

Disparities in Stunting Prevalence in Central Sulawesi: A Comparative Analysis of Determinants and Interventions in Two Districts

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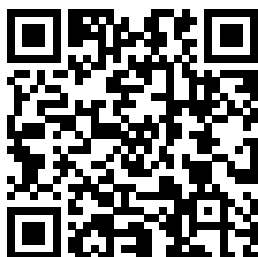
Stunting, Children Under Two, Determinants, Innovation, Dapur Sehat Atasi Stunting (DASHAT)

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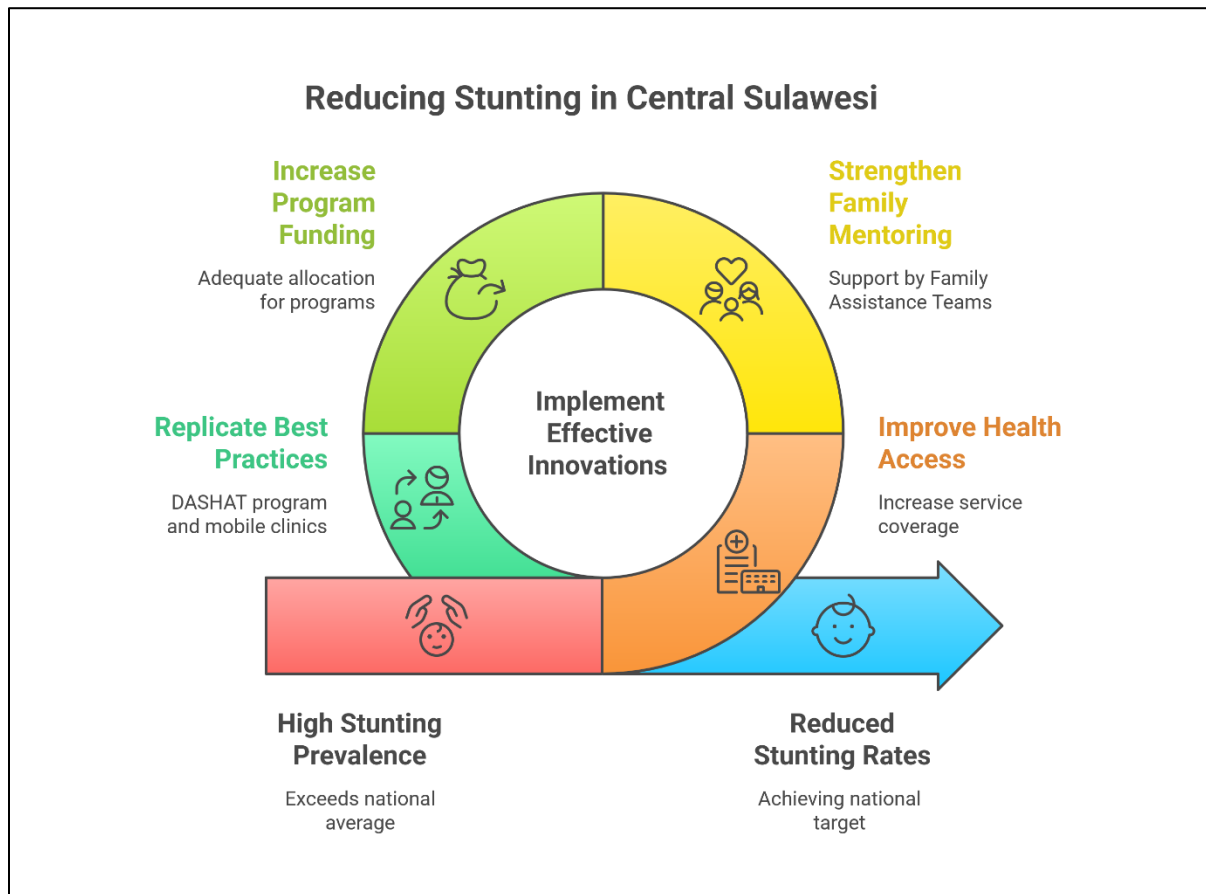
ABSTRACT

Stunting among children under two years old remains a major public health issue in Indonesia, particularly in Central Sulawesi, where the 2024 prevalence reached 26.1%, exceeding the national rate of 19.8%. This study aimed to analyze disparities in stunting determinants and identify effective innovations for reduction using an ecological analytic design combining quantitative and qualitative approaches. Data were derived from the 2024 Indonesian Nutritional Status Survey (SSGI), district stunting dashboards, and in-depth interviews with key stakeholders in Sigi District (high prevalence, 33.0%) and Tojo Una-Una District (low prevalence, 16.5%). Results showed that stunting in Sigi was associated with limited access to health services, low immunization coverage, poor sanitation, low maternal education, minimal funding for specific programs (1.33%), and post-disaster challenges. In contrast, Tojo Una-Una achieved >90% essential service coverage, strong family mentoring by Family Assistance Teams (TPK), and adequate program allocation (15.03%) through innovations such as the Dapur Sehat Atasi Stunting (DASHAT) program and mobile clinics. Effective stunting reduction requires integrating specific nutrition actions with sensitive interventions addressing sanitation, education, and economic empowerment. Strengthening cross-sectoral collaboration, digital data monitoring (e-PPGBM), and replication of Tojo Una-Una's best practices are critical to achieving the 2024 RPJMN target and supporting the 2030 Sustainable Development Goals.

Key Messages:

- Stunting among children under two in Central Sulawesi remains above the national average, with disparities driven by health service access, post-disaster infrastructure, and budget allocation.
- Replicating effective innovations from Tojo Una-Una—such as DASHAT, multifunctional posyandu, and family mentoring—can accelerate stunting reduction toward the 2024 RPJMN target and 2030 SDGs

GRAPHICAL ABSTRACT



INTRODUCTION

Stunting or growth failure among children under five remains one of the chronic nutritional problems that continues to be a challenge for health development in Indonesia (1–6). Stunting occurs when a child is long or tall below his age standard due to prolonged malnutrition and recurrent infections in the critical period of the first 1000 days of life (7–10). The long-term impact of stunting is not only on physical health aspects, but also on cognitive development, productivity, and economic potential in the future (11,12). Therefore, reducing stunting is a national priority outlined in the 2020–2024 National Medium-Term Development Plan (RPJMN) with a target of stunting prevalence to decrease by 14% by the end of 2024 (13).

Central Sulawesi Province is one of the provinces with a relatively high prevalence of stunting compared to the national figures. Data from the 2024 Indonesian Nutrition Status Survey (SSGI) recorded the prevalence of stunting under five in Central Sulawesi at 26.1% (95% CI: 24.7–27.6), higher than the national figure of 19.8%. The variation between districts/cities is quite wide, showing that there are differences in determinants that affect the nutritional status of children. Buol Regency occupies the highest position with a prevalence of 36.9%, followed by Sigi Regency (33.0%) and Donggala (29.6%). In contrast, Tojo Una-Una Regency has the lowest rate of 16.5% (95% CI: 13.7–19.9) (14). This data confirms that some districts require more intensive priority interventions, while low-achieving districts can be examples of good practices that can be replicated.

The stunting dashboard provides a more detailed picture of the situation at the district level. Sigi Regency recorded a stunting prevalence of toddlers of 13.99% with a total of 806 cases (15), while Tojo Una-Una recorded 10.16% with 1,080 cases (16). Although the dashboard numbers are slightly lower than SSGI, the pattern that emerges remains consistent: Sigi has a higher prevalence than Tojo Una-Una. In addition, dashboard data shows that 25.95% of families in Sigi are classified as at risk of stunting, while in Tojo Una-Una it even reaches 28.64%. This fact shows that the risk burden in both districts is quite large,

but Tojo Una-Una has more success in reducing stunting rates through more effective intervention mechanisms.

In terms of determinants, Sigi faces challenges of access to health services in remote areas, immunization coverage and growth monitoring that is not optimal, and health infrastructure affected by the 2018 earthquake. Sanitation and access to clean water are not fully adequate, the practice of open defecation (BABS) is still found, and the level of education and nutritional knowledge of some mothers is relatively low. Meanwhile, funding for specific stunting programs is only 1.33% of the total APBD, so direct intervention is still limited. The audit of stunting cases has not been maximized, there is only one documented follow-up plan (RTL) (15).

In contrast, Tojo Una-Una Regency showed better achievement in essential service indicators: basic immunization coverage, growth and development monitoring, and the administration of blood-supplemented tablets (TTDs) were above 90%. All villages already have Human Development Cadres (KPM) and Family Assistance Teams (TPK) who actively monitor families at risk of stunting. Funding for specific programs reaches 15.03% of the APBD and is planned to increase to 22.98% in the following year. A budget realization rate above 99% shows a strong commitment from local governments in implementing stunting reduction programs. Tojo Una-Una is also more advanced in carrying out case audits, as evidenced by the 44 RTLs that have been prepared as a follow-up to stunting cases (16).

However, Tojo Una-Una still faces challenges in people's behavior. Environmental determinant scores showed problems with access to clean water (600.68), healthy latrines (491.10), and smoking habits in households (561.64). This means that even though health services are good, environmental and behavioral risk factors can contribute to the potential for stunting in the future if not seriously intervened.

The comparison of these two districts provides an important lesson that stunting reduction requires a combination of specific interventions (focus on nutrition and maternal-child health) and sensitive interventions (sanitation, clean water, economic empowerment, nutrition education). Sigi Regency needs to strengthen the reach of health services through multifunctional posyandu, mobile posyandu, and telehealth. Specific program budgets need to be increased to at least 10% so that interventions such as complementary feeding (PMT), exclusive breastfeeding, nutritional supplementation, and immunization can be expanded. Increasing the capacity of TPPS and digitizing nutrition monitoring through e-PPGBM will help detect cases faster and facilitate immediate treatment.

Meanwhile, Tojo Una-Una can maintain the achievement of high service coverage while strengthening behavior-based interventions, such as smoke-free home campaigns, community sanitation triggers (STBM), and nutrition education based on local wisdom through the Healthy Kitchen Overcome Stunting (DASHAT) program. A cross-sectoral approach involving health, education, agriculture, public works and social services is needed to ensure the sustainability of the programme.

From a sustainable development perspective, efforts to accelerate stunting reduction contribute directly to the achievement of SDG 2 Zero Hunger, SDG 3 Good Health and Well-Being (17,18), and SDG 6 Clean Water and Sanitation (19,20). The success of reducing stunting will not only have an impact on the quality of health of future generations, but also strengthen the economic productivity and quality of human resources in Central Sulawesi towards the vision of a Golden Indonesia 2045. The purpose of this study is to assess the Determinants of Stunting and Innovation that Effectively Reduce Stunting in Baduta Children at the Regency/City Level throughout Central Sulawesi

METHODS

The research approach uses a quantitative method with ecological analytical design combined with qualitative analysis to explore good practices and innovations that have been carried out by local governments. The research design used was a cross-sectional study based on secondary data. This study utilizes data from the 2024 Indonesian Nutrition Status Survey (SSGI) to obtain the prevalence of stunting and other nutrition status indicators at the district/city level, as well as data from the stunting dashboard of Sigi and Tojo Una-Una Regencies as a representation of districts with high and low prevalence. This analysis is complemented by in-depth interviews with nutrition program managers, TPPS chairs, and posyandu cadres to explore the innovations that have been implemented to reduce stunting. The research location covers all

districts/cities in Central Sulawesi Province (13 administrative areas). The focus of the in-depth analysis was given to Sigi Regency (stunting prevalence of 33.0% according to SSGI) and Tojo Una-Una Regency (16.5%) to explore the determinants and innovations that contribute to the difference in prevalence. The research will be conducted over six months in 2025, beginning with the collection of secondary data, statistical analysis, and qualitative information exploration, culminating in the preparation of policy recommendations.

The study population is children aged 0–23 months who are respondents to SSGI 2024 in Central Sulawesi. The research sample comprises aggregate data on stunting prevalence and determinant indicators, such as access to clean water, latrine ownership, immunization coverage, and exclusive breastfeeding, at the district/city level. The selection of Sigi and Tojo Una-Una Regencies as case studies was carried out by purposive sampling based on extreme differences in stunting prevalence (highest and lowest), which can provide contrast determinant analysis.

Data sources include Quantitative data on the prevalence of stunting and other nutrition indicators from SSGI 2024. The Stunting Dashboard data for 2024 relate to health service coverage, the number of at-risk families, budget realization, case audits, and follow-up plans. Qualitative data in the form of semi-structured interviews with the head of the health office, nutrition program managers, posyandu cadres, and community leaders in the district of the research locus. The research variable includes the dependent variable is the prevalence of stunting in clown children. Independent variables included specific determinants (nutritional intake, exclusive breastfeeding, history of infectious diseases) and sensitive determinants (maternal education, access to clean water, toilet ownership, immunization coverage, socioeconomic status, availability of health services). Contextual variables include the amount of budget allocated for stunting, institutional capacity, and the existence of program innovations such as Healthy Kitchen to Overcome Stunting (DASHAT), nutrition gardens, or mHealth applications. Data collection is carried out through Secondary Data Extraction from the 2024 SSGI report and the district dashboard. Document Review includes regent/mayor regulations, supporting regional action plans, and case audit reports. In-depth interviews with key informants to explore innovations and good practices that have not been quantitatively recorded.

Data analysis was carried out quantitatively and qualitatively. Descriptively by calculating the prevalence of stunting and related indicators per district/city. Comparative: compare the determinants between Sigi (high prevalence) and Tojo Una-Una (low prevalence) to identify differentiating factors. Visualization: create a prevalence heatmap and a determinant radar chart to graphically display comparisons. Using content analysis techniques from interview results to find innovation themes, implementation challenges, and factors supporting success. Qualitative results are combined with quantitative data to produce evidence-based recommendations. The validity of the data is maintained using official sources (SSGI, Ministry of Home Affairs' Monev Bangda Dashboard, health office reports). Triangulation is achieved by combining quantitative and qualitative data, as well as discussions with stakeholders, to verify the findings. Reliability is maintained with consistent data collection procedures and the use of standardized interview instruments.

CODE OF HEALTH ETHICS

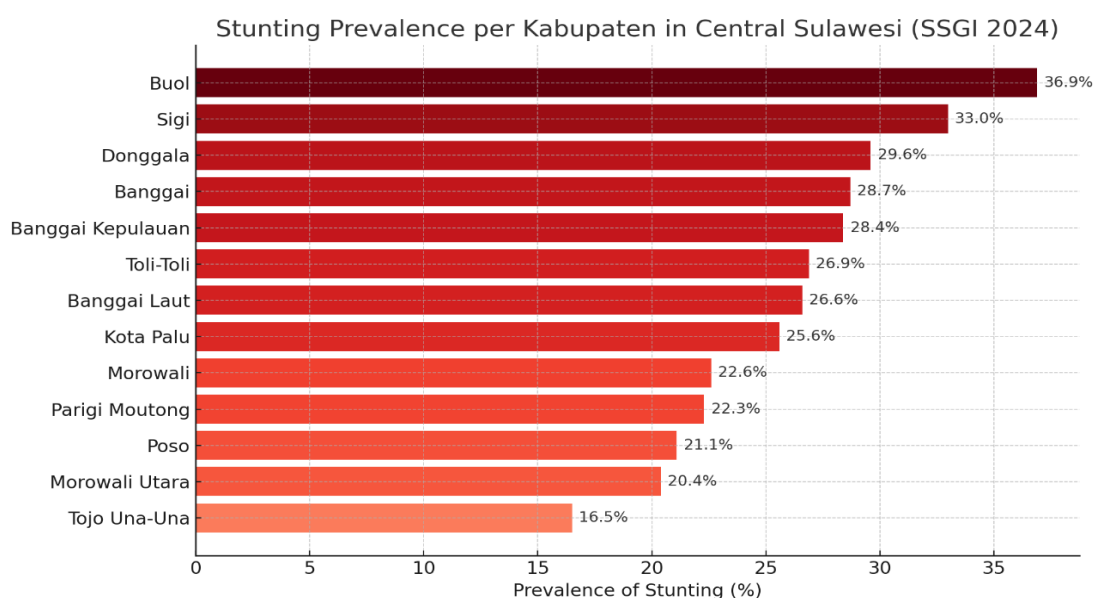
Ethical approval from the Health Research Ethics Committee, Faculty of Medicine, Sebelas Maret University, Surakarta, Indonesia, Number 102/UN27.06.11/KEP/EC/2025 dated July 7, 2025.

RESULTS

The prevalence of stunting among toddlers in Central Sulawesi Province in 2024 will be recorded at 26.1% (95% CI: 24.7–27.6), higher than the national figure of 19.8%, so this province is still a priority for accelerating stunting reduction. The distribution between districts/cities shows a wide variation. Buol Regency recorded the highest prevalence of 36.9% (95% CI: 32.0–42.1), followed by Sigi Regency at 33.0% (95% CI: 27.6–38.7) and Donggala at 29.6%. Four other districts, namely Banggai (28.7%), Banggai Islands (28.4%), Toli-Toli (26.9%), and Banggai Laut (26.6%) are also above the provincial average. Palu City recorded a figure of 25.6% which is close to the average, while the district with the lowest prevalence was Tojo Una-Una at 16.5% (95% CI: 13.7–19.9). The nearly two-fold difference between Sigi and Tojo Una-Una is an important concern in understanding determinants and designing targeted interventions.

Table 1. Prevalence of Stunting among Children Under Five in Central Sulawesi by District/City

District/City	Stunting (%)	95% CI
Buol	36,9	32,0 – 42,1
Sigi	33,0	27,6 – 38,7
Donggala	29,6	26,0 – 33,5
Banggai	28,7	24,7 – 33,0
Banggai Kepulauan	28,4	24,6 – 32,7
Toli-Toli	26,9	23,3 – 31,0
Banggai Laut	26,6	21,9 – 32,1
Kota Palu	25,6	21,2 – 30,5
Parigi Moutong	22,3	17,6 – 28,0
Morowali	22,6	17,7 – 28,3
Poso	21,1	17,0 – 25,8
Morowali Utara	20,4	16,5 – 24,9
Tojo Una-Una	16,5	13,7 – 19,9

**Figure 1. Stunting Prevalence by District in Central Sulawesi**

Comparison of stunting determinants between Sigi Regency (33.0%) and Tojo Una-Una (16.5%) in Central Sulawesi Province based on seven main categories: Health Services Access, Sanitation & Water, Feeding Practices, Maternal Factors, Socioeconomic & Education, Family Support, and Post-Disaster Condition. A scale of 1–5 is used to describe the level of condition of each determinant, where 1 indicates very poor conditions, and 5 indicates very good conditions. Tojo Una-Una scored higher on all determinants, with the most pronounced advantages on sanitation, family support, and post-disaster conditions. Figure 2 illustrates the main differences in various determinants of stunting between Sigi and Tojo Una-Una Regencies in Central Sulawesi Province. In general, Sigi Regency—with a higher prevalence of stunting (33.0%)—showed a lower score in all aspects than Tojo Una-Una (16.5%). The most prominent differences were seen in the determinants of sanitation and water, family support, and post-disaster conditions. Tojo Una-Una obtained the highest score (close to 5) in all three aspects, indicating better sanitation conditions, stronger family support, and more optimal post-disaster recovery.

In contrast, Sigi showed relatively low scores (around 2) on almost all determinants, especially in access to health services and post-disaster conditions, reflecting the limited infrastructure and the prolonged impact of the 2018 earthquake on social and public health systems. This pattern confirms that even though the two regions are in the same province, environmental, social, and post-disaster recovery factors greatly influence the success of stunting prevention programs.

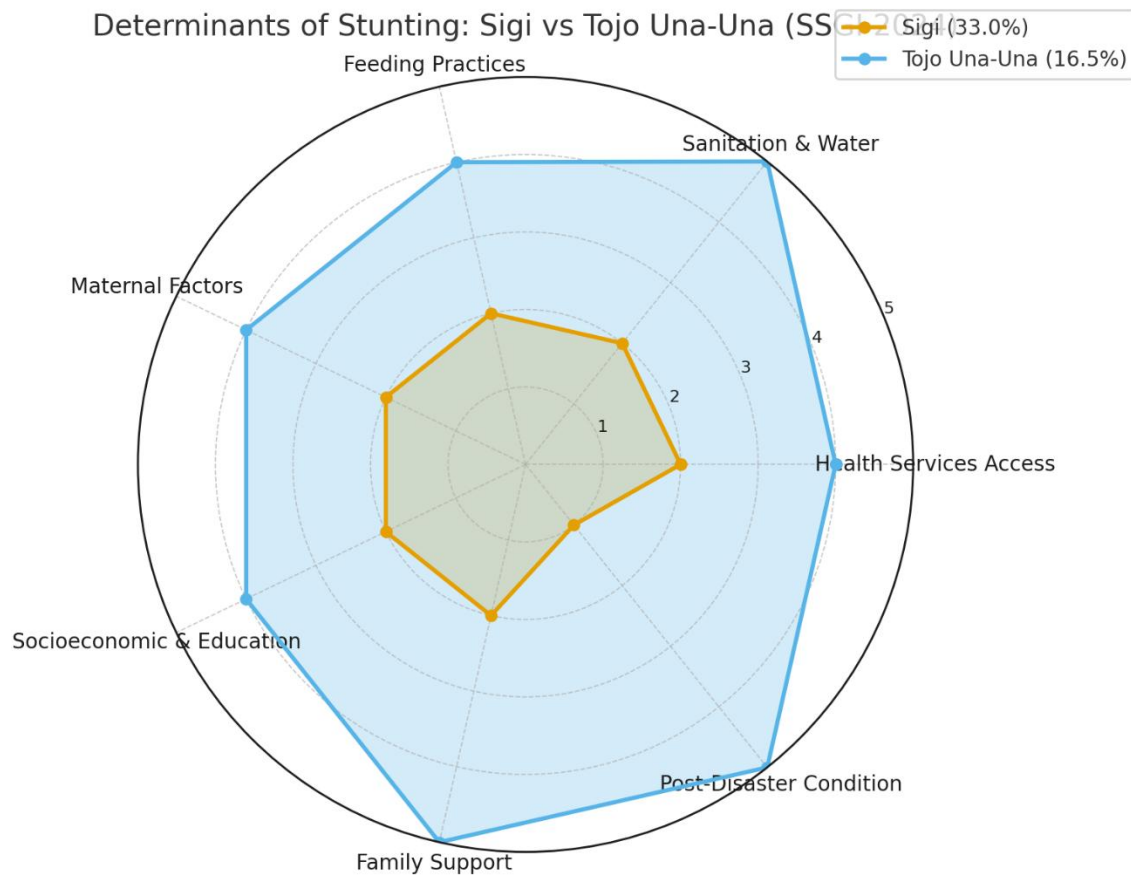


Figure 2. Determinants of Stunting: Sigi vs. Tojo Una-Una

Table 2. Comparative Analysis of Stunting Determinants between Sigi (High Prevalence) and Tojo Una-Una (Low Prevalence) Based on SSGI and Ministry of Home Affairs Monitoring 2024

Determinant Aspects	Sigi District (33.0% - High)	Tojo Una-Una District (16.5% - Low)	Analysis/Implications
Health Service Access	ANC, immunization, and growth monitoring coverage remain low in remote villages, with long distances to health posts and disaster-damaged infrastructure.	Active posyandu, mobile health centers reach island areas; high coverage of immunization and growth monitoring.	The expansion of multifunctional posyandu, mobile clinics, and the digitalization of data in Sigi is needed to ensure equitable service coverage.
Sanitation & Clean Water	Low access to adequate sanitation; open defecation is still practiced; drinking water sources are not fully protected.	The majority of villages are already ODF; access to clean water has improved via healthy village programs.	Communal sanitation improvements and hygiene campaigns are key to reducing diarrhea and ARI in Sigi.
Parenting & Feeding Practices	Exclusive breastfeeding is not optimal; low dietary diversity; limited animal protein intake.	DASHAT program runs well; utilization of marine/local fish is high.	Nutrition education and local food utilization should be strengthened in Sigi (e.g., village nutrition gardens, PKK mothers' training).
Maternal & Pregnancy Factors	Pregnant women still experience anemia; birth spacing <24 months; incomplete pregnancy monitoring.	High ownership of MCH books, good participation in maternal classes,	Sigi needs to strengthen iron tablet supplementation (for adolescents & pregnant women) and maternal classes.

Determinant Aspects	Sigi District (33.0% - High)	Tojo Una-Una District (16.5% - Low)	Analysis/Implications
Socio-Economic & Education	High poverty and post-disaster vulnerability; mothers' education relatively low.	regular iron tablet distribution. Village-based economic empowerment (local food MSMEs) improves household purchasing power; routine nutrition education through PKK.	Sensitive approaches such as economic empowerment and nutrition education need intensifying in Sigi.
Family Participation & Support	Family mentoring for stunting risk not optimal; low involvement of community leaders.	Active mentoring by cadres, religious leaders, and TPK ensures awareness of growth monitoring importance.	Sigi could replicate TPK community-based model and involve traditional/religious leaders.
Post-Disaster Conditions	Health and social infrastructure not fully recovered from the 2018 earthquake; adds to nutritional risk burden.	Not affected by major disasters; health services run normally.	Special support for infrastructure and service recovery in Sigi is urgently needed.

Table 3. Effective Innovations for Reducing Stunting among Children Under Two in Central Sulawesi (Based on SSGI & Ministry of Home Affairs Monitoring Data, 2024)

Intervention Aspect	Effective Innovation	Implementation Examples / Best Practices	Expected Impact
Mapping & Data	Micro-mapping using SSGI and e-PPGBM	Identifying priority villages (>30% prevalence), monthly monitoring via e-PPGBM & district dashboards	More targeted interventions, early stunting detection
Primary Health Services	Multifunctional posyandu & mobile clinics	5-table posyandu (weighing, immunization, counseling, maternal screening, sanitation education); mobile posyandu for remote villages	>90% service coverage, reduced number of unmonitored children
Maternal & Child Nutrition	DASHAT program & local supplementary feeding	Healthy kitchens provide local-based complementary foods (fish, eggs, legumes) for undernourished children	Improved animal protein intake, reduced wasting & stunting
Sanitation & Clean Water	ODF village movement & communal sanitation	CLTS triggering, ODF village incentives, construction of healthy latrines & communal wells	Reduced recurrent diarrhea, improved chronic nutrition status
Education & Parenting	Maternal classes & diverse complementary feeding education	Integrated with ANC, breastfeeding education, complementary feeding demos	Increased exclusive breastfeeding >80%, improved timely complementary feeding
Family Assistance	Family Assistance Teams (TPK) & digital cadres	TPK support for 1,000 HPK, monitoring iron tablet adherence, breastfeeding, immunization, child weight	Increased posyandu attendance & supplement adherence
Economic Empowerment	Local food MSMEs & village nutrition gardens	Empowering farmer/livestock groups to produce eggs, fish, vegetables; subsidized for poor at-risk families	Improved animal protein affordability & household food security

Intervention Aspect	Effective Innovation	Implementation Examples / Best Practices	Expected Impact
Digital & Social Innovation	mHealth apps & local social media campaigns	Apps reminding posyandu visits & iron tablets; WhatsApp groups for cadres-mothers; local-language content	Improved nutrition and health behaviors via accessible information
Cross-Sector Collaboration	Convergent stunting programs	Integration of health, public works, education, agriculture, and social sectors in village planning	Simultaneous, sustainable interventions accelerate stunting reduction

Analysis of determinants showed that Sigi faced multiple challenges: low ANC, immunization, and growth monitoring coverage in remote villages; health infrastructure damaged by the 2018 disaster; limited access to proper sanitation with open defecation still present; high prevalence of maternal anemia and short birth intervals; low maternal education; and suboptimal family mentoring. Conversely, Tojo Una-Una successfully maintained active posyandu, reached island areas with mobile clinics, achieved high basic immunization coverage, and had most villages ODF. The DASHAT program effectively utilized marine fish as animal protein, and village cadres actively supported at-risk families.

Lessons from Tojo Una-Una highlight effective innovations such as micro-mapping using SSGI and e-PPGBM, strengthening multifunctional posyandu, building communal sanitation and ODF villages, DASHAT-based local complementary feeding, integrated maternal classes, family mentoring by TPK, and mHealth apps for monitoring. For districts like Sigi, interventions should prioritize post-disaster health infrastructure recovery, expanding posyandu and mobile clinic coverage, improving village sanitation, and enhancing nutrition education based on local food culture to increase animal protein intake. Multisectoral approaches integrating health, agriculture, public works, and social sectors are needed to accelerate stunting reduction and reach the RPJMN target of 14% by 2024.

DISCUSSION

Stunting among children under two years of age is an important indicator of public health and human development quality. In 2024, Central Sulawesi recorded a stunting prevalence of 26.1% (95% CI: 24.7–27.6), higher than the national figure of 19.8%, making it a continued priority for government interventions. There was wide variation across districts: Buol had the highest prevalence (36.9%), followed by Sigi (33.0%) and Donggala (29.6%), while the lowest was Tojo Una-Una (16.5%). These differences reflect the varying influence of social, economic, environmental, and health service determinants in each area.

Several studies conducted in Sigi District indicate that determinants of stunting include maternal knowledge, attitudes, and behaviors during the First 1,000 Days of Life (HPK), maternal education less than 9 years, male child sex, birth length <48 cm, and low birth weight. Suggested solutions have used approaches such as the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method (10,21,22). Social and health determinants of children under two years of age with stunting in Sigi District were child's age, length of birth of <48 cm, maternal education and food insecurity (23). Interventions to reduce stunting by reducing the incidence of low birth weight, reducing food insecurity, managing birth spacing > 3 years, number of children less than 3, and breastfeeding (24).

Data from the Ministry of Home Affairs' stunting monitoring dashboard (Monev Bangda) provides more detailed insights. In 2024, Sigi recorded stunting prevalence of 13.99% (806 cases), while Tojo Una-Una recorded 10.16% (1,080 cases). Although slightly different from SSGI estimates, both data sources confirm that Sigi bears a higher burden of stunting compared to Tojo Una-Una. The following analysis integrates prevalence, determinants, service coverage, institutional capacity, and funding allocations to understand the root causes and formulate context-specific effective innovations.

Determinants of Stunting in Sigi District

According to the 2024 monitoring dashboard, 25.95% of families in Sigi were categorized as at risk of stunting. Access to health services remains a challenge, especially in remote areas. Coverage of antenatal care (ANC), complete basic immunization, and growth monitoring has not yet reached the >90% target. The situation is exacerbated by health infrastructure that has not fully recovered from the 2018 earthquake and liquefaction. Environmental factors also play a role: access to adequate sanitation remains low, open defecation is still practiced, and sources of drinking water are not fully protected. These conditions increase the risk of diarrhea and chronic infections that hinder child growth. Funding for stunting-specific programs in Sigi is very low, only 1.33% of the total budget, so most interventions remain sensitive rather than direct. Stunting case audits are also suboptimal, with only one follow-up plan documented, indicating an incomplete corrective process. Furthermore, the capacity of the District Stunting Reduction Acceleration Team (TPPS) still needs strengthening through standardized training modules and field supervision to ensure consistent program implementation.

Determinants of Stunting in Tojo Una-Una District

Tojo Una-Una shows relatively better performance in health services. Essential service coverage such as immunization, growth monitoring, and nutrition supplementation exceeded 90% for most indicators. Every village had Human Development Cadres (KPM) and Family Assistance Teams (TPK) actively supporting families during the First 1,000 HPK. However, Tojo Una-Una still faces a high burden of at-risk families (28.64%) and behavioral challenges. Quantitative determinant scores were high for clean water access (600.68), healthy latrines (491.10), and household smoking habits (561.64). This suggests that stunting risks could still arise due to environmental exposure or household behaviors, despite strong health service coverage. Funding for stunting programs in Tojo Una-Una is more adequate than in Sigi, with 15.03% of the regional budget allocated to specific and sensitive programs, projected to rise to 22.98% in the following year. Budget realization rates were also very high (>99%), demonstrating strong commitment to program implementation. Furthermore, Tojo Una-Una documented 44 follow-up plans (RTL) from stunting case audits, far more than Sigi, showing that case review and follow-up mechanisms were effective.

Comparative Analysis of Sigi and Tojo Una-Una

The comparative analysis shows that high stunting prevalence in Sigi is influenced by limited-service access, health infrastructure not fully recovered post-disaster, low funding for specific programs, and weak case audit mechanisms. By contrast, Tojo Una-Una, although having a high proportion of at-risk families, managed to keep stunting prevalence low due to broader service coverage, sufficient funding, and stronger case monitoring systems. These differences provide key lessons: high health service coverage, combined with family support and data-based follow-up mechanisms, are critical to reducing stunting prevalence. However, Tojo Una-Una still needs to strengthen sanitation and behavior-change interventions to prevent prevalence from rising again.

Effective Innovations for Stunting Reduction

Based on SSGI 2024 and district dashboard data, the following innovations can accelerate stunting reduction in Central Sulawesi, particularly in Sigi and Tojo Una-Una:

1. Strengthening 1,000 HPK Services – ensuring all pregnant women receive at least six quality ANC visits, distribution of 90 iron tablets during pregnancy, and regular weight monitoring.
2. Digitalization of Community Health Posts (Posyandu) – using e-PPGBM and mHealth applications to enable real-time monitoring of child nutrition status and prompt follow-up.
3. Sanitation and Clean Water Interventions – implementing Community-Led Total Sanitation (CLTS) programs in all stunting-priority villages, constructing clean water facilities and healthy latrines using village funds, especially in Sigi.
4. Family Assistance and Cadre Development – strengthening TPK capacity through standardized training, routine supervision, and performance incentives; engaging PKK women's groups and

community leaders in nutrition education.

5. Optimizing Specific Program Budgets – increasing APBD allocation to at least 10% for specific stunting programs such as supplementary feeding, local food fortification, immunization, and nutrition education; mobilizing CSR and private partners for nutrition kitchens, food gardens, and sanitation.
6. Case Audit and Follow-Up Plans – expanding case audits to cover >80% of stunted children identified in villages; publishing results and follow-up plans to enhance accountability.
7. Behavior Change Campaigns – applying culturally tailored social marketing via community radio and local social media to promote smoke-free homes, healthy behaviors, and animal protein consumption; establishing “Village Nutrition Kitchens” involving adolescent girls, PKK mothers, and farmer groups to provide affordable local complementary feeding.

The findings of the differences in stunting determinants between Sigi and Tojo Una-Una are in line with the national literature that emphasizes the importance of structural and environmental determinants in efforts to reduce stunting in Indonesia. A study by Bappenas (2023) and the Indonesian Ministry of Health (2022) shows that sanitation factors, access to health services, and family support are the main pillars in accelerating stunting reduction in post-disaster areas. Sigi's condition, which still has a low score in sanitation & water and post-disaster conditions, illustrates that the impact of the 2018 earthquake still has implications for the health system and family welfare.

Internationally, these results are consistent with the findings of UNICEF (2022) and WHO (2021) in developing countries such as Vietnam, the Philippines, and Nepal, which affirm that post-disaster recovery and strengthening of family-based social systems play an important role in improving children's nutritional status. Cross-sectoral interventions that integrate environmental improvement, nutrition education, and social support have proven effective in reducing the prevalence of stunting in a sustainable manner. Thus, the results of this study not only reflect the local conditions of Central Sulawesi, but also contribute to a global understanding of how post-disaster social and environmental contexts can strengthen or weaken stunting prevention efforts.

CONCLUSION

This study demonstrated substantial disparities in stunting prevalence among districts in Central Sulawesi, with Sigi (33.0%) showing persistently high rates compared to Tojo Una-Una (16.5%), which achieved significant progress through integrated and well-funded interventions. The analysis identified limited access to essential health services, inadequate sanitation, low maternal education, insufficient program budgets, and post-disaster vulnerabilities as major determinants contributing to high stunting prevalence. In contrast, districts with comprehensive coverage of antenatal care, immunization, growth monitoring, and community-based innovations such as the Dapur Sehat Atasi Stunting (DASHAT) and Family Assistance Teams (TPK) demonstrated better outcomes. These findings emphasize that stunting reduction requires simultaneous implementation of specific nutrition interventions and sensitive programs addressing environmental, behavioral, and socioeconomic determinants. Strengthening cross-sectoral collaboration, ensuring sufficient funding, and utilizing digital health monitoring systems (e-PPGBM and mHealth) are critical strategies to achieve equitable progress. Replicating successful models from Tojo Una-Una can accelerate attainment of Indonesia's 2024 RPJMN target and contribute to the global Sustainable Development Goals (SDGs).

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CONFLICTS OF INTEREST

The authors declare no conflict of interest. This research was conducted independently, and no commercial or financial relationships could be construed as a potential conflict of interest. The funding agency (PDUPT Research Grant Scheme) had no role in the design of the study, data collection and analysis, decision to publish, or preparation of the manuscript.

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