
THE POTENTIAL OF ECONOMIC LOSS DUE TO STUNTING IN INDONESIA

Esty Asriyana Suryana*, Miftahul Azis

Indonesian Center for Agricultural Socio Economic and Policy Studies, Ministry of Agriculture, Kota Bogor
16111, Jawa Barat, Indonesia

* Correspondence: Esty Asriyana Suryana, Indonesian Center for Agricultural Socio Economic and Policy Studies, Ministry of Agriculture, Kota Bogor 16111, Jawa Barat, Indonesia,
e-mail: estyasriyana@gmail.com

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Abstract. Stunting cases continue to increase, along with the high risk of undernutrition, the increasing prevalence of malnutrition, and decreasing productivity. If this condition is not handled correctly, it can affect Indonesia's development performance, inequality, and poverty. Stunting can hinder economic growth and labor productivity, affecting 11% of GDP (gross domestic product) and reducing the income of adult workers by up to 20%. Based on this, it is necessary to make prevention and control efforts in nutrition intervention activities an economic investment. Therefore, this study estimates the economic potential lost due to stunting in children under five. This descriptive study is based on processing secondary data from various related agencies. We employed Konig's formula and correction factors from Horton's study. The results of this study show that the incidence of stunting in children under five in Indonesia in 2021 was 24.4%. Nationally, Indonesia has the potential for economic loss due to stunting in toddlers, which ranges from IDR 15,062 to IDR 67,780 billion. These are equivalent to a range of 0.89-3.99% of the total GDP in 2021 (IDR 16,970.8 trillion).

Kata Kunci: economic loss, human development index, stunting, toddler, nutrition

Abstrak. Kasus stunting terus meningkat, seiring dengan tingginya risiko kurang gizi, meningkatnya prevalensi masalah gizi dan penurunan produktivitas. Kondisi ini jika tidak ditangani dengan baik dapat mempengaruhi kinerja pembangunan Indonesia, ketimpangan dan kemiskinan. Stunting dapat menghambat pertumbuhan ekonomi dan produktivitas tenaga kerja sehingga mempengaruhi 11% PDB (Produk Domestik Bruto) dan mengurangi pendapatan pekerja dewasa hingga 20%. Berdasarkan hal tersebut, perlu dilakukan upaya pencegahan dan pengendalian dalam kegiatan intervensi gizi sebagai investasi ekonomi. Studi ini memperkirakan potensi ekonomi yang hilang akibat stunting pada anak balita. Penelitian ini merupakan penelitian deskriptif dengan mengolah data sekunder dari berbagai instansi terkait. Perhitungan menggunakan rumus Konig dan faktor koreksi dari penelitian Horton. Hasil penelitian ini menunjukkan bahwa kejadian stunting pada balita di Indonesia pada tahun 2021 sebesar 24,4 persen. Secara nasional, Indonesia memiliki potensi kerugian ekonomi akibat stunting pada balita sebesar Rp 15.062 - 67.780 miliar dari total PDB Indonesia tahun 2021 sebesar Rp 16.970,8 triliun.

Keywords: kerugian ekonomi, indeks pembangunan manusia, stunting, balita, gizi

INTRODUCTION

The rate of stunting as an impact of malnutrition on toddlers in Indonesia exceeds the limit set by the WHO. According to Sukanto et al. (2021), stunting in Indonesia which accounted for 27.5% of total children in 2019. The prevalence of stunting in lower and middle-income countries is relatively high.

Other countries that also have high stunting rates include Nigeria, India, etc. These countries are in fact also countries with low economic status. This indirectly supports the statement that stunting cases are often found in areas with high poverty and low levels of

education (Reyes et al., 2004; Laksono et al., 2022).

Some studies have predicted that a high stunting rate in a country can impact economic loss. Meanwhile, Indonesia predicts becoming one of the world's economic powers in the next few decades. Price Waterhouse Coopers (PWC), predicts that Indonesia's economy will enter the top five in the world by 2030 and even become the fourth country with the largest economy in the world by 2050. If that happens, Indonesia will be under China, India, and the United States. This prediction is based on Indonesia's economic growth, which is considered stable, and has a large population. From the population's age composition, in 2030, 70 percent of Indonesia's population will be aged 15–64 or in their productive age (Hayes and Setyonaluri 2015). This composition is referred to as the demographic bonus. This productive age group, estimated at 180 million people, will become the driving force for the national economy (Kudrna et al., 2022). Instead of compliance, the demographic bonus is in danger of becoming a shortage because of Indonesia's high percentage of toddlers with stunting. It is these toddlers who will later become productive forces.

The worst damages of undernutrition happen during pregnancy and early childhood – from conception to two years, i.e., the first 1000 days, the Window of Opportunity period. The toddler phase of child development occurs from 1 to 3 years old (Perry, 1998; Soetjiningasih & Gde Ranuh, 2013). Toddler-age children refer to the concept of a critical period and high plasticity in the process of growth and development, so the age of one to three years is often the golden period (golden opportunity) to increase the ability to the highest level. Furthermore, flexible experience takes over the function of the surrounding cells by forming synapses and dramatically influences the next period of growth and development (Allen & Marotz, 2010). According to Soekirman (2000), height gain is relatively less sensitive to undernutrition that occurs in a short time. Undernourished children have weaker immune systems and are thus more susceptible to infections and illnesses. Long-term insufficient nutrient intake and frequent infections can delay motor and cognitive development effects are largely

irreversible. However, the effect of nutritional deficiency on height will appear for a long time. Therefore, stunting indicates chronic undernutrition, describes a nutrition history in children over a particular time, and can provide an overview of the disruption of socioeconomic conditions. Extreme food shortages, common childhood diseases such as diarrhea and pneumonia, or both can lead to acute malnutrition, stunting or wasting, quickly leading to death if left untreated (UNICEF, 2017). In addition, stunting will contribute broadly by several factors such as maternal height and weight, insufficient breastfeeding, quality and quantity of complementary feeding, and types of birth such as being born prematurely (Small for Gestational Age and/or Intrauterine Growth Restriction) (Hayati et al., 2012; Mauludyani et al., 2021; Kusumawardhani & Ashar, 2022). Stunting can arise due to ongoing poverty, inappropriate parenting behavior, and often experiencing repeated illnesses caused by poor hygiene and sanitation (Kemenkes RI, 2007).

Furthermore, this condition will impact cognitive and socio-emotional functioning and economic life within and among communities, it also can affect the performance and quality of work, decrease productivity, and result in lower income (Kementerian PPN/Bappenas, 2019; Mann & Truswell, 2002; Yadika et al., 2019). Indeed, eradicating poverty will take more than economic progress. Nevertheless, if income distribution does not follow economic growth, the number of poor people will not be much reduced. (Wongdesmiwati, 2009). As a result, Stunting will thereby hinder economic growth, raise the poverty rate, and exacerbate inequality (Saputri, 2019).

The United Nations Development Program (UNDP) collaborated with Statistics Indonesia (Badan Pusat Statistik or BPS) to create a framework for the interrelationships between economic growth, poverty, and healthy development (nutritional status) (Bappenas, 2022). In the direction of the relationship between economic growth and nutritional status, it can be viewed from two processes of influence, so it is handled through these two influences. If handled quickly, this situation could affect Indonesia's development performance regarding economic growth, poverty, and inequality. Stunting can hinder

economic growth and labor productivity, affecting 11% of GNP (Gross National Product) annually in Asia and Africa (Horton & Steckel, 2014). For individuals, it reduces the income of adult workers by up to 20% and increases vulnerability to poverty by 33% (Hoddinott et al., 2013). In addition, stunting can also contribute to increasing the possibility of intergenerational poverty, as seen from a 10% reduction in total lifetime income (Tim Nasional Percepatan Penanggulangan Stunting-TNP2K, 2017).

Several studies in Indonesia already examined the impact of economic losses due to nutrition problems, such as research conducted by Mangalik et al. (2016) about the estimation of economic loss and the cost of intervention due to anemia. Other research conducted by Renyoet et al. (2017) show that there were economic losses due to absenteeism from work due to obesity in children under five, also study about economic loss due to malnutrition among children under five in Indonesia year from (Aries & Martianto, 2007) obtain similar results. However, no discussion specifically calculates economic losses regarding stunting.

The prevalence of severe stunting can increase the potential for economic losses from decreased productivity as an adult, which can ultimately affect the economic condition of a country, mainly in developing countries. Calculations regarding economic losses due to malnutrition have been carried out in several studies using tools similar to this study. However, no recent data is used to calculate estimated economic loss figures (the latest data were in 2013), as Renyoet et al. (2017) estimated. Differences in previous studies and the conditions and phenomena that occur from the results obtained in this study also add to the novelty of this paper. Based on the explanation above, this article aims to calculate economic loss using the calculation

formulation of the Konig Formula. Researchers first calculated the stunting prevalence to get economic loss figures with this formula, then looked for income at productive age data. After that, we calculated the child's economic potential at birth to get the number of lost productivity costs due to stunting. The potential economic loss due to stunting is corrected using a correcting factor that says these toddlers can still recover in actual conditions.

METHODS

Data Collection

Data used in this study is secondary data obtained from various relevant agencies: the Health Research and Development Agency, Ministry of Health, and Statistics Indonesia. SSGI 2021 data was taken in 514 regencies/cities throughout Indonesia with 14,889 census blocks and 153,228 toddlers, which have been integrated with the National Socioeconomic Survey (Susenas). This study uses toddlers because it follows stages based on the age range of the child's growth and development. This is a critical age before preschool. Growth and development at this time are the most rapid and measurable. This data is then processed into national, provincial, and district/city achievements. The type of data shows in Table 1.

Data Analysis

The data is processed with the Microsoft Excel program 2016. Then the estimation of potential economic losses due to stunting in toddlers is calculated with the Konig formula (Horton, 1999). The calculation stages of the potential economic loss due to stunting are as follows:

Table 1. The types of data

Variable	Indicator	Source
1. Characteristics of toddlers	• Age • Nutritional status data (number of stunting toddlers)	12-36 month old. Index of height/length according to age (a height/length-for-age). z-score of more than two standard deviations
2. Population characteristics	• Birth rate • Total population based on gender and age group • Productive age	15-64 years old Statistics Indonesia (2021). Ministry of Health 2021
3. Data on wages/salaries of workers	• Data on wages /net income of workers by province and main field of work	245 workdays Statistics Indonesia 2021

Source: Statistics Indonesia (2021), Kemenkes RI (2021)

The economic value of children when they start working (income at productive age) is calculated using the formula:

$$FV[r, t] = P_0(1 + r)^t \dots\dots\dots 1$$

Description:

FV[r,t] = income at productive age (15-64 years)

P0 = Wages/salary year 2021

r = Discount rate

t = Productive years of life

The amount of economic value until the child enters retirement, is calculated using the formula:

$$FVA[r, t] = \frac{FV[r, t] [(1+r)^t - 1]}{r} \dots\dots\dots 2$$

Description:

FVA[r,t] = The economic value of children up to retirement

FV[r,t] = income at productive age (15-64 years)

r = Discount rate

t = Productive years of life

The economic potential of a child at birth or the age of 0 is calculated using the formula:

$$PV[0] = \frac{FVA[r, t]}{(1+r)^t} \dots\dots\dots 3$$

Description:

PV[0] = Child's economic potential at birth

FVA[r,t] = The economic value of children up to retirement

r = Discount rate

t = Productive years of life

The amount cost of lost productivity due to stunting is calculated using the following formula:

$$PPE = Prev \times \sum BR \times PV[0] \dots\dots\dots 4$$

Description:

PPEM = Economic potential loss due to stunting

Prev = prevalence of stunting 2021

$\sum BR$ = Birth rate 2021

PV[0] = Child's economic potential at birth

Economic potential loss due to stunting is being corrected using a correcting factor that says that these toddlers can still recover in actual conditions, so they still have less than 100% productivity. The formula used is as follows:

$$P = f_{(cor)} \times Prev \times \sum BR \times PV[0] \dots\dots\dots 5$$

Description:

P = The amount of the corrected economic loss

f (cor) = Correction factor (2% and 9%)

Prev = prevalence of stunting 2021

$\sum BR$ = Birth rate 2021

PV[0] = Child's economic potential at birth

First, we calculated the value of children when they started working. FV[r,t] is the income at productive age (15-64 years). Then we calculated the amount of economic value until the child enters retirement (FVA[r,t]). After that, we find the child's economic potential at birth (PV[0]), so we can get the number of lost productivity costs due to stunting (PPEM). The potential economic loss

due to stunting is corrected using a correcting factor that says these toddlers can still recover in actual conditions. Hence, they still have less than 100% productivity. Other data that we used to calculate this study are wages/salary year 2021 (Po), discount rate (r), the productive years of life (t), birth rate, and the prevalence of stunting.

Study Assumptions

There are several assumptions used and limitations in this study so that the results are generally accepted. These assumptions include: (1) stunted toddlers as adults will experience a decline in productivity by 2-9% (Horton, 1999); (2) salary or wages in all fields of business are the same; (3) the characteristics of the subjects seen are the same; (4) using a 5% discount rate. This data is used based on the average interest rate for the last 5 years and also refers to several similar studies using the same assumptions (Renyot 2016; Kusumawardhani and Martianto 2011). Interest rates are used because this study estimates the potential and economic losses from now to the future. So that we can find out the economic loss that is valued in money at this time and in the future by using interest rates.

RESULTS

Stunting prevalence

The study found that the prevalence of stunting in toddlers in Indonesia year 2021 was 24.4% (Figure 1). Several provinces have stunting problems above the national prevalence, where the highest stunting prevalence is East Nusa Tenggara (37.8%). Based on Basic Health Research (Riset Kesehatan Dasar or Riskesdas), as many as 269,658 toddlers out of 633,000 toddlers in East NT were recorded as experiencing stunting, and 75.960 toddlers of whom were wasting (Riskesdas, 2018). The high number of stunted toddlers in East NT is caused by poor nutrition. Many mothers do not provide good nutritional intake during pregnancy, so they give birth to children with stunted body postures. The study concluded that the maternal education level was associated with stunting children under two years in Indonesia. In line with the research from (Laksono et al., 2022) state that the lower the mother's level of

education, the higher the chances of a mother having stunted children under two years. Provinces with the following high percentage of stunting and the stunting rate is below the 20% cutoff imposed by the World Health Organization (WHO) norm are West Sulawesi (33.8%), Aceh (33.2%), West Nusa Tenggara (31.4%), South Kalimantan (30%), and West Kalimantan (29.8%). This shows that these provinces still needed to improve in handling stunting. In addition to being in second place nationally, West Sulawesi has three districts with a higher frequency of stunting in children under five than the national average, namely Majene, Polewali Mandar, and Pasangkayu Regency. As Aceh could only cut the stunting toddler rate by 2 points from the previous year, the highest stunting in Aceh occurred in Gayo Lues Regency at 42.9% (Kemenkes RI, 2022). Two factors affect the nutritional status of children, both directly and indirectly, and the fundamental root cause. If these factors occur during the golden period of brain development (0-3 years), the brain will not develop properly (Sari et al., 2010).

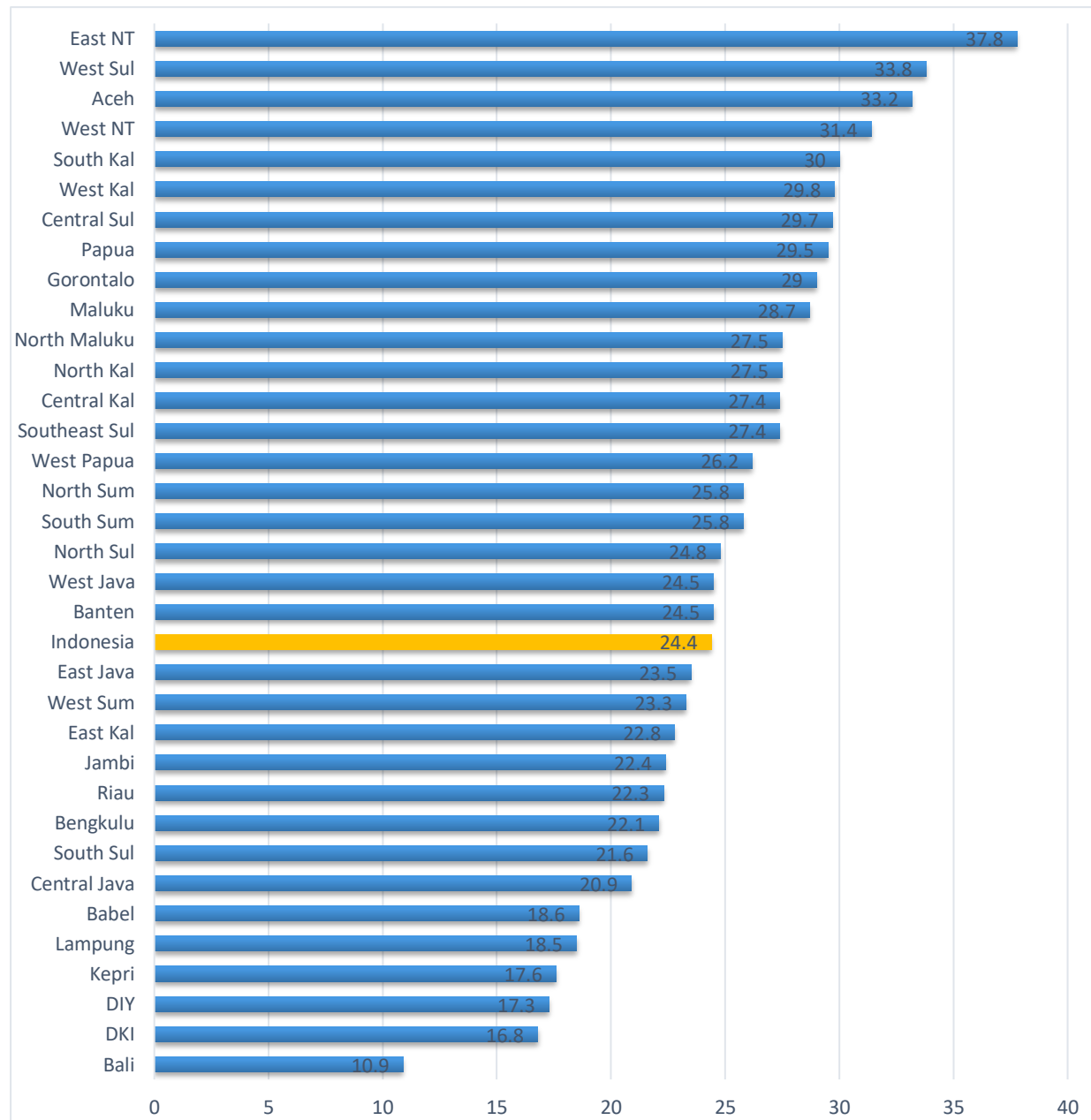
Economic loss due to stunting

The economic costs of nutritional problems range from 2-3% of GDP (World Bank, 2006) up to 16% in most affected countries (Ethiopian Public Health and Nutrition Institute, 2013). The impact of stunting is long-term and traps generations in a vicious cycle of poverty. Many studies have shown that improved nutrition promotes economic growth and is excellent value for money (Alderman et al., 2007; Victoria et al., 2021). Every dollar spent on food is estimated to have a benefit of between USD 8-138 approx. EUR 6-100. Another study stated that preventing one child from being born with a low birth weight was worth USD 580.23 approx. Or equivalent to EUR 426 (World Bank, 2006). According to the Copenhagen Consensus, ensuring good nutrition is the most important and cost-effective way to improve human well-being in line with the Millennium Development Goals (Horton et al., 2008).

Table 2 provides the estimated potential economic loss due to stunting by the 34 provinces in Indonesia. The average estimated potential loss of productivity is 2%, equivalent to IDR 381 billion. The average economic potential lost as an adult if

productivity declines by 2% due to stunting is estimated to have cost the nation's economy IDR 381 billion. In contrast, if the productivity decline is 9%, it would be equivalent to IDR 1.710 billion. So that the estimated economic loss potentially due to low productivity in 34

provinces in Indonesia is an average of Rp. 381-1.710 billion.



Source: SSGI (2021, processed)

Figure 1. Stunting prevalence in toddlers in Indonesia in 2021

Table 2. Estimated Potential Economic Losses Due to Stunting

Province	Productivity		% GRDP	
	2% (in billion IDR)	9% (in billion IDR)	2%	9%

Province	Productivity		% GRDP	
	2% (in billion IDR)	9% (in billion IDR)	2%	9%
1 Aceh	574	2583	3.10	13.97
2 North Sumatra	930	4185	1.08	4.87
3 West Sumatra	314	1413	1.24	5.59
4 Riau	437	1967	0.52	2.33
5 Jambi	195	88	0.84	3.77
6 South Sumatra	645	2,902	1.31	5.91
7 Bengkulu	89	399	1.11	5.01
8 Lampung	336	1,515	0.91	4.08
9 Bangka Belitung Island	80	361	0.93	4.21
10 Riau Island	129	583	0.47	2.12
11 DKI Jakarta	641	2,886	0.22	0.99
12 West Java*	1,882	8,468	0.85	3.83
13 Central Java	939	4,229	0.66	2.98
14 DI Yogyakarta	87	391	0.58	2.62
15 East Java	1,167	5,255	0.48	2.14
16 Banten	698	3,141	1.05	4.72
17 Bali	92	416	0.42	1.90
18 West Nusa Tenggara	352	1,584	2.51	11.30
19 East Nusa Tenggara	441	1,988	3.98	17.93
20 West Kalimantan	339	1,527	1.47	6.60
21 Central Kalimantan	182	819	1.07	4.82
22 South Kalimantan	326	1,468	1.69	7.62
23 East Kalimantan	215	970	0.31	1.40
24 North Kalimantan	56	252	0.51	2.28
25 North Sulawesi	151	679	1.06	4.77
26 Central Sulawesi	210	946	0.85	3.83
27 South Sulawesi	503	2,265	0.92	4.16
28 Southeast Sulawesi	195	880	1.41	6.33
29 Gorontalo	85	384	1.94	8.74
30 West Sulawesi	129	581	2.56	11.54
31 Maluku	13	614	2.81	12.66
32 North Maluku	94	427	1.81	8.16
33 West Papua	87	393	1.03	4.62
34 Papua	354	1,594	1.51	6.78
Average	381	1,710	1.27	5.72
Indonesia	15,062	67,780	0.89	3.99

Source: Statistics Indonesia (2021, processed)

DISCUSSION

Stunting Prevention Program and Policies Related

Indonesia's stunting percentage is higher than several Southeast Asian countries, such as Vietnam (23%), the Philippines (20%), Malaysia (17%), and Thailand (16%). WHO ranks Indonesia fourth in the world and second in Southeast Asia regarding the number of stunted children under five (WHO, 2022). One thing that must be understood is that stunting can be overcome so as not to become stunted

or corrected in the first hundred days of life. When a baby is born up to 2 years old, modifications and interventions can still be made so they do not become stunted. So, reducing the prevalence of stunting is a government super priority program with a target of 3-3.5% annually, so a maximum of 14% in 2024. Undernutrition is, directly and indirectly, responsible for 60% of deaths in toddlers, and more than two-thirds of deaths occur in children less than one year old (Solomon & Tigabu, 2008). Developing countries need high quality human resources and have a high production value.

Measurement in terms of human development achievement generally uses the Human Development Index (HDI).

HDI has three main determining factors: education, health, and economy. According to Statistics Indonesia 2022, Indonesia's HDI 72.91 is ranked 130th out of 199 countries. From 2010-2022, the average Indonesian HDI growth per year reached 0.77%. Indonesia's position in ASEAN is still relatively low when viewed from the number of sequences with other countries in the world, and this is undoubtedly influenced by nutritional status and public health in Indonesia. Indonesia's rate is lower than Singapore, Malaysia, Thailand, and the Philippines and on par with Vietn'am (UNDP, 2018). Based on UNDP Human Development Report 2022 data, Indonesia has an HDI rate that is still far behind than 4 other ASEAN countries, namely: (12) Singapore (HDI: 0.939); (51) Brunei (HDI: 0.829); (62) Malaysia (HDI: 0.803); (66) Thailand (HDI: 0.800); (114) Indonesia (HDI: 0.705). It shows the slow rate of improvement in the quality of our human resource development compared to ASEAN countries. In the context of HDI, stunting is usually reflected in the components of the Life Expectancy Index, which is related to health, and the components of the Education Index, which is related to education participation and outcomes. To increase the HDI, efforts to prevent stunting must be a priority, including through policies and programs focusing on children's nutrition, access to health services, and improving the quality of education.

One of the reasons of the high rate of stunting in Indonesia is the high infant and maternal mortality. The poor nutritional status of toddlers causes more than half of infants and under-five (U5) to die. Poverty and undernutrition have a relationship with each other. Therefore, improving the nutritional quality of the community is related to improving the economy because children who receive adequate food and nutrition will grow and develop optimally according to their age and have a reasonable life expectancy because of their excellent health (Renyonet & Nai, 2019).

Indonesia is ranked fifth globally, with more than 7.6 million children without

optimal growth. More than a third of toddlers in Indonesia experience growth that does not match the international standard for height for age (UNICEF, 2012). Research in 2018 in Indonesia found that 29.9% of children under 24 months were stunted. This figure is lower than the previous year but still above the regional average (22%). The same research found that 30.8% of toddlers were stunted—down from the 37% prevalence rate estimated the year before (UNICEF, 2017). Stunting rates vary widely between regions. The highest prevalence of stunting is found in the eastern part of Indonesia and some parts of the west, then it is more widespread in rural areas than urban areas. Further research found that the stunting rate even reached 42% in some regions (UNICEF, 2020).

Various research results have stated that stunting is associated with poverty, low education, disease burden, and the common empowerment of women (de Onis & Branca, 2016; Morris et al., 2008). Studies in Bangladesh show that poverty and undernutrition are interrelated, found in illiterate mothers, low incomes, having more siblings, lacking access to media, inadequate nutritional intake, and lower environmental sanitation and health risks—nutrition (de Onis et al., 2012).

Economic losses due to several nutritional problems and stunting in Albania have a financial loss of 50% greater than other dietary problems (Bagriansky, 2010). A similar study was also conducted in Cambodia. The result is that stunting has an economic loss of up to 31% (USD 128 million or around IDR 1.568 billion in 2013), greater than other nutritional problems in this country (Bagriansky et al., 2014). One of the factors causing the high and low loss of economic potential is the high number of births. Every baby born has the potential for new human resources, and many births will also affect the loss of high economic potential if stunting is also high. Although not all provinces have a high prevalence of stunting, the loss of economic potential is also high.

The direction of nutrition improvement in Indonesia based on Law Number. 36 of 2009 is to improve the nutritional quality of both individuals and communities through several strategies:

progress of consumption patterns with balanced nutrition; improved behavior, physical activity, increasing access to health and quality of service through science and technology as well as increasing awareness of food and nutrition systems.

Policies in the context of improving the nutritional status of the community are regulated in the Food Law Number 18 of 2012, which encourages the central and regional governments to prepare Action Plans in Food and Nutrition every five years. The guiding regulation of the Act is the issuance of Presidential Decree Number. 5 of 2010 concerning the National Medium-Term Development Plan (Rencana Pembangunan Jangka Menengah Nasional or RPJMN) (2010-2014) states that increasing food security, public health, and nutrition is the direction of Food and Nutrition Development. Meanwhile, Presidential Instruction No. 3 of 2010 reaffirmed the preparation of the 2011-2015 National and Regional Action Plan for Food and Nutrition (Rencana Aksi Nasional Pangan dan Gizi or RAN-PG) and (Rencana Aksi Daerah Pangan dan Gizi or RAD-PG) in 33 provinces (Kemenkes RI, 2013). Cross-Country Cooperation through the United Nations in realizing sustainable development until 2030 was launched starting October 21, 2015. The policy-supporting instruments for accelerating nutrition improvement and implementation must be carried out in an organized and collaborative manner so that they can be applied at all levels in every stakeholder involved. The issuance of the Presidential Decree is to make efforts more concrete, focus on the first 1000 days of life, and encourage the integration of cross-program (specific) and cross-sectoral (sensitive) activities (Budiastutik & Rahfiludin, 2019).

In addition, a policy has been developed in Indonesia: Scaling Up Nutrition (SUN). Given that nutrition is a problem that has multi-factorial variables, its implementation requires cross-sectoral involvement. Another policy is in the form of a program launched by the Indonesian Ministry of Health (Kementerian Kesehatan Republik Indonesia or Kemenkes RI) including the Healthy Indonesia Program with a Family Approach (Program Indonesia Sehat dengan Pendekatan Keluarga or PIS-PK),

Supplementary Feeding (pemberian makanan tambahan or PMT), and the First 1000 Days of Life (hari pertama kehidupan or HPK).

The national cost of providing additional meals for malnourished children is IDR 52.66 trillion annually (Stiglitz & Fitoussi, 2010). It demonstrates that the cost of overcoming is significantly lower than the economic losses resulting from failing to take appropriate countermeasures (Aries & Martianto, 2007). According to another study, economic losses resulting from anemia totaled IDR 62.02 trillion (IDR 5.08 billion) annually, or 0.71% of Indonesia's GDP (Mangalik et al., 2016). The program's iron fortification of Raskin rice, flour, and burial and the addition of iron tablets cost IDR 1.95 trillion (USD 150 million) annually. Countermeasures cost through fortification and iron supplementation are still much lower compared to the economic losses caused by anemia.

The successful implementation of policies to reduce nutrition problems through various methods (systematic review, quantitative research, semi-qualitative interviews, problem tree analysis) shows that they must carry out comprehensive efforts to overcome nutrition problems despite many obstacles in the field. (Keats et al., 2018). Furthermore, Indonesia has committed to reducing the prevalence of stunting; issuing Presidential Decree No. 42 of 2013 is one of the strategies in SUN that involves various fields and elements of government.

Therefore, presidential regulations are indispensable for conducting interventions and research. However, the development gap between regions in Indonesia also affects the wide disparity in stunting prevalence. Serious efforts are needed to handle and reduce stunting problems, preferably starting long before a child is born (1000 HPK) as a golden period in prevention. (de Onis et al., 2012). In addition, to overcome these problems, pregnant women and children under the age of 2 need to access critical services simultaneously. These services include breastfeeding, primary immunization, dietary diversity, drinking water and sanitation, early childhood education, food insecurity measurements in the neighborhood, and a birth certificate to ensure they are in the system.

Stunting prevention initiatives must

be implemented using a multi-sector strategy in an integrated and convergent manner. The frequency of stunting has a direct causal relationship with poverty and economic growth in the long run at 0.02%. In comparison, economic growth has a directional relationship with the incidence of stunting and poverty in the long run at 0.57%, according to a study by Kustanto (2021). In order to accelerate the prevention of stunting in Indonesia, the government must make sure that all ministries and institutions, along with development partners, academia, professional organizations, civil society organizations, private firms, and the media, may collaborate.

This potential yield still cannot be said to result from an overall potential loss. Several limitations in this study are: (1) limited to certain assumptions; (2) depending on the secondary data used; (3) depending on the results of other studies, such as the results of research conducted by Ross and Horton in 1999; (4) no calculation of treatment costs caused by infectious diseases in stunted toddlers (because they have low body immunity and costs due to early death, which is the impact of non-communicable diseases and other diseases caused by stunting); and (5) the proportion of losses using GRDP and GDP in general.

Stunting prevention programs and policies are essential for comprehensively addressing stunting. Some critical programmatic and policy approaches related to stunting prevention are: (1) Implementing nutrition interventions during the critical 1,000-day window, from pregnancy to a child's second birthday. These interventions can include promoting exclusive breastfeeding, providing nutritious complementary foods, and ensuring adequate nutrient intake through targeted supplementation, (2) Improving maternal health and nutrition is vital to stunting prevention. Policies should promote adequate prenatal care, maternal nutrition, and access to essential health services for pregnant women, (3) Implementing programs that provide targeted supplementation of crucial micronutrients, such as iron, vitamin A, and zinc, can reduce stunting. These interventions can be delivered through antenatal care, immunization platforms, or community-based programs, (4) Integrated Early Childhood Development (ECD) Programs: ECD

programs that address multiple aspects of child development, including health, nutrition, education, and psychosocial support, play a crucial role in stunting prevention. Policies should support the integration of ECD interventions into existing health and education systems, (5) Access to clean water, improved sanitation facilities, and proper hygiene practices are essential for preventing infections and reducing the risk of stunting. Policies should focus on improving WASH infrastructure, promoting hygiene behavior change, and ensuring equitable access to these services, (6) Policies that support sustainable agricultural practices promote diversified and nutritious food production and strengthen food value chains can improve access to nutritious food and reduce stunting rates, (7) Strengthening health systems is crucial for delivering effective stunting prevention interventions. It includes improving the capacity of healthcare providers, ensuring the availability of essential medicines and supplies, and strengthening health information systems for monitoring and evaluation, (8) Social Protection and Poverty Alleviation: Implementing social protection programs, such as conditional cash transfers, school feeding programs, and targeted nutrition support for vulnerable populations, can help address the underlying causes of stunting related to poverty and food insecurity, (9) Developing and implementing behavior change communication strategies is essential for promoting optimal infant and young child feeding practices, improved hygiene behaviors, and other preventive measures related to stunting, (10) Establishing robust monitoring and evaluation systems, including systematic data collection and analysis, helps track the progress of stunting prevention programs and policies. Additionally, investing in research to generate evidence on effective interventions and their impact is crucial for informing future policies and programmatic strategies. Besides that, because the stunting prevalence rate changes yearly, updating the data is needed for information for policymakers.

CONCLUSIONS

The results show that stunting in toddlers will have a long impact and cause a

high loss of economic potential. Nationally, the prevalence of stunting in toddlers in 2021 is 24.4%. Indonesia has potential economic loss due to stunting in toddlers, IDR 15,062-67,780 billion or 0.89-3.99% of Indonesia's total GDP. The estimated potential economic loss due to decreased productivity in 34 provinces in Indonesia is IDR 381-1,710 billion. If this value is seen as a percentage of GRDP, it is around 1.27-5.72% of the average provincial GRDP in Indonesia.

Based on this, it is necessary to make prevention and control efforts in nutrition intervention activities an economic investment. Tackling the problem of stunting must start long before a child is born, even from adolescence, so the chain of stunting in the life cycle can be broken. Integrated intervention programs/activities are needed so that interventions can be targeted and effective in tackling and reducing stunting. Cross-sectoral collaboration and synergies are needed regarding stunting prevention efforts.

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