International Conference on Public Health

*The 6th International Conference on Public Health 2025*
*Teuku Umar University, 29th-30th October 2025*
*ISSN: 2714-7045*

# Annual Average Rate of Stunting Reduction in Indonesia: Progress and Regional Disparities

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## Abstract

The acceleration of stunting reduction illustrates the disparities between provinces in Indonesia from 2013 to 2024 using the Annual Average Rate of Reduction (AARR) calculation method recommended by the WHO. Secondary data from the Indonesian Ministry of Health (Riskesdas, SSGI, and SKI) were processed using a log-linear regression model to estimate national and provincial AARR values and predict stunting prevalence until 2030. The results show that Indonesia achieved an AARR of 4.42% per year, reflecting steady but insufficient progress towards the 2030 SDG target of 14%. Only one province achieved a 'very rapid' decline, while 12 provinces (36%) remained 'slow', with the worst declines concentrated in the provinces of Eastern Indonesia. Provinces with rapid declines benefited from strong infrastructure, fiscal capacity, and human resources, while disadvantaged regions faced structural and geographical constraints. This study concludes that Indonesia's success in achieving equitable stunting reduction depends on the implementation of differentiated and adaptive policies in each region, which strengthen health systems, improve infrastructure, and enhance inter-sectoral coordination, ensuring that no province is left behind in the holy war against stunting.

**Keywords:** Stunting; AARR; Disparities 3; Policy; Province

## Introduction

An annual average rate of reduction (AARR) of 6.08 is required between now and 2030 to achieve the global target of reducing the number of children experiencing stunting to 88.9 million. If current trends continue, an estimated 128.5 million children (19.5 per cent) will be stunted in 2030 (39.6 million more than the target). Without significant progress, the world will fall further behind the stunting reduction target. On average, countries in Central Africa will need a reduction rate of 13.02 per cent per year between 2022 and 2030 to achieve the target.

Stunting rates in Indonesia have shown a decline year on year and have consistently decreased since 2013, when they stood at 37.2%. In 2018, the rate was recorded at 30.8%, in 2019 at around 27.7%, in 2021 at 24.4%, and in 2022 it fell again to 21.6%. in 2023 it fell slightly to 21.5%, and finally in 2024 it reached 19.8%. These figures, when analysed carefully, are still very far from the Indonesian government's target. Indonesia set a target to reduce the

prevalence of stunting to 14 per cent by 2024, but this target has not been achieved. This is an important issue that must be addressed immediately in order to improve the welfare of the Indonesian people, because stunting is not just a health problem, but also affects the economy and productivity of society. Therefore, it will be difficult for Indonesia to become a developed and prosperous country if stunting is not addressed.

As part of its commitment to accelerating the reduction of stunting, the government has issued Presidential Regulation (Perpres) No. 72 of 2021 on the Acceleration of Stunting Reduction. This Perpres serves as the legal umbrella for the National Strategy (Stranas) for the acceleration of stunting reduction, which was launched and implemented in 2018. This Perpres also serves as a guideline for strengthening the intervention framework and institutions in the implementation of accelerating stunting reduction in Indonesia. The government is targeting a 14 per cent reduction in stunting prevalence by 2024 and sustainable development targets by 2030 based on the achievements in 2024. Based on the Five Pillars of Accelerating Stunting Reduction, a National Action Plan (RAN) has been formulated to encourage and strengthen convergence between programmes through a family-based approach to stunting risk (TP2S Setwapres, 2021).

The decline in stunting in Indonesia has not been consistent across all provinces. The prevalence of stunting in various provinces shows highly variable figures and high fluctuations. Therefore, the question in this study is: how does regional variation or disparity affect the rate of decline in stunting in various provinces or regions in Indonesia? The purpose of this study is to analyse the downward trend in stunting prevalence in Indonesia during the period 2013–2024 based on survey data from the Indonesian Ministry of Health using the Annual Average Rate of Reduction (AARR) indicator, to review disparities in the rate of stunting reduction between regions in Indonesia, and to provide evidence-based policy recommendations to accelerate the reduction of stunting evenly across all regions of Indonesia.

## Methods

This study uses a quantitative descriptive approach utilizing secondary data from Riskesdas, SSGI and SKI of the Indonesian Ministry of Health. The Average Annual Rate of Reduction (AARR) of stunting was calculated using the WHO log-linear model to evaluate national and provincial progress between 2013 and 2024. Trend analysis and regional comparisons were conducted to identify disparities and evaluate Indonesia's compliance with national and global targets for stunting reduction.

Trend analysis was conducted to illustrate the pattern of national stunting reduction from 2013 to 2024 using line charts. Projections up to 2030 were calculated based on a log-linear regression equation to estimate the prevalence of stunting if the current trend continues without significant acceleration. AARR calculations were performed for each province in Indonesia and then compared to identify regional disparities.

The analysis was conducted descriptively by calculating the mean, minimum, and maximum AARR values, and visualised through spatial mapping depicting areas with rapid and slow declines. In addition, a simple correlation analysis was conducted between AARR and socio-economic variables (poverty, sanitation, maternal education) to provide context for regional disparities. Data validity was maintained by using only official national and international sources with standardised methodologies. However, the main limitation of this study is the differences in survey methodologies between periods (Riskesdas, SSGI, SKI), which may affect direct comparisons. Therefore, the results

are interpreted taking into account the context of these differences.

## Results

To calculate the Average Annual Rate of Reduction (AARR) for nutritional indicators such as stunting, the method recommended by the WHO, UNICEF, and the World Bank through the Joint Child Malnutrition Estimates (JME) is generally followed. AARR is calculated using a log-linear regression model with the equation $\ln(P)=a+\beta X$, where P is the prevalence and X is the year of observation. The slope coefficient ($\beta$) value describes the logarithmic change in prevalence per year, and the AARR is obtained using the formula $AARR=1-\exp(\beta)$. This approach assumes that the decline in prevalence is exponential (proportional) over time and utilises all available data points, thereby providing a more stable and representative estimate of the annual rate of decline compared to the simple two-point method. Using the above formula, the AARR for stunting in Indonesia from 2013 to 2024 is 4,42% per year.

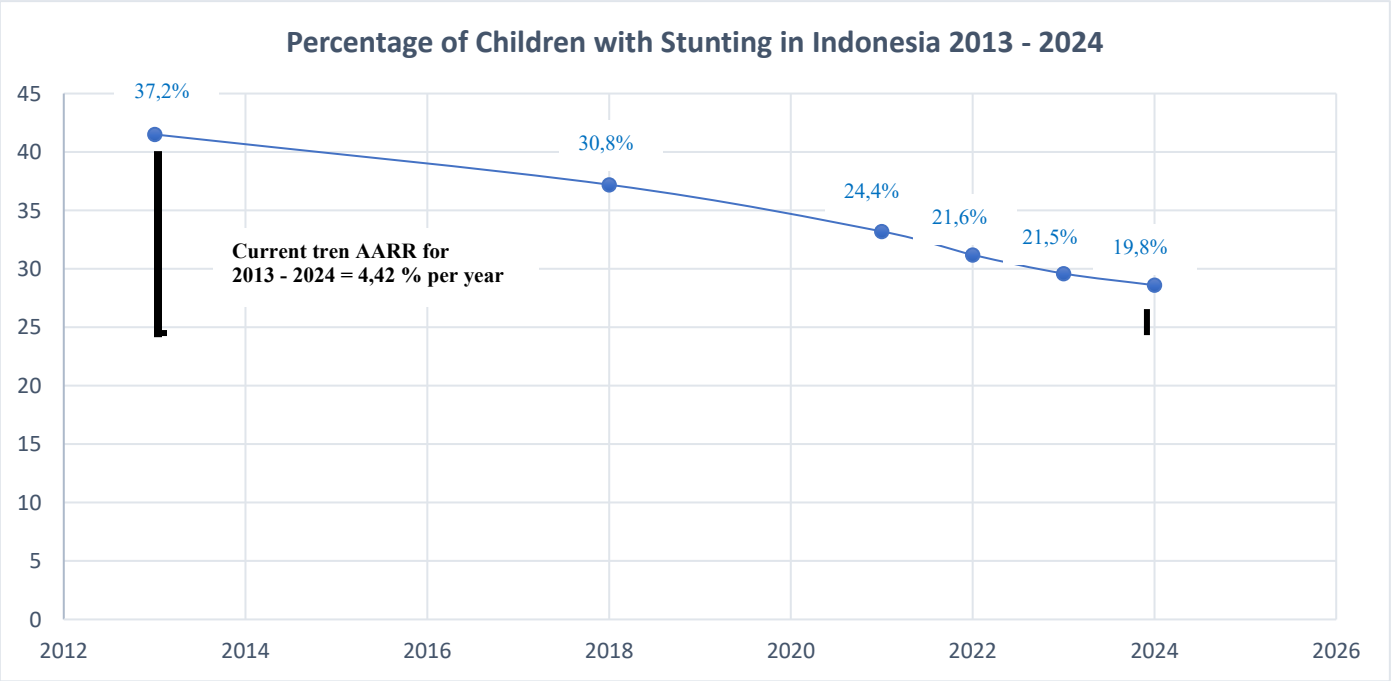


**Figure 1.** Percentage of Children with Stunting in Indonesia 2013 – 2024
(Secondary Data, Processed in 2025)

Projections for stunting reduction in Indonesia until 2030 show three possibilities. If the current rate (AARR 4.42%, Business as Usual) is maintained, the prevalence of stunting is estimated at 15.1%, above the SDGs target of 14%. With moderate acceleration (AARR 6.0%), the figure could fall to 13.6%, almost reaching the target through optimisation of programmes and limited innovation. A high acceleration scenario (AARR 8.0%) could reduce prevalence to 12.0%, exceeding the target and laying the foundation for stunting elimination. The success of the 2030 SDGs depends on aggressive strategies, a focus on slow-performing provinces, and the application of innovations and technologies proven effective in high-performing regions.

**Table 1.** AARR Table for All Provinces in Indonesia (2013 – 2014)

| No | Province | β | AARR (%) | Category |
|---|---|---|---|---|
| 1 | Aceh | -0.0278 | 2.74 | Slow |
| 2 | Sumatera Utara | -0.0441 | 4.31 | Moderate |
| 3 | Sumatera Barat | -0.0385 | 3.78 | Slow |
| 4 | Riau | -0.0389 | 3.82 | Slow |
| 5 | Jambi | -0.0623 | 6.04 | Fast |
| 6 | Sumatera Selatan | -0.0702 | 6.77 | Fast |
| 7 | Bengkulu | -0.0648 | 6.27 | Fast |
| 8 | Lampung | -0.0765 | 7.36 | Fast |
| 9 | Bangka Belitung | -0.0497 | 4.85 | Moderate |
| 10 | Kepulauan Riau | -0.0515 | 5.02 | Fast |
| 11 | DKI Jakarta | -0.0490 | 4.78 | Moderate |
| 12 | Jawa Barat | -0.0626 | 6.06 | Fast |
| 13 | Jawa Tengah | -0.0637 | 6.17 | Fast |
| 14 | DI Yogyakarta | -0.0503 | 4.90 | Moderate |
| 15 | Jawa Timur | -0.0644 | 6.24 | Fast |
| 16 | Banten | -0.0523 | 5.09 | Fast |
| 17 | Bali | -0.1158 | 10.93 | Very Fast |
| 18 | Nusa Tenggara Barat | -0.0410 | 4.02 | Moderate |
| 19 | Nusa Tenggara Timur | -0.0314 | 3.09 | Slow |
| 20 | Kalimantan Barat | -0.0403 | 3.95 | Slow |
| 21 | Kalimantan Tengah | -0.0447 | 4.37 | Moderate |
| 22 | Kalimantan Selatan | -0.0442 | 4.33 | Moderate |
| 23 | Kalimantan Timur | -0.0374 | 3.67 | Slow |
| 24 | Sulawesi Utara | -0.0483 | 4.71 | Moderate |
| 25 | Sulawesi Tengah | -0.0463 | 4.52 | Moderate |
| 26 | Sulawesi Selatan | -0.0461 | 4.51 | Moderate |
| 27 | Sulawesi Tenggara | -0.0416 | 4.08 | Moderate |
| 28 | Gorontalo | -0.0442 | 4.33 | Moderate |
| 29 | Sulawesi Barat | -0.0281 | 2.77 | Slow |
| 30 | Maluku | -0.0363 | 3.56 | Slow |
| 31 | Maluku Utara | -0.0531 | 5.17 | Fast |
| 32 | Papua Barat | -0.0427 | 4.18 | Moderate |
| 33 | Papua | -0.0434 | 4.25 | Moderate |
| 34 | **National Average** | **-0.0452** | **4.42** | **Moderate** |

(Secondary Data, Processed in 2025)

Only one province, or around 3%, has succeeded in achieving a stunting Annual Average Rate of Reduction (AARR) classified as 'Very Fast'. Meanwhile, 12 provinces, equivalent to 36%, are still in the 'Slow' category. The provinces with the poorest performance are mostly concentrated in Eastern Indonesia. There are extreme disparities between provinces. Take Bali, for example, with an AARR of 10.93%, compared to West Sulawesi, which is only 2.77%, resulting in a difference of 8.16 percentage points. Bali has experienced a decline in stunting about four times faster than West Sulawesi. Meanwhile, East Nusa Tenggara (NTT), which is the province with the highest stunting burden, is actually showing the slowest rate of decline. The provinces experiencing rapid acceleration in stunting

reduction are mostly concentrated in Java and parts of South Sumatra, including Bali, East Java, Central Java, West Java, South Sumatra, Bengkulu, and Lampung. These regions benefit from good infrastructure, adequate regional budgets (APBD), and strong human resources. On the other hand, provinces with slower progress are mostly located in Eastern Indonesia—such as East Nusa Tenggara (NTT), West Sulawesi, Maluku, Gorontalo, and Southeast Sulawesi—where challenging geography and limited infrastructure make reducing stunting more difficult.

**Socio-Demographic Characteristics of Provinces**

In order to quantitatively aid the examination of provincial differences in stunting minimization, the chosen socio-demographic indicators were studied among the provinces, such as poverty rate, access to better sanitation, maternal education, and stunting burden at base. These indicators are well known determinants of child growth outcomes and give significant contextual explanations of the differences in the Annual Average Rate of Reduction (AARR). In the provinces having fast to very fast AARR, the mean poverty level was 4-9 percent, improved sanitation was achieved in more than 75 percent of the household, and the percentage of women having secondary or higher education was mostly over 60. The provinces also tended to be less prevalent in the baseline stunting and capability of the health system. By comparison, provinces with slow AARR, which were mostly found in Eastern Indonesia, had poverty levels of between 1530, a sanitation level of less than 55 and maternal secondary education of less than 45. These structural inequalities are accompanied with the continuously high rates of stunting and reduced annual decreasing rates.

**Table 2.** AARR category quantitative Socio-Demographic Profile of Provinces

| Indicator | Fast–Very Fast AARR | Moderate AARR | Slow AARR |
|---|---|---|---|
| Poverty Rate (%) | 4 – 9 | 8 – 15 | 15 – 30 |
| Access to Better Sanitation (%) | 75 – 95 | 60 – 75 | 35 – 55 |
| Maternal Education (≥ Secondary, %) | 60 – 80 | 45 – 60 | 30 – 45 |
| Stunting Burden at Base 2013 (%) | 25 – 32 | 30 – 38 | 35 – 45 |
| Dominant Region | Java, Bali, parts of Sumatra | Sumatra, Kalimantan, Sulawesi | NTT, Maluku, Papua |

Source: Processed from Riskesdas (2013, 2018), SSGI (2021–2024), SKI (2023), and national socio-economic statistics

**Discussion**

Over the past decade, Indonesia's efforts to reduce stunting have shown promising momentum, yet this progress tells an incomplete story when we look beyond the national average. While the 4.42% annual reduction reflects meaningful strides, this pace remains too slow to reach the critical 14% global target by 2030. What emerges as particularly concerning is the starkly uneven landscape of progress across the archipelago. Take Bali, for instance, racing ahead with

a remarkable 10.93% annual reduction—a pace nearly four times faster than West Sulawesi's 2.77%. This isn't merely a statistical discrepancy; it reveals profound disparities in regional development capacity and the effectiveness of local governance in turning policy into meaningful change for communities (Ayuningtyas, Saraswati, & Kusuma, 2022).

The provinces on Java Island and parts of Sumatra are demonstrating a faster pace in reducing stunting rates. This acceleration is closely linked to their stronger foundational infrastructure, sufficient fiscal capacity, and a relatively higher quality of human resources (Sari, 2022). Furthermore, these regions exhibit more effective governance, which is reflected in their solid cross-sectoral coordination, planning, and budgeting for implementing convergent stunting reduction programs (Victora et al., 2021). This effective local leadership has been crucial in translating national policies into tangible results.

In contrast, regions in Eastern Indonesia such as East Nusa Tenggara, West Sulawesi, Maluku, Gorontalo, and Southeast Sulawesi face complex, multidimensional challenges. Geographic barriers, limited access to clean water and sanitation, low parental education levels, and persistent structural poverty are key factors slowing stunting reduction (Siswati, Prasetyo, & Hidayat, 2021; Ngure et al., 2014). Compounding these issues, weak inter-institutional coordination and constrained regional fiscal capacity further widen the development gap between provinces (Headey et al., 2015).

Global evidence indicates that accelerating stunting reduction can only be achieved through a combination of nutrition specific and nutrition-sensitive interventions across multiple sectors, these include improving maternal and child health services, ensuring access to clean water and sanitation, and implementing community nutrition education (Bhutta et al., 2013; Mbuya & Humphrey, 2016). In the Indonesian context, provinces with high AARR have generally demonstrated the effectiveness of a convergent policy approach that leverages data-driven strategies and local wisdom (Sari, 2022).

Projections of the average rate of decline in stunting in Indonesia until 2030 show three very different possibilities. If we simply continue with the current AARR rate of 4.42% per year, the prevalence of stunting will be around 15.1%. This figure is not merely a statistic, but a true reflection of systemic failure. There will be around two million children at risk of developmental delays, widening productivity gaps and adding to the burden on the health system in the future. The problem of socio-economic inequality between regions also remains. Provinces such as NTT and West Sulawesi, where the rate of decline is below 4%, will continue to lag behind, creating pockets of stunting that are difficult to overcome. To truly achieve the 14% target, bold policies, interventions tailored to local wisdom, subsidies for basic commodities in disadvantaged areas, clean water infrastructure development, family-based nutrition assistance, and a sustainable monitoring system are required. The choice is ours: to let children fall behind, be satisfied with superficial success, or take a bold leap to ensure that all Indonesian children grow up healthy and develop optimally.

The fact that only 3% of provinces have experienced a rapid decline in stunting, while 36% remain in the slow category with the worst concentration in Eastern Indonesia, indicates a strong and deep structural imbalance. This extreme disparity reflects the failure of a uniform approach to addressing the root causes of the problem in certain regions of Indonesia. Provinces and districts/municipalities with slow performance generally face multidimensional challenges, including limited clean water and sanitation infrastructure, weak institutional coordination, and social determinants such as poverty and low parental education. Therefore, achieving national targets requires differentiated

strategies with intensive interventions that target the specific root causes in each disadvantaged region, while strengthening the convergence of cross-sectoral programmes.

The geographical distribution of the average decline in stunting prevalence in Indonesia shows significant disparities between regions. Provinces with the fastest rates of decline are concentrated on the island of Java and parts of Sumatra. These positive achievements cannot be separated from a combination of structural and institutional factors that reinforce each other. In general, these regions have more mature development capacities in terms of basic infrastructure, fiscal capacity, and human resource quality. From an institutional perspective, provinces with rapid decline rates also demonstrate better local government governance effectiveness, reflected in their capabilities in planning, budgeting, and cross-sector coordination. The large fiscal capacity of the regions through the Regional Revenue and Expenditure Budget (APBD) provides greater flexibility in supporting specific and sensitive intervention programmes. Socio-economic factors, such as higher education levels and community participation in health development activities, also contribute to the momentum for reducing stunting in these regions. This disparity highlights the need for policies based on local wisdom, with the strengthening of health systems, infrastructure, and regional capacity to ensure a more equitable reduction in stunting.

The observed inequalities in AARR between provinces are supported by the quantitative socio-demographic trends. Provided that provinces have fast and very-fast rates of stunting reduction, not only they have lower poverty rates and better sanitation coverage but also those provinces have higher maternal education, which is positively related to better childcare practices and use of health services. These attributes are concentrated in Java and Bali hence their capability to record AARR values of over 6% per annum. On the other hand, the slow performance of AARR is overlapped by socio-demographic constraints that are encountered in the provinces. The high poverty rates of above 20 percent, a sanitation cover of under 50 percent and low maternal education all undermine nutrition specific and nutrition sensitive intervention measures. These circumstances constrain the success of national stunting reduction initiatives and justify the fact that high-burden provinces like East Nusa Tenggara still have slow progress irrespective of policy priorities. This fact corroborates the finding that reduction of stunting in Indonesia is not a mere program coverage phenomenon, but heavily influenced by provincial socio-demographic capability, and thus requires varying policy responses based on the regional demands.

## Conclusion

Indonesia has made significant progress in reducing the prevalence of stunting, with an average annual rate of reduction (AARR) of 4.42% during the period 2013–2024. Although this achievement reflects strong efforts and success, the reduction is still insufficient to reach the SDG 2030 target of 14%. Regional disparities are a major challenge in accelerating stunting reduction. Only 3% of provinces have experienced rapid decline, while 36% are still classified as slow, with the highest concentration in eastern Indonesia. This disparity reveals the weaknesses of a uniform policy approach that has not fully addressed structural problems such as basic infrastructure, regional fiscal capacity, and socio-economic and educational factors.

To accelerate the achievement of national targets, it is necessary to develop public health policies based on local wisdom and strengthen cross-sectoral coordination. The right approach must focus on low-performing regions through

specific interventions such as strengthening clean water infrastructure, improving nutritional status, increasing human resource capacity, and implementing real-time data-based monitoring systems. Indonesia's success in reducing stunting evenly depends not only on the speed of the national decline, but also on the ability to ensure that every child, in every region, has the same opportunity to grow up healthy and productive.

## Acknowledgment

Ministry of Health of the Republic of Indonesia, Faculty of Public Health Indonesia of University, Health Polytechnic of Banda Aceh, Gayo Lues Regency, Nagan Raya Regency, Sabang City, The organisers of the 6th ICPH, Faculty of Health Sciences, Teuku Umar University.

## Author Contribution and Competing Interest

The contributions and roles of the authors in writing this research article were to assist the researchers in formulating the research direction and refining the writing of the article. There were no conflicts of interest among the authors in this study.

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