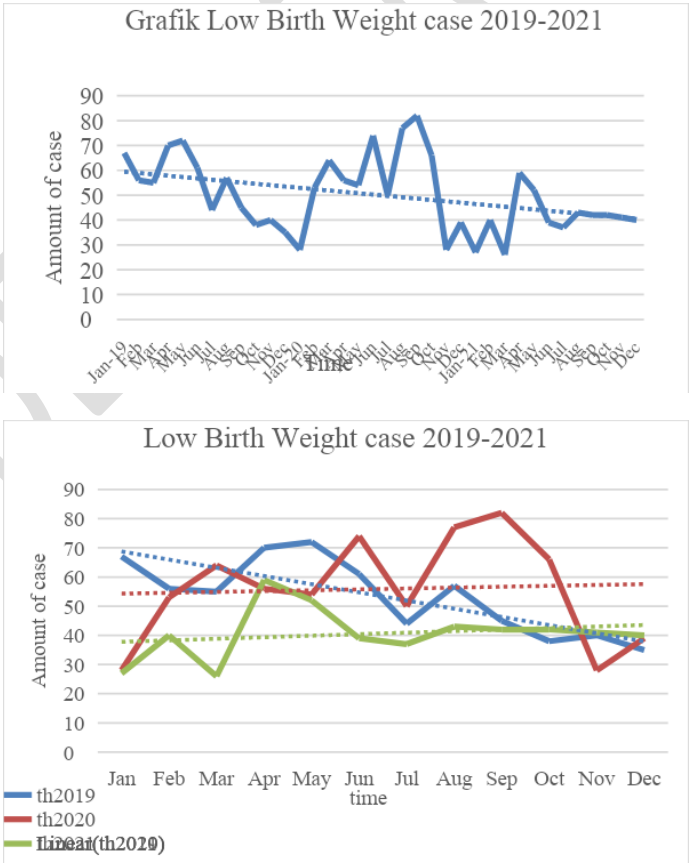


Figure 2. Trends in data on Low birth weight cases in 2019, 2020 and 2021

According to Figure 2, the Low birth weight (LBW) cases trended lower in 2019 (y=-2.8042x+71.561), then increased in 2020 (y=0.2972x+53.985) and 2021 (y= 0.5245x+37.258). However, the case of low birth weight (LBW) in the city of Semarang still indicates a negative trend (y=-0.5425x+60.008) when studied using three-year combined data (2019, 2020, and 2021).

Low birth weight is a potential risk factor for COVID19, according to Fatima Crispi in 2021. LBW has been linked to an increased risk of cardiovascular death, metabolic syndrome, diabetes, and lung morbidity. Prematurity, cardiovascular hypertrophy and delayed lung development, and bone density can all contribute to LBW. It can also be caused by births that are too small (fetal growth restriction) and/or too early (prematurity). [24] Consequently, despite a drop in the number of cases of low birth weight (LBW), the Semarang City Government must stay cautious because Covid-19 instances have not abated, and LBW appears to be an independent risk factor for severe COVID-19 and can increase risk stratification. LBW babies have a high risk of developing a variety of health problems.. [25] . The newborn death rate in Indonesia was 15 per 1,000 live births, according to the 2017 Indonesia Demographic Health Survey. Semarang is a city in Central Java's province of Semarang. In 2017, Semarang City's infant mortality rate was 7.6 per 1,000 live births, compared to 7.63 per 1,000 live births in 2016. In 2017, the neonatal death rate in Semarang was 5.8 per 1,000 live births, up from 5.73 in 2016. In 2016, there were 1,000 live births. [26] Several measures can be made to prevent and control LBW, including giving proper health education about LBW to pregnant women. [27] If efforts to prevent and control LBW are properly carried out, success in increasing baby weight will be realized; the mother's level of knowledge in managing the distance between pregnancies and knowing unsafe ages to undergo pregnancy and childbirth, as well as providing nutrition beginning during pregnancy and childbirth, will be realized. Maintain the health of yourself and the kid in the womb until it reaches the age of two years, and pay close attention to the cleanliness of the environment [28]. Health education, supervision and monitoring, avoidance of hypothermia in infants, free therapy that can be done, testing the nutritional status of pregnant women, and calculating and preparing steps in health are all part of these prevention and control initiatives. (Antenatal Care) [29] LBW is a public health issue that requires special attention in a number of countries, particularly in emerging or low-income countries. LBW cases in children are similar to the consequences of the global COVID-19 epidemic (infants). The financial situation of parents, diminishing parental income, understanding of child (infant) health, and lack of regular baby check-ups at health service centers or hospitals all play a role in the occurrence of LBW. Despite the fact that the city of Semarang has a graph showing a decreased trend in LBW cases, the

local government is particularly concerned about this pandemic because Semarang once had a high incidence of LBW cases

3. Maternal death cases data

Table3.Maternalmortalitycasedata

Month	2019	2020	2021
Jan	4	1	2
Feb	2	1	1
Mar	1	2	1
Apr	2	1	1
May	1	0	1
Jun	3	4	8
Jul	0	1	2
Aug	0	1	2
Sep	2	2	2
Oct	2	1	2
Nov	0	1	2
Dec	1	2	2

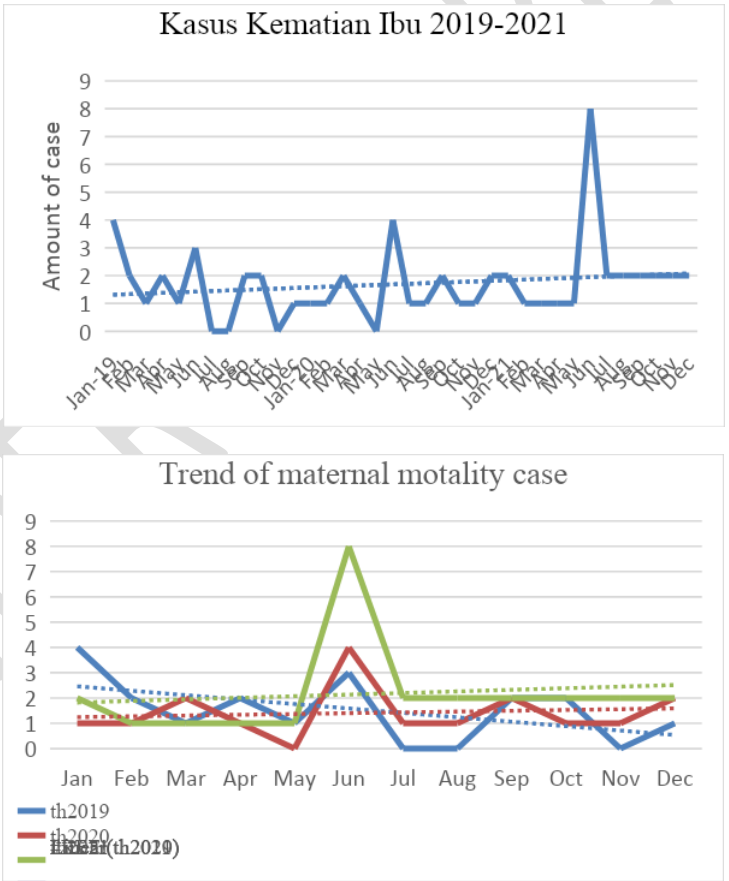


Fig 3. Trends in data on maternal mortality cases in 2019, 2020 and 2021

According to Figure 3, the trend of reducing maternal mortality cases began in 2019 (y=-1.1748x+2.6364), then began to rise in 2020 (y=0.0315x+1.2121) and 2021 (y=0.50629x+1.7576). Because most hospitals and healthcare institutions are overburdened with COVID-19 patients, it's probable that inappropriate handling or

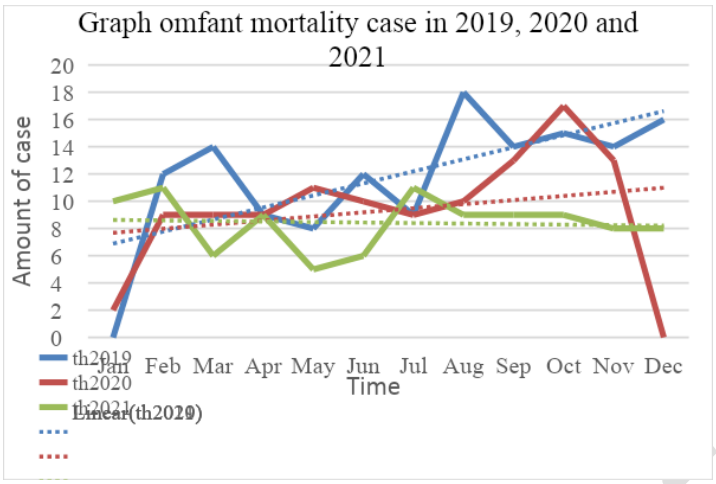
late delivery occurs at the hospital. This may be related to some mothers' reluctance to have their condition evaluated in hospitals for fear of contracting COVID-19, so that, based on a combined examination of three-year trends (2019, 2020, and 2021), incidences of maternal mortality. Pregnant women who died from Covid-19 contributed 20% of the maternal mortality rate in Indonesia during the pandemic. In reality, roughly 536 pregnant women were reported to be infected with the corona virus in July, a threefold increase. Of that number, 52 percent, or roughly 278 pregnant women, are Covid-19 positive but asymptomatic.[30], Because obstetricians and gynecologists are at such a high danger of contracting the corona virus as a result of this disease, they are on high alert [31] This pandemic has impacted all parts of life, including health services, which have been limited in terms of both access and quality, particularly maternity and child health services. Because it influences the mother and newborn mortality rate, which is a national problem, this service program has become one of the national priorities.[32]

The participation of all sectors in Semarang cannot be divorced from efforts to reduce maternal and newborn mortality. The participation of all sectors must be done in a coordinated manner. Both the public and private sectors, as well as the community, are involved. Considering that initiatives to promote the health of pregnant women are basic social services that directly affect people's quality of life. Efforts made during the Covid 19 epidemic were not adequate.

4. Child/infant mortality case data

Table 4. Data on child/infant mortality cases

Month	2019	2020	2021
Jan	0	2	10
Feb	12	9	11
Mar	14	9	6
Apr	9	9	9
May	8	11	5
Jun	12	10	6
Jul	9	9	11
Aug	18	10	9
Sep	14	13	9
Oct	15	17	9
Nov	14	13	8
Dec	16	0	8



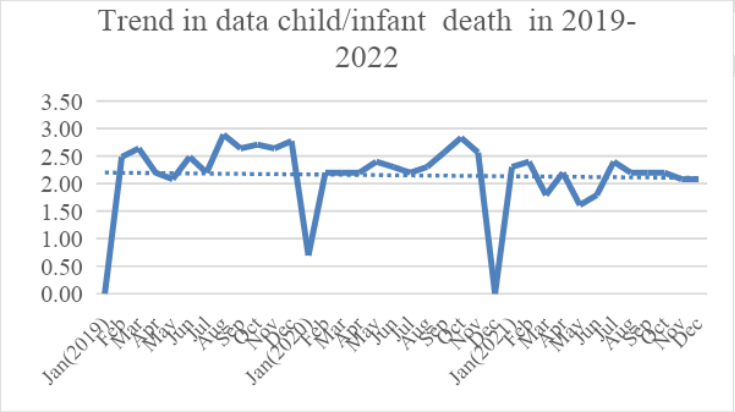


Figure 4. Trends in data on child mortality cases in 2019, 2020 and 2021

According to Figure 4, there was an upward trend in infant mortality cases in 2019 (y= 0.8846x+6) and 2020 (y=0,3007x+7.3788), but a decrease trend in 2021 (y= - 0.0385x+ 8.6667). However, assuming the trend continues for three years, from 2019 to 2021, infant mortality instances will decrease (y = -0.0028x+2,202). Even if the government program for reducing baby mortality cases continues to run successfully in a pandemic situation, infant mortality cases in the city of Semarang declined during the COVID-19 pandemic. Infant mortality is one indicator of a country's progress in improving public health. Neonatal Mortality Rate, Infant Mortality Rate, and Toddler Mortality Rate are indices of child-related mortality. In the city of Semarang, this indicator is on the decline. Infant mortality incidents declined from 33,278 in 2015 to 32,007 in 2016, while 10,294 instances were reported in the first semester of 2017. According to Ministry of Health Performance Achievement data from 2015 to 2017, the maternal mortality rate reduced from 4,999 in 2015 to 4912 in 2016 and 1712 instances in 2017 (semester 1). This is in line with the findings of this investigation [33]

The Ministry of Health has also launched a program to provide ultrasound devices to all puskesmas

so that they can observe the condition of the fetus in the mother's womb before birth during

examinations at the puskesmas level, ensuring that there are no complications that need to be handled immediately at the health facilities. The government's public health insurance program and birth insurance program continue to expand their coverage. The Childbirth Guarantee Program provides a financial guarantee for childbirth services such as antenatal care, delivery assistance, and postpartum services such as postnatal family planning and newborn care. Jampersal is a program that is designed for all pregnant women who do not have delivery insurance. It is particularly effective at lowering infant and mother mortality. [34]

5. Stunting, LBW, maternal mortality, and infant mortality predictions for 2022

The linear regression approach is one of the techniques for forecasting or predicting the quality or quantity of an event. This is due to the fact that by estimating numerous parameters as a summary, it can be utilized as a starting point for creating a decision or policy. Table 5 shows the predicted stunting incidence, LBW, maternal, and child mortality in 2022, and is meant to serve as an overview and data base for forecasting stunting cases in Semarang [35]. The following findings are produced using the regression equation for the incidence of stunting, LBW, maternal death, and infant mortality in 2022:

Table 5. Stunting, LBW, maternal mortality, and infant mortality statistics are predicted through May 2022.

	1	2	3	4	5	6	7	8	9	10	11	12
Month	Jan-19	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Stunting	1.165	472	476	530	505	517	532	440	476	1.075	1.460	1.504
BBRL	67	56	55	70	72	61	44	57	45	38	40	35
Mother death	4	2	1	2	1	3	0	0	2	2	0	1
Baby death	0	12	14	9	8	12	9	18	14	15	14	16
	13	14	15	16	17	18	19	20	21	22	23	24
Month	Jan-20	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Stunting	1.181	1.229	1.351	210	203	191	216	312	271	436	445	496
BBRL	28	53	64	56	54	74	50	77	82	66	28	39
Mother death	1	1	2	1	0	4	1	1	2	1	1	2
Baby death	2	9	9	9	11	10	9	10	13	17	13	0
	25	26	27	28	29	30	31	32	33	34	35	36
Month	Jan-21	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Des
Stunting	1.467	1.794	1.566	1.611	1.982	2.187	2.392	1.489	1.525	1.560	1.595	1.630
BBRL	27	40	26	59	52	39	37	43	42	42	41	**40**
Mother death	2	1	1	1	1	8	2	2	2	2	2	2
Baby death	10	11	6	9	5	6	11	9	9	9	8	8

Predictionofincident in2022

	37	38	39	40	41
Month	Jan-22	Feb-22	Mar-22	Apr-22	May-22
Stunting	1.666	1.701	1.736	1.771	1.806
BBRL	40	39,39	38,85	38,31	37,77
Mother death	1,74	1,75	1,77	1,78	1,79
Babydeath	2,098	2,096	2,093	2,090	2,087

CONCLUSION.

Stunting cases and infant mortality may be on the rise as a result of pandemic conditions. The impact of the decline in hospital services and obstetricians, midwives due to government policies dealing with social distancing and concerns about COVID-19 infection during the pandemic (reduced family income) and the impact of the decline in hospital services and obstetricians, midwives due to government policies dealing with social distancing and concerns about COVID-19 infection

The decrease in the trend of LBW cases and maternal deaths is feasible since the Semarang municipal government's program to reduce LBW cases and child deaths is still in place, albeit not as effectively as it was before the pandemic.

In cases of stunting, infant mortality, LBW, and maternal mortality, the trend of increasing or decreasing must be monitored.

The Semarang city government is concerned about this case because COVID-19 cases are still fluctuating, which has a significant impact on the program to reduce stunting, LBW, and maternal and infant mortality carried out by the city government.

DATA AVAILABILITY

The working papers and accompanying information files contain all necessary information. This research will aid researchers in identifying critical areas related to stunting, low birth weight, maternal mortality, and infant mortality in Semarang, Indonesia.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the authors.

REFERENCE

1. Ivanovic DM, Leiva BP, Perez HT, Inzunza NB, Almagià AF, Toro TD, et al. Long-term effects of severe undernutrition during the first year of life on brain development and learning in Chilean high-school graduates. Nutrition. 2000;16(11–12):1056–63.
2. Organization WH. Global nutrition targets 2025: Stunting policy brief. World Health Organization; 2014.
3. Carolin BT, Siauta JA, Amamah N, Novelia S. Analysis of Stunting among Toddlers at Mauk Health Centre Tangerang Regency. Nurs Heal Sci J. 2021;1(2):118–24.
4. Wali N, Agho KE, Renzaho A. Factors associated with stunting among children under 5 years in five South Asian countries (2014–2018): Analysis of demographic health surveys. Nutrients. 2020;12(12):3875.
5. Titaley CR, Ariawan I, Hapsari D, Muasyaroh A, Dibley MJ. Determinants of the stunting of children under two years old in Indonesia: a multilevel analysis of the 2013 Indonesia basic health survey. Nutrients. 2019;11(5):1106.
6. Abbas F, Kumar R, Mahmood T, Somrongthong R. Impact of children born with low birth weight on stunting and wasting in Sindh province of Pakistan: a propensity score matching approach. Sci Rep. 2021;11(1):1–10.
7. Ferdos J, Rahman MM. Maternal experience of intimate partner violence and low birth

weight of children: a hospital-based study in Bangladesh. PLoS One. 2017;12(10):e0187138.

8. Titaley CR, Que BJ, de Lima FVI, Angkejaya OW, de Lima FVI, Maelissa MM, et al. Healthcare–seeking behavior of children with acute respiratory infections symptoms: analysis of the 2012 and 2017 Indonesia Demographic and Health Surveys. Asia Pacific J Public Heal. 2020;32(6–7):310–9.

9. Odagiri M, Cronin AA, Thomas A, Kurniawan MA, Zainal M, Setiabudi W, et al. Achieving the Sustainable Development Goals for water and sanitation in Indonesia–Results from a five-year (2013–2017) large-scale effectiveness evaluation. Int J Hyg Environ Health. 2020;230:113584.

10. Pedrana A, Qomariyah SN, Tholandi M, Wijayanto B, Gandawidjaja T, Amelia D, et al. Assessing the effect of the Expanding Maternal and Neonatal Survival program on improving stabilization and referral for maternal and newborn complications in Indonesia. Int J Gynecol Obstet. 2019;144:30–41.

11. Manggala AK, Kenwa KWM, Kenwa MML, Jaya AAGDP, Sawitri AAS. Risk factors of stunting in children aged 24-59 months. Paediatr Indones. 2018;58(5):205–12.

12. Vaivada T, Akseer N, Akseer S, Somaskandan A, Stefopulos M, Bhutta ZA. Stunting in childhood: an overview of global burden, trends, determinants, and drivers of decline. Am J Clin Nutr. 2020;112(Supplement_2):777S-791S.

13. Aprina A, Erwandi E. Determinants of Failure to Grow on Toddlers (Stunting). J Aisyah J Ilmu Kesehat. 2021;6(3):409–18.

14. Cahyati WH, Prameswari GN, Wulandari C, Karnowo K. KAJIAN STUNTING DI KOTA SEMARANG. J Riptek. 2019;13(2):101–6.

15. Dewey KG. Reducing stunting by improving maternal, infant and young child nutrition in regions such as South Asia: evidence, challenges and opportunities. Matern Child Nutr. 2016;12:27–38.

16. De Onis M, Branca F. Childhood stunting: a global perspective. Matern Child Nutr. 2016;12:12–26.

17. Hendraswari CA, Purnamaningrum YE, Maryani T, Widyastuti Y, Harith S. The Determinants of Stunting for Children Aged 24-59 Months in Kulon Progo District 2019. Kesmas J Kesehat Masy Nas (National Public Heal Journal). 2021;16(2).

18. Teague J. Key Ingredients for Faster Progress on Nutrition. 2020.

19. Yanti T, Fauziah D. The Effect of Family Income on Stunting Incident in Preschool Children at Bogor City During COVID-19 Pandemic. Exec Ed. 2021;12(2):407.

20. Hall RE, Kudlyak M. Unemployed with jobs and without jobs. National Bureau of Economic Research; 2020.

21. Sugihantono A, Suwitri S, Suwandono A, Kismartini K, Nandini N, Denny HM. MULTISECTOR COLLABORATION FOR THE IMPLEMENTATION OF REGIONAL FOOD AND NUTRITION ACTION PLAN IN CENTRAL JAVA. Int J Heal Educ Soc. 2020;3(9):1–13.

22. Ogunlesi TA, Adetoro OO. Preventing Perinatal Mortality in the Developing Countries. In:

Contemporary Obstetrics and Gynecology for Developing Countries. Springer; 2021. p. 23–34.

23. Tambunan TTH. Covid-19 Pandemic and Severity of Economic Impacts: The Indonesian Case. Glob Econ Sci. 2021;1–15.

24. Crispi F, Crovetto F, Larroya M, Camacho M, Tortajada M, Sibila O, et al. Low birth weight as a potential risk factor for severe COVID-19 in adults. Sci Rep. 2021;11(1):1–8.

25. Indrayati N, Santoso DYA, Iqomh MKB. Relationship Between the Level of Maternal Education and Readiness for Caring for Low Birth Weight. In: Proceedings of the International Conference on Nursing and Health Sciences. 2020. p. 55–60.

26. Ekawati R, Susantini P. Overview of Neonatal Death in Semarang City Central Java Province in 2018. Birth. 2020;62(14):81–6.

27. Neupane D, Dawson P, Houston R, Dhakal L, Sharma J, Gargi KC, et al. Lower mortality is observed among low birth weight young infants who have received home-based care by female community health volunteers in rural Nepal. BMC Pregnancy Childbirth. 2017;17(1):1–7.

28. Saudah N, SD RW, Catur Prasastia LD, Frilasari H. Predict Infant Low Birth Weight (LBW) based on Characteristics of Maternal. Pres Pathumthani Univ. :510.

29. Pristya TYR, Novitasari A, Hutami MS. Pencegahan dan Pengendalian BBLR di Indonesia: Systematic Review. Indones J Heal Dev. 2020;2(3):175–82.

30. Hantoushzadeh S, Shamshirsaz AA, Aleyasin A, Seferovic MD, Aski SK, Arian SE, et al. Maternal death due to COVID-19. Am J Obstet Gynecol. 2020;223(1):109-e1.

31. Iyengar KP, Ish P, Upadhyaya GK, Malhotra N, Vaishya R, Jain VK. COVID-19 and mortality in doctors. Diabetes Metab Syndr Clin Res Rev. 2020;14(6):1743–6.

32. Kingsley JP, Vijay PK, Kumaresan J, Sathiakumar N. The changing aspects of motherhood in face of the COVID-19 pandemic in low-and middle-income countries. Matern Child Health J. 2021;25(1):15–21.

33. Stiyaningsih H, Wicaksono F. Impact of women's empowerment on infant mortality in Indonesia. Kesmas J Kesehat Masy Nas (National Public Heal Journal). 2017;11(4):185–91.

34. Rahmah MJ. Private Practice Midwives Motivation in Signing Delivaery Assurance of Memorandum of Understanding in Semarang City. J Kesehat Masy Univ Diponegoro. 2(1):18734.

35. Lestari S, Fujiati II, Keumalasari D, Daulay M. The prevalence and risk factors of stunting among primary school children in North Sumatera, Indonesia. In: IOP Conference Series: Earth and Environmental Science. IOP Publishing; 2018. p. 12219.