

Original article

Factor related to stunting of children under two years with working mothers in Indonesia

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ABSTRACT

Objectives: Working women have complex challenges regarding parenting, giving nutrition, and raising children. This research analyses the factors related to stunting in children under two years among working mothers in Indonesia.

Methods: We used a cross-sectional design method with a sample size of 2,073 children under two years. The dependent variable is nutritional status, while independent variables consist of residence, maternal age, marital status, maternal education, wealth status, children's age, gender, and early initiation of breastfeeding (EIBF). We analysed the relationship between dependent and independent variables using the binary logistic regression model.

Results: Children in urban areas whose mothers work were 1.116 times more likely to experience stunting than those in rural areas (95% CI, 1.107 to 1.124). Married working mothers were 1.500 times more likely than divorced mothers to have stunted children (95% CI, 1.461 to 1.540). Children aged 12–23 months whose mother work were 2.831 times more likely than those aged <12 months to suffer from stunting (95% CI, 2.809 to 2.854). Children under two years who have not received EIBF from working mothers are 1.020 times more likely to experience stunting than those who received EIBF (95% CI, 1.012 to 1.027).

Conclusions: Factors significantly related to the stunting of children under two years with working mothers were residence, maternal age, marital status, maternal education, wealth status, children's age, gender, and EIBF. The policy program to reduce stunting in children should focus on scaling up nutrition and action on direct causal factors and underlying causes and various resulting consequences.

1. Introduction

The cultural context of Asian nations, including Indonesia, mandates that women bear primary responsibility for household duties and child care.¹ In addition to being responsible for the home, mothers in some low-income families are forced to share the burden of finding work. As a result, there needed to be more time and focus available for childcare. Working mothers play an additional role outside the household, which has challenges, and it is challenging to face many difficulties when raising their children. A study in Indonesia reported that stunting incidence in toddlers with working mothers was associated with factors: residence, age, marital status, education, and toddler age.² Therefore, the strategies and initiatives for working employees to maintain a work-life balance, including their physical, emotional and social

well-being, can help worker resilience, well-being and increased productivity.³

Stunting is linear growth failure in childhood, the most common form of malnutrition globally. Debate continues regarding whether children who become stunted before 24 months of age can catch up in growth and cognitive function later in life. Physical and neurocognitive damage accompanying growth disorders is potentially irreversible, a significant obstacle to human development.⁴ The pathogenesis of stunting children in lipid synthesis can cause barriers to the myelination of the nervous system, which impacts the cognitively impaired. In protein synthesis, it causes interference with chondrocytes proliferation in growth plates which has an impact on slowing long bone growth. Besides that, it also inhibits skeletal muscle growth, which impacts muscular atrophy. Disorders of hematopoiesis and iron metabolism can

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lead to anaemia. Immune dysfunction results in recurrent infections. Meanwhile, autophagy causes disruption of cellular growth in the small intestine, resulting in environmental enteric dysfunction and reduced organ size, resulting in wasting.⁴

Stunting is still a global public health problem. Children whose height exceeds two standard deviations below the median of the World Health Organization's (WHO) child growth criteria are considered stunted—globally, 149.2 million children under five suffered stunting in 2020.⁵ In Indonesia, the prevalence of stunting in 2018 was 30.8%.⁶ Compared with 2013, this number has declined but is still above the World Health Organization (WHO) 's cut-off values for stunting. The Government of Indonesia committed to reducing the prevalence of stunting by 14% in 2024 (Presidential Decree No. 72/2021 on the acceleration of stunting reduction). Stunting prevalence reduction also became the goal of the Global Nutrition Target for 2025⁷ and the key indicator number 2.2 of the Sustainable Development Goal.⁸

Countries that have achieved substantial reductions in stunting prevalence over the past 30 years are geographically dispersed among several regions around the world. Trends in the prevalence of stunting in a sample of the 13 best-performing countries globally were selected in consultation with experts. Although the baseline prevalence and rate of decline of stunting varied for each of these countries over the period examined, one consistent pattern emerged that characterised some of the best performers: an initial period of stagnation followed by a consistent decline.⁹

The community is not yet aware of stunting as a problem compared to other malnutrition problems. Globally, policies aimed at reducing the incidence of stunting are focused on the first 1000 days, known as Scaling Up Nutrition.¹⁰ Failure to reach one's growth potential is caused by chronic malnutrition and recurrent illness during childhood. It reflects the cumulative effects of chronic malnutrition over the first 1000 days of life. It is also associated with less education, poverty, less health, and more susceptibility to infectious diseases and indicates poor quality of life that negatively impacts a nation's human capital.¹⁰

Improved parental education is also a strong predictor of better child growth. Of the underlying determinants of stunting, better access to maternal health services, including optimal antenatal care and deliveries in health facilities or with trained midwives, all contribute to a substantial increase in child growth. However, the magnitude of the variation explained by each differs substantially between countries. The direct effect of changes in several maternal characteristics predicts a reduction in stunting, including parity, interval between pregnancies, maternal height, household socio-economic status, sanitation conditions and family planning.⁹

Women's empowerment is related to reducing stunting, including the life expectancy ratio. Women's empowerment that is not supported by a favourable local cultural environment is a contributing factor to stunting. Women's empowerment is useful for fulfilling health, and socio-economic rights related to education level and employment. Pregnant women with low education and income levels may experience greater difficulties in providing adequate nutritious food from various types of food. Culture includes the level of knowledge, behavioural patterns and attitudes that are customary to local traditions. For example, the influence of cultural prohibitions on the consumption of certain diets or foods in pregnant women can cause the fetus to become malnourished and put the baby at greater risk of stunting.

The Government of Indonesia has been focused on stunting prevention. Three considerations for stunting prevention include improving diet, parenting patterns, sanitation and access to clean water. Often non-health problems are the root of the stunting problem, be it economic, political, social, cultural, poverty, lack of women's empowerment, and environmental degradation problems.¹¹ This study aims to analyse the factors related to stunting in children under two years among working mothers in Indonesia.

2. Methods

2.1. Study design and data

The study design was cross-sectional with a two-stage stratified sampling method. We used the Indonesian Nutritional Status Survey (SSGI) data year 2022 from the Health Development Policy Agency, Ministry of Health of the Republic of Indonesia that was conducted from February to December 2022.

2.2. Population

In this study, the subject was a working mother with a total sample of 2,073, while the children under two years became the unit of analysis. Samples were collected from 486 districts/cities spread across 34 provinces in Indonesia. We include children under the age of two years in our study, taking into consideration several factors. Firstly, children under two years experience a crucial period of 1,000 days of life during which they still have the potential to achieve optimal growth and development. Secondly, children in this age group share similar conditions, such as exclusive breastfeeding and immunization records, which minimize bias in maternal recall.

2.3. Research variables

The dependent variable was child stunting, measured by anthropometry using the height/age index expressed by the z-score based on WHO. The stunting category included two categories, normal (z-score ≥ -2.0) and stunting (z-score < -2.0). The independent variables were residence types, maternal age, marital status, maternal education, wealth status, children's age, gender, and early initiation breastfeeding (EIBF).

Residences were divided into urban and rural areas. Maternal age was grouped into: <20 , 20–24, 25–29, 30–34, 35–39, 40–44, and >44 years old. Marital status was categorised into married and divorced/widowed. Maternal education was grouped into no formal education, primary, secondary, and higher. Children's ages were <12 months and 12–23 months.

Gender was categorised into male and female, while EIBF consisted of no and yes. Wealth status is assessed based on household wealth quintiles, such as movable property, immovable property, and owned facilities. The household score assessed the national wealth quintile, which is 20% of the population. Wealth is categorised into poorest, poorer, middle, richer, and richest.

2.4. Data analysis

We conducted a chi-square test to see the relationship between independent and dependent factors, followed by a binary logistic regression to determine the possibility of related factors between the independent and dependent variables. This process was conducted in IBM SPSS Statistics version 21. We also visualised the number of working mothers and the percentage of stunted children on maps. The provincial boundary maps scale of 1:50,000 was from the Geospatial Information Agency of Indonesia. Spatial data processing and visualization were conducted on QGIS version 3.22. The provincial boundary maps and QGIS are publicly available and can be downloaded freely.

2.5. Ethical clearance statement

The study protocol of the Indonesian National Nutrition Status Survey 2021 was approved by the Health Research Ethics Committee, Ministry of Health of the Republic of Indonesia, with the number LB.02.01/2/KE.248/2021. The Health Research Ethics Committee confirmed informed consent.

3. Results

The number of working mothers was higher in East Java, East Nusa Tenggara, and North Sumatra but lower in Riau, Jambi, North Kalimantan, East Kalimantan, and West Papua. Stunted children were highest in Aceh, Central Kalimantan, Southeast Sulawesi, West Sulawesi, East Nusa Tenggara, and Papua. On the contrary, the percentage of stunted children is lowest in Lampung and Bali (Fig. 1).

Table 1 shows that mothers who work in urban areas have a higher proportion of stunted children than those in rural areas. The proportion of married working mothers has a higher number of stunted children than working mothers who are divorced. Working mothers with higher education levels have lower-stunted children. Working mothers who are richer have fewer stunted children or with a ratio of almost three times that of the poorest. Working mothers who provide EIBF or do not provide EIBF almost have the same number of stunted children.

Table 2 depicts children under two years in urban areas whose mothers work are 1.116 times more likely to experience stunting than those in rural areas (AOR 1.116; 95% CI, 1.107–1.124; $p < 0.001$). Children under two years whose mothers work in all age groups are more likely to be stunted than mothers aged >44 years. Married working mothers are 1.500 times more likely to have stunted children than divorced mothers (AOR 1.500; 95% CI, 1.461–1.540; $p < 0.001$).

Children under two years whose mothers work and have no formal education are 1.282 times more likely to be stunted than those whose mothers work and have higher education (AOR 1.282; CI 95%, 1.249–1.316; $p < 0.001$). Children under two years whose mothers work and are categorised as poorest are 2.751 times more likely to suffer from stunted children than those with mothers who are richest in wealth status (AOR 2.751; CI 95%, 2.715–2.787; $p < 0.001$).

Children aged 12–23 months whose mothers work are 2.831 times more likely to suffer from stunting than children aged <12 months (AOR 2.831; 95% CI, 2.809–2.854; $p < 0.001$). Boys under two years whose mother work are 1.352 times more likely to be stunted than girls (AOR 1.352; 95% CI, 1.342–1.361; $p < 0.001$). Children under two years who do not receive EIBF from working mothers are 1.020 times more likely to be stunted than children under two who receive EIBF (AOR 1.020; 95% CI, 1.012–1.027; $p < 0.001$).

4. Discussion

The discussion in this article about working mothers is related to stunting. The discussion is based on the characteristics of working mothers, namely place of residence, mother's age category, marital status, education, socio-economics, child's age category, child's gender and EIBF.

This research finds that children under two years in urban areas whose mothers work are more likely to experience stunting than those in rural areas. Increasing income from working mothers is implicated in the higher consumption of processed and high-fat foods contributing to malnutrition.¹² In contrast, research in Ethiopia found that low varied dietary intakes and economic, environmental, and sociocultural factors increased the risk of stunting in rural areas.¹³ A previous study also found that most premature male infants in rural areas have malnutrition and undernutrition.¹⁴

We found that children under two whose mothers worked in all age groups were more likely to be stunted than mothers aged >44 years. This finding aligns with a previous study which reported that children born to young mothers are at risk of experiencing nutritional disorders, and immature young mothers tend to give the wrong parenting style.¹⁵ On the contrary, another research reported that children born to older mothers are at higher risk of experiencing nutritional disorders.¹⁶

This study found that married working mothers have a higher incidence of stunting in children under two than divorced mothers. This finding is consistent with previous studies on toddlers, which reported that married working mothers are likelier to have stunted children than

divorced ones.¹⁷ Mother has an essential role in raising children. The psychological closeness between mother and children and parenting style is related to the children's growth and development.¹⁸

This study found that working mothers with low education are likelier to have stunted children than those with higher education. This finding aligns with a previous study which reported that knowledge, attitudes, and parenting styles influence parental strategies to prevent stunting.¹⁹ Therefore, improving mothers' behaviour and knowledge is essential to become part of stunting prevention programs.

This research found that children under two years whose mothers work and are categorised as poor are more likely to suffer from stunting than those whose mothers are rich in wealth status. This finding aligns with a previous study in Indonesia.²⁰ Wealthy working mothers can provide nutritious food and drinks for their children. They also have good knowledge, which positively impacts parenting styles, including meeting nutritional needs.²¹ A previous study also reported that the risk to get low birth weight babies in mothers with better wealth status is lower than in poor mothers.²² Women's economic empowerment and increasing the number of antenatal care visits should be prioritised to improve access to better medical services.²³

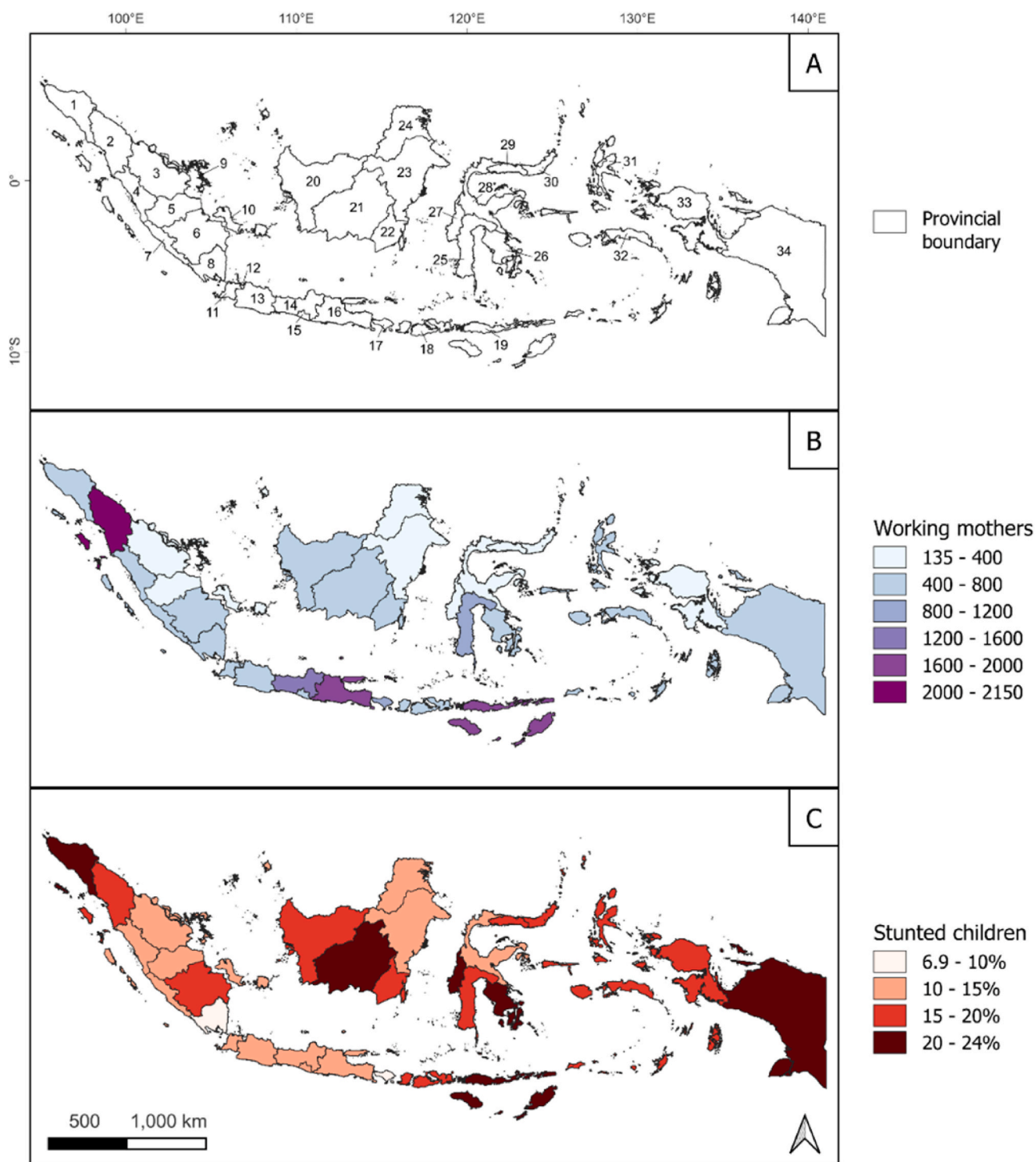
This study found that children aged 12–23 months whose mothers work are more likely to suffer from stunting than children aged <12 months. Sanitation hygiene became one factor which influenced the nutritional status of children. Poor sanitation and hygiene will increase the risk of infections, potentially harming children's health.²⁴

This study also found that boys children under two years whose mothers work were more likely to experience stunting than girls. This finding was in line with a recent systematic review and meta-analysis on sex differences in the undernutrition of children, which reported that boys are more likely to suffer from stunting than girls.²⁵ Studies of child growth failure in low and middle-income countries also showed higher odds of stunting in boys than girls.²⁶ Contrary to this result, a cross-sectional study in urban slums in Bangladesh reported no association between sex and stunting in children whose mothers work.²⁷ Regional variations existed, indicating that social, genetic, or environmental variables might impact sex differences in stunting.²⁸

This study found that children under two years who do not receive EIBF from working mothers were at higher risk of experiencing stunting. This finding aligns with previous studies in Indonesia²⁹ and 35 other low and middle countries.³⁰ These findings highlight the importance of EIBF as a form of maternal care and the best way to provide nutrition at a young age to lower the risk of stunting. EIBF ensures that the infant receives colostrum, which boosts the child's immunity to illness.

The limitation of this research is that it cannot know the parenting patterns of children under two years while the mother is working, whether with a housemaid, baby sister, grandfather/grandmother or cared for in a day care center, including their nutritional needs. This was a need for further research. It is hoped that future research will be able to comprehensively examine the parenting patterns given to children under two years while their mothers are working.

Bias may occur in this study related to the use of cross-sectional data collected at one point in time and the process of stunting incidence over the child's age period. This is important, stunting is caused by cumulative risk exposure over time, thereby allowing for changes in status in the research variables. In the same age category period applied in the study, there may be changes in the status of the stunting category as a result of the child's growth. Likewise, there is the possibility of changes in population status, such as location of residence, mother's employment status, mother's marital status, and welfare status during the child's growth from birth to the age at the time of data collection. Bias may also occur regarding early initiation of breastfeeding, where data is collected based on maternal recollection, not direct observation. This potential bias can influence, either strengthening or weakening the relationship between variables and the incidence of stunting. The limitation of more detailed data regarding these two things is an obstacle in this cross-sectional data analysis research. The results of this research



Province

1 Aceh	10 Bangka Belitung Islands	19 East Nusa Tenggara	19 East Nusa Tenggara
2 North Sumatra	11 Banten	20 West Kalimantan	28 Central Sulawesi
3 Riau	12 Jakarta	21 Central Kalimantan	29 Gorontalo
4 West Sumatra	13 West Java	22 South Kalimantan	30 North Sulawesi
5 Jambi	14 Central Java	23 East Kalimantan	31 North Maluku
6 South Sumatra	15 Special Region of Yogyakarta	24 North Kalimantan	32 Maluku
7 Bengkulu	16 East Java	25 South Sulawesi	33 West Papua
8 Lampung	17 Bali	26 Southeast Sulawesi	34 Papua
9 Riau Islands	18 West Nusa Tenggara	27 West Sulawesi	

Fig. 1. The study area is located in Indonesia. (A) Map of provincial boundary; (B) Distribution of working mothers at the provincial level; (C) Percentage of stunted children of working mothers at the provincial level.

Table 1
Descriptive statistic of stunting of children under two years with working mothers in Indonesia (n = 20,735).

Variables	Nutritional Status		p-value
	Normal (n = 17,368)	Stunting (n = 3,367)	
Residence			<0.001
Rural	86.8%	13.2%	
Urban	82.0%	18.0%	
Maternal Age			<0.001
<20	80.4%	19.6%	
20–24	82.3%	17.7%	
25–29	87.4%	12.6%	
30–34	85.1%	14.9%	
35–39	82.4%	17.6%	
40–44	83.2%	16.8%	
>44	82.2%	17.8%	
Marital Status			<0.001
Married	84.6%	15.4%	
Divorced/Widowed	86.0%	14.0%	
Education			<0.001
No formal	75.8%	24.2%	
Primary	81.1%	18.9%	
Secondary	85.1%	14.9%	
Higher	89.3%	10.7%	
Wealth Status			<0.001
Poorest	74.8%	25.2%	
Poorer	82.7%	17.3%	
Middle	83.9%	16.1%	
Richer	85.5%	14.5%	
Richest	90.4%	9.6%	
Children's age (month)			<0.001
<12	91.5%	8.5%	
12–23	79.5%	20.5%	
Children's gender			<0.001
Boy	82.8%	17.2%	
Girls	86.6%	13.4%	
Early initiation of breastfeeding			<0.001
No	84.6%	15.4%	
Yes	84.8%	15.2%	

describe the relationship between stunting and its variables in children under two years old at the national level, so different results will be obtained if the analysis or research is carried out at a narrower level, whether provincial or other. narrower one. Providing and using more detailed research variable data needs to be carried out in future research to avoid bias. In addition, this research is a cross-sectional study which is only exploratory in nature and cannot or cannot describe aspects of the causes of stunting. Future research related to stunting needs to be carried out through a case-control or cohort approach to further improve the causality aspect of stunting.

5. Conclusion

Related to the aims of this study, we concluded that residence, maternal age, marital status, maternal education, wealth status, children's age, gender, and EIBF were related to stunting in children under two years whose mothers work. This study complements the findings of previous studies and is crucial for helping the policymaker reduce stunting prevalence, especially in children under two years. We recommend the policy maker to reduce stunting in children through scaling up nutrition and action on direct causal factors and underlying causes and various resulting consequences.

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None.

Table 2
Binary logistic regression of stunting of children under two years with working mothers in Indonesia (n = 20,735).

Predictor	Stunting		
	p-value	AOR	CI 95%
Residence: Rural	-	-	-
Residence: Urban	<0.001	1.116	1.107–1.124
Maternal age: <20	<0.001	1.136	1.094–1.180
Maternal age: 20–24	<0.001	1.149	1.116–1.183
Maternal age: 25–29	<0.001	0.867	0.843–0.892
Maternal age: 30–34	0.021	1.034	1.005–1.063
Maternal age: 35–39	<0.001	1.205	1.172–1.240
Maternal age: 40–44	<0.001	1.058	1.027–1.090
Maternal age: >44	-	-	-
Marital Status: Married	<0.001	1.500	1.461–1.540
Marital Status: Divorced/Widowed	-	-	-
Education: No Formal	<0.001	1.282	1.249–1.316
Education: Primary	<0.001	1.197	1.184–1.210
Education: Secondary	<0.001	1.147	1.135–1.159
Education: Higher	-	-	-
Wealth Status: Poorest	<0.001	2.751	2.715–2.787
Wealth Status: Poorer	<0.001	1.734	1.713–1.756
Wealth Status: Middle	<0.001	1.644	1.625–1.664
Wealth Status: Richer	<0.001	1.532	1.515–1.549
Wealth Status: Richest	-	-	-
Children's age (month): <12	-	-	-
Children's age (month): 12–23	<0.001	2.831	2.809–2.854
Children's gender: Boy	<0.001	1.352	1.342–1.361
Children's gender: Girls	-	-	-
Early initiation of breastfeeding: No	<0.001	1.020	1.012–1.027
Early initiation of breastfeeding: Yes	-	-	-

Author contributions

Sri Supadmi: Conceptualization, Data curation, Formal analysis, Methodology, Visualization, Writing—original draft, Writing—review & editing. *Agung Dwi laksono*: Conceptualization, Data curation, Methodology, Writing—review & editing. *Hastin Dyah Kusumawardani*: Formal analysis, Writing—review & editing. *Hadi Ashar*: Conceptualization, Data curation, Formal analysis, Writing—review & editing. *Afi Nursafingi*: Conceptualization, Formal analysis, Visualization, Writing—original draft, Writing—review & editing. *Ina Kusriani*: Formal analysis, Writing—original draft, Writing—review & editing. *Muhamad Arif Musoddaq*: Formal analysis, Writing—original draft, Writing—review & editing.

Declaration of competing interest

None.

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