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Administrative and Settlement-Type Variation in Stunting Prevalence among Under-Five Children in the Osing Cultural Environment of Banyuwangi, Indonesia

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Abstract

Childhood stunting remains a major public health concern, but its distribution may vary substantially between local administrative settings. This study examined variation in area-level stunting prevalence between Desa and Kelurahan within the Osing cultural environment of Banyuwangi, East Java, Indonesia, and interpreted the findings in relation to settlement structure, local food environments, and the historically documented ecological and agrarian knowledge of the Osing community. An area-level observational analysis was conducted using secondary administrative data from 109 Osing-associated administrative units, comprising 87 Desa and 22 Kelurahan. Stunting prevalence was calculated as the number of stunted children under 5 divided by the total under-5 population in each administrative unit. Descriptive statistics, Levene's test, an independent-samples t-test, and Cohen's d were used. Mean prevalence was 3.58% in Desa and 6.38% in Kelurahan, a difference of 2.80 percentage points. Variances were homogeneous ($F=0.092$, $p=0.762$), and the difference in means was statistically significant ($t(107)=-2.653$, $p=0.009$), with Cohen's d approximately 0.63. The findings indicate marked administrative heterogeneity within the Osing cultural environment. The lower mean observed in Desa may plausibly be related to differences in settlement conditions, food-producing landscapes, household food security, and opportunities to use local ecological resources, but these mechanisms were not directly measured. Therefore, the results should be interpreted as an area-level association and a basis for multilevel and ethnonursing research rather than as evidence that rural residence or Osing identity itself protects against stunting.

Keywords: stunting; Osing; Desa; Kelurahan; food environment

1. INTRODUCTION

Stunting is a manifestation of impaired linear growth. It is defined as length-for-age or height-for-age below −2 standard deviations from the median of the World Health Organisation (WHO) Child Growth Standards. It reflects chronic or recurrent nutritional deprivation and adverse health conditions during the critical period of early childhood. It is associated with consequences for development and health across the life course [1], [2].

The global burden remains substantial. The 2025 UNICEF/WHO/World Bank Joint Child Malnutrition Estimates reported continuing global progress challenges toward the 2030 stunting target and emphasised the need for reliable, context-sensitive monitoring [3]. In Indonesia, the 2024 Indonesian Nutritional Status Survey (SSGI) reported a national stunting prevalence of 19.8%, 14.7% in East Java, and 14.4% in Banyuwangi [4]. These survey estimates should not be treated as numerically equivalent to the administrative area-level estimates analysed in the present study because the sampling frames, denominators, ascertainment procedures, and estimation methods differ.

Stunting is multifactorial. Recent Indonesian systematic reviews and multilevel studies identify child, maternal, household, environmental, socioeconomic, and community determinants, including low birth weight, parental stature, food insecurity, dietary diversity, sanitation, water, and access to health services [5]–[9]. These determinants are not distributed evenly across space. Differences in population density, livelihoods, poverty, food environments, infrastructure, and service accessibility can produce substantial variation among communities located within the same regency.

Place of residence is, therefore, an important contextual dimension. Indonesian evidence indicates that the determinants of stunting can differ between rural and urban populations and that socioeconomic disparities may persist in both settings [8], [9]. However, Desa and Kelurahan are administrative categories and should not be automatically equated with rural or urban residence. A rigorous rural–urban interpretation requires an independent classification

using population density, settlement characteristics, economic activity, infrastructure, and service accessibility. The present study consequently uses the terms Desa and Kelurahan as administrative contexts.

Banyuwangi provides an informative setting for this analysis. The regency had 1,708,114 residents in the 2020 Population Census and is administratively organised into 25 subdistricts and 217 Desa/Kelurahan [10]. Its territory includes agricultural, plantation, coastal, peri-urban, and urban environments. Consequently, regency-level estimates can conceal meaningful variation between local administrative communities.

Banyuwangi is also culturally heterogeneous. The Osing are an indigenous ethnic community historically and culturally associated with Banyuwangi, coexisting with Javanese, Madurese, Balinese, and other communities [11]–[15]. Osing cultural identity is expressed through language, food heritage, rituals, architecture, agricultural practices, and ecological knowledge. Historical and ethnographic scholarship emphasises the role of Osing identity in Banyuwangi's regional cultural formation, while also showing that Osing should not be assumed to constitute the numerical majority of the regency as a whole [11], [12].

Ethnoecological studies are particularly relevant to the present question. Research on the traditional landscape of the Osing documents productive household and community landscapes, including yards, rice fields, gardens, and fields, together with knowledge concerning plants and their uses [13], [14]. Such knowledge may support access to locally available food resources and adaptive livelihood strategies. Importantly, the presence of natural resources does not, by itself, ensure adequate child dietary intake: food availability must be translated into household access, preparation, feeding, and consumption before a nutritional effect can occur [6], [16].

The epidemiological question addressed here is therefore not whether Osing identity itself causes lower stunting, but why stunting prevalence may differ across administrative settings within the same Osing-associated cultural environment. A lower mean in Desa could plausibly reflect differences in productive landscapes, household food security, population density, food-market exposure, sanitation, social capital, or service use. These are hypotheses that require direct measurement and should not be inferred as causal mechanisms from the present ecological comparison.

The objective of this study was to examine administrative and settlement-type variation in stunting prevalence among children under 5 living within the Osing cultural environment of Banyuwangi, Indonesia, with particular attention to the observed difference between Desa and Kelurahan and to plausible ecological, food-system, and culturally shaped pathways that may explain this pattern.

2. METHODS

2.1 Study Design

This study used an area-level observational cross-sectional design based on secondary administrative data. The unit of analysis was the administrative settlement area rather than the individual child. Accordingly, the findings describe differences in area-level prevalence and cannot be interpreted as individual-level associations.

2.2 Study Setting and Population

The study was conducted in Banyuwangi Regency, East Java, Indonesia, focusing on 109 administrative units classified in the supplied dataset as belonging to the Osing ethnic environment. The analytical units comprised 87 Desa (79.8%) and 22 Kelurahan (20.2%). The classification represents an Osing-associated cultural environment and should not be interpreted as evidence that every resident of each administrative unit is Osing.

2.3 Data Source and Outcome

The administrative dataset contained the number of stunted children under five years of age, the total number of children under five years of age, the administrative area, ethnic-environment classification, and observations for February and August 2022. For the primary Desa–Kelurahan comparison, data from February 2022 were analysed because the available statistical output reported the cross-sectional comparison between these two administrative contexts. Area-level stunting prevalence was calculated as the number of stunted children under five divided by the total number of children under five in the corresponding administrative area, multiplied by 100. Stunting was defined according to the WHO Child Growth Standards [1].

Data provenance and quality control procedures were explicitly maintained. The secondary dataset obtained from the Banyuwangi District Health Office (Dinas Kesehatan Kabupaten Banyuwangi) comprised 217 administrative units, including 109 units classified as areas associated with the Osing ethnic community and 108 non-Osing units. Overall,

the dataset contained 4,381 stunted children under five in February 2022 and 4,049 in August 2022, with a total denominator of 107,843 children under five. For prevalence calculations in the present study, the February 2022 data were used. Among the 109 Osing-associated areas included in the comparison, the five analytical variables—administrative area, ethnic-environment classification, number of stunted children in February, number of stunted children in August, and the under-five population denominator—contained no missing data. No data imputation was performed, and no individual-level observations were generated. February 2022 prevalence was recalculated directly from the numerator and denominator available in the dataset rather than being derived from rounded percentage values.

2.4 Statistical Analysis

Descriptive statistics were used to summarise the number of administrative areas, the mean prevalence, the standard deviation, and the standard error. Analytical prevalence was recalculated as the number of stunted children under five divided by the corresponding under-five population denominator and expressed as a percentage. Homogeneity of variance was assessed using Levene's test. Differences in mean area-level stunting prevalence between Desa and Kelurahan were examined using an independent-samples *t*-test, reproducing the statistical analysis reported in the available SPSS output. Cohen's *d* was calculated to quantify the standardised magnitude of the difference. Statistical significance was set at $p < 0.05$. Because the outcome represented area-level prevalence, statistical inference was restricted to the administrative-area level.

2.5 Data Transparency and Reproducibility

The analysis was based on secondary data obtained from the Banyuwangi District Health Office, available through publicly accessible online sources, and cross-checked against data obtained directly from the Office through offline access. The data were subsequently processed and analysed using statistical software. The complete dataset of Desas and Kelurahans in Banyuwangi was subsequently screened and classified using information about the Osing community. The identification of areas with a predominantly Osing population was informed by Banyuwangi cultural experts (budayawan Banyuwangi), who provided contextual information to determine the administrative areas where the Osing ethnic population was predominant. The classification of Desa and Kelurahan in Banyuwangi was based on applicable administrative provisions issued by the Ministry of Home Affairs of the Republic of Indonesia.

Accordingly, the reported means and inferential statistics were derived from empirical observations contained in the supplied administrative dataset rather than from simulated or generated data. The analytical procedures were documented to facilitate transparency and reproducibility of the area-level comparison.

2.6 Interpretive Framework

Interpretation followed a multilevel and transcultural public health perspective. The framework considered the administrative context as an upstream contextual layer that may be associated with the settlement environment, food-producing landscapes, household food security, dietary diversity, caregiving practices, sanitation, health-service accessibility, and social support. Osing ecological and agrarian knowledge was conceptualised as a culturally situated community resource that may influence how households interact with and utilise their local environment, rather than as an intrinsic biological characteristic of Osing people [13]–[16].

2.7 Ethical Considerations

The analysis used aggregated secondary administrative data without direct personal identifiers. Ethical approval for the study was obtained from the Ethics Committee of the Faculty of Dentistry, University of Jember, Indonesia, under ethical approval certificate No. 3384/UN25.8/KEPK/DL/2025.

Table 1. Administrative distribution of Osing-associated study areas

Administrative context	n	%
Desa	87	79.8
Kelurahan	22	20.2
Total	109	100.0

3. RESULTS AND DISCUSSION

3.1 Distribution and Main Finding

The analysis included 109 Osing-associated administrative units. Desa accounted for 87 units (79.8%), whereas Kelurahan accounted for 22 units (20.2%). Thus, the observed pattern was derived from a dataset dominated numerically by Desa, although the Kelurahan group was sufficiently represented for comparative analysis.

Mean area-level stunting prevalence was 3.58% (SD=4.50) in Desa and 6.38% (SD=4.06) in Kelurahan. The difference was 2.80 percentage points, with the lower mean observed in Desa. Levene's test showed no evidence of unequal variances (F=0.092, p=0.762). The independent-samples t-test demonstrated a statistically significant difference in mean prevalence, t(107) = -2.653, p = 0.009, with a 95% confidence interval for the difference of -4.884 to -0.706 percentage points. Cohen's d was approximately 0.63, indicating a moderate standardised difference.

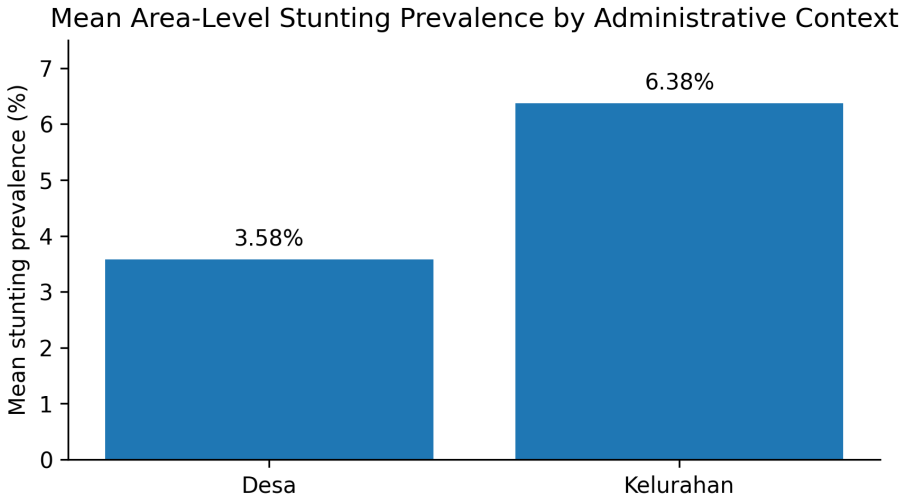


Figure 1. Mean area-level stunting prevalence by administrative context.

Table 2. Statistical comparison of area-level stunting prevalence

Statistic	Result
Mean prevalence, Desa	3.58%
Mean prevalence, Kelurahan	6.38%
Mean difference (Desa − Kelurahan)	−2.795 percentage points
Levene's F (p)	0.092 (0.762)
t (df)	−2.653 (107)
p-value	0.009
95% CI	−4.884 to −0.706
Cohen's d	≈0.63

3.2 Why Was the Mean Lower in Desa Than in Kelurahan?

The statistical result establishes a difference in administrative-area means, but it does not by itself establish why the difference occurred. A useful interpretation is that Desa and Kelurahan may represent different combinations of population density, livelihood systems, food environments, socioeconomic composition, sanitation, social organisation, and health service use. Indonesian multilevel evidence indicates that determinants of stunting vary across rural and urban contexts. At the same time, systematic reviews show that household socioeconomic conditions, dietary intake, water and sanitation, and maternal and child factors remain important [5], [7]–[9].

The lower mean in Desa may therefore be consistent with a more food-producing, less densely settled environment in some Osing-associated areas. However, this explanation does not imply that every Desa has better nutrition or that every Kelurahan is nutritionally disadvantaged. Desa vary widely in poverty, agricultural productivity, infrastructure, sanitation, and access to health services, and Kelurahan can also contain food-producing households and strong social networks.

3.3 Natural Resources and the Local Food Environment

One plausible pathway concerns the relationship between productive landscapes and household food security. Ethnoecological research describes Osing traditional landscapes as involving multiple land-use spaces, including home yards, rice fields, gardens, and fields, and documents extensive local knowledge of plant resources and their uses [13], [14]. Such landscapes can potentially shorten the physical distance between households and food-producing resources and may support a more diverse local food environment.

From a nutrition perspective, the relevant mechanism is not the mere presence of natural resources but their conversion into nutritionally adequate diets. Food security includes physical and economic access to sufficient, safe, and nutritious food, while dietary diversity reflects the range of foods consumed. Evidence from Indonesia has linked household food insecurity and inadequate dietary diversity to childhood stunting [6], [7], [16]. Therefore, a productive village environment may provide an opportunity for greater dietary resilience when households have the knowledge, labour, land access, purchasing power, and caregiving practices needed to use those resources.

3.4 Osing Agrarian and Ecological Knowledge as a Potential Community Resource

The Osing cultural environment is relevant because ecological and agrarian knowledge has been documented as part of the community's historical cultural heritage. Ethnoecological research describes how Osing communities interact with traditional landscapes and plant resources, while cultural studies document the continuing significance of agricultural knowledge and local practices [13], [14], [17]. This history provides a credible basis for hypothesising that some village households may retain practical knowledge concerning cultivation, household gardens, plant use, and locally available foods.

The term 'knowledge' is important. It is more scientifically defensible to describe Osing ecological knowledge as a historically rooted community resource than to characterise Osing people as intrinsically 'superior' in their use of nature. Cultural practices are heterogeneous and can change across generations, and their nutritional effects depend on contemporary socioeconomic conditions. The present dataset did not measure ecological knowledge, land ownership, home-garden production, biodiversity, or dietary diversity; consequently, these factors remain hypotheses for future research rather than demonstrated causes of the observed difference.

3.5 Why Might Kelurahan Show Higher Prevalence?

Several contextual pathways may contribute to a higher mean in Kelurahan. First, greater population density and more heterogeneous household socioeconomic conditions can concentrate vulnerability within relatively small administrative areas. Second, urbanising food environments may increase exposure to inexpensive, energy-dense foods without guaranteeing adequate intake of micronutrient-rich foods. Third, households in Kelurahan may have less direct access to productive land, even when food markets and health facilities are physically closer. Fourth, sanitation, water quality, housing conditions, migration, and continuity of caregiving may vary between neighbourhoods.

Importantly, better physical access to health facilities does not automatically translate into better nutritional outcomes. Preventive services require utilisation, continuity of care, health literacy, family decision-making, and adequate household resources. Public health nursing, therefore, needs to assess not only whether a facility exists but also whether families can use and benefit from the service [18].

3.6 Culture, Family Care, and Transcultural Interpretation

Culture may influence food selection, feeding practices, family authority, perceptions of child growth, and health-seeking behaviour. Studies among other Indonesian ethnic communities demonstrate that culturally embedded concepts of eating can influence feeding practices and nutritional outcomes [19]. Transcultural nursing similarly emphasises the need to understand culturally patterned meanings of care before designing interventions [20].

For the Osing community, this suggests that future research should investigate local foods offered to children, food taboos, breastfeeding and complementary feeding, family roles of mothers, fathers and grandparents, traditional health practices, perceptions of healthy growth, and the role of community actors. The present study does not establish that these cultural practices explain the Desa–Kelurahan difference, but the observed heterogeneity provides a rationale for examining them.

3.7 Comparison with Wider Indonesian and Indigenous Evidence

The finding is consistent with a broader literature showing that stunting is context-dependent. Indonesian studies have reported differences in determinants between rural and urban settings, as well as persistent socioeconomic inequalities [8], [9]. Other research shows that nutrient intake and dietary diversity are important pathways linking household conditions to child growth [5], [6]. Research among indigenous populations in other countries likewise indicates that a high stunting burden can coexist with distinctive cultural and ecological knowledge, as structural disadvantage, poverty, service access, and nutrition interact with cultural factors [21], [22].

The Banyuwangi comparison also needs to be distinguished from population-survey estimates. In the supplied 217-area administrative dataset, the aggregate prevalence for February 2022 was approximately 4.06%. Within the 109 Osing-associated areas, the mean prevalence was 3.58% in Desa and 6.38% in Kelurahan. These figures are administrative-area indicators and should not be compared directly with the 2024 SSGI population prevalence of 14.4% in Banyuwangi, 23.5% in neighbouring Jember, 14.7% in East Java, and 19.8% nationally [4]. The differences illustrate the importance of specifying the data source and the denominator.

3.8 Implications for Community Health Nursing

The findings support geographically sensitive stunting surveillance. Community health nurses and primary health-care teams can use administrative variation as a signal for further assessment rather than as a stand-alone explanation. Areas with higher prevalence should be assessed for household food security, dietary diversity, maternal and child nutrition, sanitation and water, immunisation, growth monitoring, antenatal and postnatal care, health literacy, and family caregiving.

In Osing-associated Desa, interventions can additionally explore the constructive use of local food resources and community knowledge without romanticising traditional practices. Home gardens, locally available nutrient-dense foods, community food demonstrations, and culturally congruent nutrition education may be considered only after their actual availability, safety, acceptability, and contribution to children's diets have been established. In Kelurahan, the assessment may need to place greater emphasis on neighbourhood-level food environments, socioeconomic vulnerability, housing and sanitation, and continuity of family and health-service support.

3.9 Strengths and Limitations

The study has several strengths: it examines an understudied cultural environment, includes 109 identified administrative units, retains prevalence as a continuous outcome, and reports both statistical significance and effect size. The principal limitation is ecological inference. Individual-level factors such as birth weight, maternal stature, dietary diversity, household food security, sanitation, and service utilisation were not available in the analysed comparison. Desa/Kelurahan were not independently validated as rural/urban categories, and no spatial statistics such as Moran's I, LISA, hotspot analysis, or spatial regression were performed. Therefore, the observed difference should be regarded as an administrative association and hypothesis-generating signal rather than a causal urban–rural effect.

3.10 Proposed Ecological–Nutrition Pathway

A parsimonious pathway emerging from the evidence is: Osing ecological and agrarian knowledge → productive household/community landscapes → access to diverse local food resources → household food security and dietary diversity → child feeding and nutritional adequacy → potential reduction in the risk of stunting. Administrative context may modify each link through population density, land access, markets, sanitation, poverty, and health-service accessibility. This pathway is a conceptual proposition, not a causal model tested by the present study.

Table 3. Plausible pathways linking settlement context, ecological resources, and child nutrition

Contextual factor	Potential pathway	Evidence status in this study
Productive landscapes	May increase proximity to household food resources	Plausible; not directly measured
Plant and food biodiversity	May support dietary variety when consumed by children	Plausible; availability ≠ consumption
Agrarian/ecological knowledge	May support adaptive food production and resource use	Documented culturally; causal effect untested
Household food security	May influence quantity, quality, and continuity of food intake	Established in wider literature; not measured here
Settlement environment	May shape density, food markets, housing, sanitation, and social conditions	Potential confounder/contextual pathway
Health-service access and use	May influence prevention, growth monitoring, and treatment	Potential pathway; utilisation not measured

4. CONCLUSIONS

Stunting prevalence differed significantly between administrative contexts within the Osing cultural environment of Banyuwangi. Mean area-level prevalence was 3.58% in Desa and 6.38% in Kelurahan, a difference of approximately 2.80 percentage points, with $t(107)=-2.653$, $p=0.009$ and Cohen's $d\approx0.63$. The lower mean in Desa may plausibly be related to a combination of settlement structure, productive landscapes, local food environments, household food security, social organisation, and access to health and sanitation resources. The historically documented ecological and agrarian knowledge of the Osing community provides a culturally meaningful hypothesis for how some village households may use local natural resources to support food availability. However, the present study did not measure these mechanisms and therefore cannot establish causality. Future research should combine administrative analysis with household surveys, dietary assessment, ethnonursing methods, validated rural–urban classification, and multilevel spatial analysis. Such work can test whether ecological resources, family care practices, food security, and health-service conditions explain the observed administrative heterogeneity and can inform culturally congruent community health nursing interventions.

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