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Does the Proximity of the Area Affect in Incidence of Stunting? : Study on Densely Populated Provinces in Indonesia

Astridya Paramita[1], Nailul Izza[2], DwiHapsari Tjandrarini[3], Agung Dwi Laksono[4]

[1] Junior Researcher, [2]Assistant Researcher, Functional Unit of Health Technology Innovation, The Indonesia Ministry of Health, Surabaya, East Java, Indonesia, [3]Senior Researcher, Center of Research and Development of Public Health Efforts, The Indonesia Ministry of Health, Jakarta, Indonesia, [4]Senior Researcher, Center of Research and Development of Humanities and Health Management, The Indonesia Ministry of Health, Jakarta, Indonesia.

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Abstract

The prevalence of stunting in Indonesia is still above WHO standards, so it needs to be addressed immediately, given the adverse effects on individuals and countries. This study aims to analyze the incidence of stunting in East Java by paying attention to the proximity of the area as an effort to solved stunting problems. The study was conducted using secondary data from 2017 from official government agency reports. Administrative area (regency/city) analysis unit. Analysis using spatial regression test. The results show that Moran's I test shows a spatial dependency or location autocorrelation ($p < 0.20$). The Lagrange Multiplier SAR spatial regression test can explain that spatial factors can increase 5% greater (75%) of the 5 selected factors that cause toddler stunting, compared to using the OLS classic regression test. It could be concluded that spatial factors, namely geographic areas, can increase the percentage of clarity in the regression modeling for the incidence of stunting in an area. In this study, spatial factors are known to be associated with regional proximity and ethnic similarity, namely the Madurese ethnicity.

Keywords: Stunting; the proximity of the area; child health; community nutrition.

Introduction

One indicator of the success of achieving the Sustainable Development Goals (SDGs) in the health sector is the nutritional status of children under five. A toddler group is a group that is prone to experiencing nutritional problems, one of which is stunting. Stunting is a condition of chronic malnutrition that occurs due to inadequacy of nutrients in the past, as indicated by the z-score of height for age (height/age), which is less than -2 SD.[1]

The prevalence of stunting of children under five in the world has decreased for 17 years, from 2000 to 2017, which was 10.4%. Based on the results of the 2013 Indonesia Basic Health Survey, for the national scale, the prevalence of stunting of children under five in Indonesia was 37.2%, while for East Java Province in 2013 the prevalence of stunting was 35.8%.[2] According to WHO, if the problem of stunting is above 20% it is a public health problem.[2] Based on Nutritional Status Monitoring data for

Corresponding Author: Astridya Paramita, Junior Researcher, Functional Unit of Health Technology Innovation, The Indonesia Ministry of Health, Surabaya, East Java, Indonesia.

E-mail: astreed_skm@yahoo.co.id

three consecutive years (2015-2017), the prevalence of children under five with stunting in Indonesia is still far above the WHO standard, namely 29%, 27.5%, and 29.6%.[3]

Stunting in children under five is a consequence of several factors. There are five main factors causing stunting, namely poverty, social and culture, increased exposure to infectious diseases, food insecurity, and community access to health services.[4,5] The results of a systematic review regarding the risk factors for stunting in developing countries show that it is consistently influenced by family socioeconomic status (family income), mother's education, low birth weight, premature birth, non-exclusive breastfeeding, birth length, and macronutrient and micronutrient deficiencies.[6]

In the long term, stunting conditions will interfere with the health, education, and productivity of children under five in the future. Stunting children under five tend to experience degenerative diseases in the future, it is difficult to achieve optimal growth and development potential both physically and psychomotor, which of course affects intellectual abilities.[7,8]

With the high prevalence of stunting nationally, including in the province of East Java, and its impact on individuals and countries in the future, stunting is still one of the priority health problems in Indonesia that must be immediately followed up. Indonesia has a geographical condition with the number of islands reaching 17,499 making it the largest archipelagic country in the world. Indonesian state with social life and culture diversity, and has a unique geographical conditions, raise issues and determinants of stunting are different in each region, and therefore the area is used as a case study in this research is the province of East Java as an area with densely population.[9]

Table 1: Map of stunting prevalence grouping in East Java Province in Indonesia in 2017

Kriteria WHO	Regional
Low (<20.0)	Mojokerto City, Gresik and Sidoarjo Regency, Bojonegoro Regency, Blitar City, Madiun City
Medium (20.0 - 29.9)	Pacitan, Ponorogo, Trenggalek, Tulungagung, Blitar, Jombang, Nganjuk, Madiun, Magetan, Ngawi, Tuban, Lamongan, Malang, Lumajang, Pasuruan, Mojokerto Regency and Malang City, Banyuwangi Regency, Sampang Regency, Kediri City, Surabaya City
High (30.0 - 39.9)	Probolinggo, Situbondo, Bondowoso, and Jember Regency, Kediri Regency, Sumenep regency, Pasuruan City, Batu City
Very High(≥40.0)	Bangkalan and Pamekasan Regencies, Probolinggo City

Source: Handbook of Nutrition Status Monitoring, Directorate of Community Nutrition.

Table 1 is a map of the distribution of stunting prevalence in East Java Province according to the 4 WHO criteria (1997), namely low (<20.0; light pink color), medium (20.0 - 29.9; dark pink color), high (30.0 - 39.9; red color), and very high (≥40.0; dark red color) to determine the percentage distribution of the prevalence of stunting in East Java from a regional aspect.[10] The highest prevalence of stunting in Bangkalan and Pamekasan regencies are in proximity of the area, and 2 other areas in the Madura archipelago are included in high prevalence (Sumenep Regency) and medium (Sampang Regency). 4 Regions with high prevalence and 16 regions with moderate prevalence of stunting tend to cluster together, as well as 2 regions with low prevalence.

The results of the mapping show that there is a tendency for the similarity in the percentage of stunting categories from nearby locations compared to remote locations so that it becomes the basis for an assessment of the stunting problem in East Java using a spatial approach. This is in line with Tobler's first law of geography in 1970 that everything is related to others, but those that are located close together have a more relationship than those that are located far apart.[11]

Based on the background description, this study aims to analyze the incidence of stunting in East Java by paying attention to the proximity of the area as an effort to solved stunting problems. From this analysis, it is hoped that a spatial regression model can be obtained and a large spatial dependence on the prevalence of stunting in East Java so that it can be a matter for regional considerations in formulating policies and programs for handling area-based stunting.

Methods

Study design

This type of research was analytic descriptive using secondary data in the form of survey reports and annual reports from several government agencies. The report was obtained from the survey results with a cross-sectional design.

Data sources and variables

The data used in this research was secondary in 2017 obtained from reports from several government agencies, namely from the Directorate of Community Nutrition in the form of a Pocket Book for Monitoring Nutrition Status[3], Health Research and Development Agency in the form of Health Personnel Research Report[12], The Central Bureau of Statistics is in the form of a Social Economic Survey Statistical Report[13], and the Ministry of Finance in the form of Regulation of the Minister of Finance of the Republic of Indonesia number 119/PMK.07/2017 concerning the Regional Fiscal Capacity Map.[14] The unit of analysis of this research is the geographical area at the district level as many as 38 districts/cities in East Java Province. The variables used in this study could be seen in Table 2.

Table 2: Independent variable and dependent variable

Variable	Description
X1	Percentageofbabieswho are exclusivelybreastfedfrombirth, aged 0-5 monthsbyregencies/cities, 2017*
X2	Percentageofchildrenaged 6-59 monthsreceiving Vitamin A capsulesbyregencies/cities, 2017*
X3	Per capitadailycalorieconsumption per capitabyregencies/cities, 2017**
X4	Per capitadaily protein consumption per capitabyregencies/cities, 2017**
X5	Percentageofpopulationwithanaveragemonthlyexpenditure per capitabelowthepovertylinebyregencies/cities, 2017**
X6	PercentageofFiscalCapacity Index thatreflectsthefinancialcapacityofeach region byregencies/cities, 2017***
X7	Percentageofhealthworkerswith a background as a generalpractitioner per 10,000 inhabitantsbyregencies/cities, 2017****
X8	Percentageofhealthworkerswhohavecompletednursingeducationprograms per 10,000 populationbyregencies/cities, 2017****
X9	Percentageofhealthworkerswhohavecompletedthemidwiferyeducation program per 10,000 populationbyregencies/city, 2017****
X10	Percentageofhealthworkerswhohavecompleted a publichealtheducation program per 10,000 residentsbyregencies/cities, 2017****
X11	Percentageofhealthworkerswhohavecompletednutritioneducation per 10,000
	populationbyregencies/cities, 2017****
X12	PercentageofHealthCenters per 10,000 populationbyregencies/cities, 2017****
X13	Percentageofactive Posyandu (Integrated Service Posts) per 10,000 populationbyregencies/cities, 2017****
Y	Prevalenceofchildrenunderfive (0-59 months) withheight per agelessthan -2 SD byregencies/cities, 2017*

Source: *Directorate of Community Nutrition;
**Central Bureau of Statistics;
***Ministry of Finance;
****Health Research and Development Agency

Data analysis

The statistical test used was the spatial regression test. The spatial regression test is a method to obtain a mathematical model of the relationship between the dependent variable (Y) and the independent variable (X) concerning spatial elements.[15,16] The spatial lag parameter (ρ) shows the level of correlation of the spatial influence of an area to other areas around it.[17] Spatial dependence occurs due to dependencies in spatial/region/area data. Tobler's first law of geography says that everything is related to other things but that something closer has great influence.[11]

The test used to determine the spatial dependency in the error of a model was by using Moran's I test

and the Lagrange Multiplier (LM) test to identify specifically the right type of spatial regression test.[16] Moran's I test is a diagram to see the relationship between the value of observations at a location (standardized) with the average value of observations from locations adjacent to the locations concerned.[17]

Results and discussion

Outlier Data Test

The results of the univariate outlier test showed that 3 regencies/cities had Z scores that deviated from the average, namely Mojokerto Regency, Madiun City, and Surabaya City. Besides, 4 variables have outlier values, namely the fiscal capacity index (X6), medical workers (X7), public health workers (X10), and Posyandu (X13). Likewise, the results of the multivariate outlier test using the Mahalanobis Distance statistical test show that the maximum Mahalanobis Distance value was 16.802, while the X2 value$_{(0.001;\ 9)}$ was 27.87, and the maximum Cook Distance value was 0.297, which means it was smaller than the multivariate rule of thumbs (0.297 <1), so it could be concluded that there was no outlier data.

Classic Assumtion Test

Before the spatial regression test was carried out, the classical assumption test was carried out on the variables studied, to assess the feasibility of the next statistical test, namely the spatial regression test. The classic assumption test includes a normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test. The results of the classical assumption test can be seen in Table 3.

Table 3: The results of the classical assumption test

No	ClassicAssumptionTest	Hypothesis	P-value	Results
1	Normality Test (Jarque Fallow Test)	H0: Residuals are normally distributed (p value> 0.05) H1: Residuals are not normally distributed	0.494	p = 0.494> α then H0 is accepted, or the residualis normally distributed.
2	Multicollinearity test (Farrar-Glaubery test)	H0: Multicollinearity was not occur H1: There was multicollinearity (CI> 30)	114.807	Condition Index (CI) = 114.807> 30) then Ho is rejected or multicollinearity occurs.
3	Heteroscedasticity Test (Breusch Pagan Test)	H0: There was no heteroscedasticity H1: Heteroscedasticity occurs	0.616	p-value = 0.616 > 0.05 then H0 is accepted or the error variance is homoscedasticity.
4	Autocorrelation Test (Durbin-Watson Test)	H0: There was no autocorrelation H1: There was autocorrelation	d = 2.224 N = 35 k = 9 dL = 0.908 dU = 2.114 4-dL = 3.092 4-dU = 1.856 4-d = 1.776	The Durbin Watsontest results show:dL< d d >dU d < 4-dL d > 4-dU dL<dU< d dL< (4-d) < d Thus the classic terms of auto correlation through the Durbin Watsontest cannotbe concluded.

Spatial Dependency Test

The results of the spatial dependency test using Moran's I test obtained a p-value of 0.026. The p-value smaller than α = 0.20 indicates a dependency or autocorrelation between locations (H_0 is rejected).

Based on Table 1, the very high category is in Bangkalan Regency (43%), Pamekasan Regency (42.5%), and the high category is in Bondowoso Regency, Situbondo Regency, Probolinggo Regency, and Jember Regency. If the prevalence is mapped

based on the value of the local indicator from spatial association (LISA), there are 8 significant areas, namely the High-high and Low-low clusters. Cluster High-high is a neighbor located around regencies/ cities that has a very high prevalence of stunting, which is occupied by Sampang Regency, Sumenep Regency, Probolinggo Regency, and Jember Regency. Low-low clusters are neighbors around regencies/ cities that have a low prevalence of stunting.

Table 1 shows the grouping or similarity of stunting prevalence categories for adjacent areas. The meaning of this mapping is stronger because it is in line with the results of spatial regression analysis which shows the influence of the location or surrounding area with the occurrence of stunting in an area. This is indicated by the moran's I index value of 0.216 with a p-value = 0.026 (<α 0.20) and the cluster mapping results of moran's I stunting prevalence using LISA. The results of LISA mapping identify that areas with a very high risk of stunting prevalence Sampangdistrics, Sumenep districts, Probolinggo Regency, and Jember Regency), tend to have occurred in the province of East Java, where the majority of the population is ethnic Madura.

Comparison of Regression Models

The accuracy of the regression model in approaching the truth can be seen from the R-square value, the Akaike Info Criterion (AIC) value, or the Schwarz Criterion (SC) value. The greater the R-square value or the smaller the AIC value and the SC value, the better the model.

Table 4 informs that the results of the Lagrange Multiplier SAR test for spatial lag (**p<0.05) are more precise than the spatial error, so it can be concluded that there is an effect of spatial correlation in the model of stunting. The SAR model has an R-square value of 0.75, which means that the variables used in this analysis can explain the causes of stunting by 75% after including spatial factors, while the other 25% are caused by other factors outside the variables used in the research analysis.

Table 4: Comparison of Classical Regression Model (OLS) with spatial regression

No.	Model	p-value	R-square	Akaike Info Criterion (AIC)	Schwarz Criterion (SC)
1	ClassicalRegression (OLS)	0.000014*	0.709695	253.895	270.271
2	Lag Model SpatialRegression	0.022** (Rho = 0.328407)	0.752382	251.077	269.09
3	SpatialRegressionError Model	0.114 (Lambda = 0.409734)	0.750618	250.088	266.464

The following was a model of the resulting spatial regression equation:

$$\hat{y}^{=} - 7{,}275 + 0{,}328 \sum_{j=1 j\neq j}^{n} w_{ij}y_j - 0{,}048X_{1i} - 0{,}453X_{2i} + 0{,}721X_{3i} - 0{,}035X_{4i} + 3{,}716X_{5i} + 0{,}062X_{8i} - 0{,}278X_{10i} - 13{,}706X_{11i} - 2{,}685X_{12i}$$

Intercept -7,275 means that if the percentage of not exclusively breastfed = 0, vitamin A is not given = 0, lack of energy and protein = 0, poverty = 0, lack of nurses = 0, lack of midwives = 0, lack of nutrition workers = 0, and Health Center is not available = 0, it is estimated that it will reduce the prevalence rate of stunting by 7 cases. Based on the model formed, it was found that the variables that affected the level of 0.2 were the variable giving Vitamin A, under-energy children under five, nutritionists, and the existence of the Health Center.

Results and Discussion

The results of the analysis found that the spatial factor in the prevalence of stunting under five in East Java was related to the proximity of the region and the similarity of ethnicity, namely Madurese ethnicity. This situation can be explained based on several previous studies. Previous studies conducted in Bangkalan-Madura informed that the Madurese ethnic community has socio-cultural practices related to nutrition that make stunting possible.

Socio-cultural practices related to stunting include food taboo for pregnant women. Pregnant women were found to abstain from eating squid and stingrays, citing concerns about difficulties in delivering babies (babies coming in and out like squid) and concerns about the birth shape of babies such as stingrays. This practice carries the risk of protein deficiency, while the protein needs of pregnant women increase compared to before [18]. A previous longitudinal study reported a significant effect on maternal protein intake during pregnancy on stunting nutritional status. Babies born to mothers with protein consumption less than the average (<58% RDA) in the second trimester, babies born less than 48 cm, and lack of protein intake at birth have a risk of stunting in infants aged 12 months.[19]

Another previous study on taboo food among the Madurese, Javanese, and Pendalungan ethnic communities in Jember Regency informed that in the health aspect, the practice of taboo food has both negative and positive impacts. Taboo food practices have a negative impact which results in nutrition from taboo foods that cannot be consumed or nutritional needs are not fulfilled optimally and have a positive impact as an effort to prevent adverse health impacts in the pregnancy and breastfeeding (lactation) phase.[20]

Fetal growth restriction is a major risk factor for stunting worldwide (95% CI 9.1 million - 12.6 million of 44.1 million) which is characterized as linear growth retardation. Furthermore, poor sanitation (95% CI 6.3 million - 8.2 million) and diarrhea (95% CI 2.4 million - 9.2 million) are estimated as environmental factors as the second cause of stunting globally and in the Asian region. South, sub-Saharan Africa, and East Asia and the Pacific, while child nutrition and infection are the second group of risk factors in other regions based on the results of reviews conducted in developing countries.[21,22]

The spatial regression results of the SAR model inform that involving spatial factors (areas) has increased the percentage of the ability to explain the effect of predictor variables on the incidence of stunting by 5%. This means that spatial factors need to be considered in preparing an intervention for handling stunting. The results of this spatial regression are in line with the results of research in Burkina Faso, sub-Saharan Africa that statistical spatial modeling is very useful in identifying or developing intervention programs and strategies for intervention target areas in managing malnutrition.[23]

The factors that influence the occurrence of stunting in East Java Province are toddlers receiving Vitamin A, lack of energy in under five, the availability of nutritionists, and the existence of an ineffective Public Health Center. This factor is only able to explain its effect on the occurrence of stunting by 75%, and the other 25% is caused by other factors not used in the analysis of this study. Previous studies that analyzed the determinant incidence of stunting in East Java Province found that places, where toddlers live in rural areas, have a 0.855 times greater risk of stunting than those living in cities, age under five, age of mothers under five and education of mothers under five at SD level 2.206 times more risk of stunting than with a college-educated mother.[24]

The results of previous studies revealed that a child's birth weight <2500 grams has a 2.5 times greater chance of stunting. Likewise, households with three or more children under five, maternal antenatal care less than 4 times, household ability to access proper sanitation, exclusive breastfeeding, low socioeconomic status, preterm birth, short birth length, and low maternal education are the determining factors for stunting.[25–28] The ability of the economy also affect the occurrence of stunting population in Iran with the poorest cluster socialechonomic 3.04 times greater risk of the occurrence of stunting.[29]

The occurrence of stunting in an area is not only due to a single cause but also due to differences in the social construction of the community that was built, communication patterns, and meaning between health workers and the community. A study in Jember-Indonesia revealed that the social construction of stunting according to theory is a phenomenon produced by health providers based on the existing reality, while the community understands short toddlers as something normal as long as the child is still active, playing, and still has an appetite, and also heredity from short parents.[30]

Madurese culture views the role of the father as merely the head of the family and breadwinner in the family. The results of the study using the Binary Logistic Regression test showed that the role of the father had a significant effect on the prevention of stunting with significant results (0.001 <α 0.05). Parenting culture has a significant effect on stunting prevention in children under five with significant results (0.019 <α 0.05). Parenting culture is beneficial for fathers in increasing their role in preventing stunting in toddlers and nurses need to understand

their culture before understanding transcultural nursing that is applied to society.[31]

Stunting is often not recognized in the community and short stature is considered normal. Stunting is the result of a complex set of contextual causative factors, requiring a multifaceted and transdisciplinary approach.[32,33] The results of the spatial regression analysis and the description of the geographic area that are interrelated can increase the risk factors for the prevalence of stunting in the surrounding area. Therefore, synergy is needed in overcoming the occurrence of stunting, namely by collaborating with local governments between surrounding regencies/ cities, as well as collaboration from communities that care about public health with community leaders and religious leaders regarding educational innovation efforts to form correct social constructions related to nutrition and problems. stunting as a form of approach to reduce trust in food taboo so that it can be accepted by the community. This collaboration needs to be continuously fostered in carrying out any activities related to efforts to increase nutrition or reduce the prevalence of stunting.

Conclusion

Based on the results of the study, it can be concluded that proximity areas can increase the percentage of clarity in the regression modeling of stunting incidents in an area. Based on these conclusions, handling the stunting problem in an area needs to consider spatial factors, namely the proximity to the surrounding area which is often neglected. In this study, the proximity of the region is known to be related to ethnic similarities, namely the Madurese ethnicity.

It is recommended that the synergy/cooperation of local governments between regencies/cities concerning spatial and ethnicity, a collaboration of community health care with community leaders and religious leaders concerning educational innovation efforts to form the correct social construction related to "food taboo" and the problem of stunting, and organizing other activities.

Additional Informations

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References

1. Kusrini I, Laksono AD. Regional disparities of stunted toddler in indonesia. Indian J Forensic Med Toxicol. 2020;14(3):1685–91.
2. National Institute of Health Research and Development of Ministry of Health of the Republic of Indonesia, National Institute of Health Research and Development of The Indonesia Ministry of Health. The 2013 Indonesia Basic Health Survey (Riskesdas): National Report (in Ina). Jakarta, Indonesia; 2014.
3. Directorate of Community Nutrition of the Ministry of Health of The Republic of Indonesia. The Indonesia Nutritional Status Monitoring in 2017 (in Ina). Jakarta, Indonesia; 2017.
4. Chowdhury TR, Chakrabarty S, Rakib M, Afrin S, Saltmarsh S, Winn S. Factors associated with stunting and wasting in children under 2 years in Bangladesh. Heliyon. 2020;6(9):Article number e04849.
5. Laksono AD, Ibad M, Mursita A, Kusrini I, Wulandari RD. Characteristics of mother as predictors of stunting in toddler. Pakistan J Nutr. 2019;18(12):1101–6.
6. Budiastutik I, Rahfiludin MZ. Risk Factors of Child Stunting in Developing Countries. J Amerta Nutr. 2019;122–6.
7. Islam MS, Ullah ANZ, Mainali S, Imam MA, Hasan I. Determinants of stunting during the first 1,000 days of life in Bangladesh: A review. Food Sci Nutr. 2020;8(10):1–11.
8. Laksono AD, Kusrini I. Ecological Analysis of Stunted Toddler in Indonesia. Indian J Forensic Med Toxicol. 2020;14(3):1685–91.
9. Maria I, Nurjannah N, Usman S. Analysis of Stunting Determinants based on Geographic Areas in Indonesia in 2018. Maj Kesehat Uiniversitas Brawijaya. 2020;7:239–50.
10. Onis M De, Blossner M. WHO Global Database on Child Growth and Malnutrition. Geneva; 1997.
11. Tobler WR. A Computer Movie Simulating Urban Growth in the Detroit Region. In: Economic Geography [Internet]. Clark University; 2009. p. 234–40. Available from: http://www.jstor.org/stable/143141 Accessed:
12. National Institute of Health Research and Development of Ministry of Health of the Republic of Indonesia. Research Report of Health Workers (RISNAKES) 2017: Centre of Public Health (Book 1) (in Ina). Jakarta, Indonesia; 2018. 1–404 p.
13. Central Bureau of Statistics. Percentage of Poor People by Regency / City Year 2015 - 2018 (in Ina) [Internet].

Central Bureau of Statistics. Jakarta, Indonesia; 2019 [cited 2019 May 27]. Available from: https://www.bps.go.id/dynamictable/2017/08/03/1261/persentase-penduduk-miskin-menurut-kabupaten-kota-2015---2018.html

14. Ministry of Finance. Regulation Of The Minister Of Finance Of The Republic Of Indonesia Number 119 / Pmk.07 / 2017 Concerning Regional Fiscal Capacity Maps [Internet]. Jakarta, Indonesia; 2017. p. 25. Available from: www.jdih.kemenkeu.go.id
15. Lesage JP. The Theory and Practice of Spatial Econometrics The Theory and Practice of Spatial Econometrics [Internet]. Department of Economics University of Toledo: University of Toledo; 2015. 1–310 p. Available from: https://www.researchgate.net/publication/266218273_The_Theory_and_Practice_of_Spatial_Econometrics
16. Anselin L. Spatial Econometrics. In: Baltagi BH, editor. A Companion to Theoretical Econometrics [Internet]. Blackwell Publishing Ltd; 2003. p. 310–30. Available from: http://web.pdx.edu/~crkl/SEAUG/papers/anselin01_CTE14.pdf
17. Ward MD, Gleditsch KS. An Introduction to Spatial Regression Models in the Social Sciences. Washington, USA and Colchester, UK: Department of Political Science University of Washington Seattle and Department of Government University of Essex; 2007. 1–87 p.
18. Illahi RK, Muniro L. Overview of Socio Cultural Events Nutrition and Ethnic Madura stunting Children Ages 24-59 Months in Bangkalan. Natl Nutr J. 2016;11(2 juli-desember 2016):135–43.
19. Ernawati F, Rosmalina Y, Permanasar Y. Effect of the Pregnant Women's Protein Intake and Their Baby Length at Birth to the Incidence of Stunting among Children Aged 12 Months. J Nutr Food Res [Internet]. 2013;36(1):1–11. Available from: http://ejournal.litbang.kemkes.go.id/index.php/pgm/article/view/3388
20. Sholihah A. Ethnobiological Studies of Taboo Food in the Madurese, Javanese, and Pendalungan Tribes in Jember Regency and Its Use as Popular Scientific Books (in Ina) [Internet]. University Jember, Indonesia; 2019. Available from: http://repository.unej.ac.id/handle/123456789/97451
21. Danaei G, Andrews KG, Sudfeld CR, Mccoy C, Peet E, Sania A, et al. Risk Factors for Childhood Stunting in 137 Developing Countries : A Comparative Risk Assessment Analysis at Global , Regional , and Country Levels. PLOS Med [Internet]. 2016;1:1–18. Available from: https://www.mendeley.com/suggest?w=3acaa1c3-1574-4e95-84e8-ad256c335bc7
22. Prendergast AJ, Humphrey JH. The stunting syndrome in developing countries. Paediatr Int Child Health. 2014;34(4):250–65.
23. Ying Chih Chuang, Chuang TW, Chao HJ, Tseng KC, Nkoka O, Sunaringsih S, et al. Contextual Factors and Spatial Patterns of Childhood Malnutrition in Provinces of Burkina Faso. J Trop Pediatr [Internet]. 2020;66(1)(Feb 1):66–74. Available from: https://pubmed.ncbi.nlm.nih.gov/31086979/
24. Laksono AD, Megatsari H. Determinants of Stunted Toddler in East Java: Analysis of the 2017 Nutrition Status Monitoring Data. J Amerta Nutr. 2020;109–15.
25. Titaley C, Ariawan I, Muasyaroh A, Hapsari D, Dibley M. Determinants of the stunting of children under two years old in Indonesia: A multilevel analysis of the 2013 Indonesia basic health survey. Nutrients. 2019;11(5).
26. Izza N, Purnomo W, Mahmudah. Factors Affecting the Occurrence of Stunting in Indonesia. Indian J Public Heal Res Dev [Internet]. 2019;10(10):1845–50. Available from: http://www.indianjournals.com/ijor_AdvanceSearch/summary.aspx?query=3&mode=gen
27. Beal T, Tumilowicz A, Sutrisna A, Izwardy D, Neufeld LM. A review of child stunting determinants in Indonesia. Matern Child Nutr. 2018;14(4):1–10.
28. WHO. Reducing stunting in children [Internet]. Equity considerations for achieving the Global Nutrition Targets 2025. Geneva, Switzerland; 2018. 40 p. Available from: https://apps.who.int/iris/bitstream/handle/10665/260202/9789241513647-eng.pdf?sequence=1
29. Kia AA, Rezapour A, Khosravi A, Abarghouei VA. Inequality in malnutrition in under-5 children in Iran: Evidence from the multiple indicator demographic and health survey, 2010. J Prev Med Public Heal. 2017;50(3):201–9.
30. Lestari W, Kristiana L, Paramita A. Stunting: Study of Social Constructions in Rural and Urban Communities Related To Infant's Nutrition and Nurture in Jember Municipality Weny. Aspir J Maslah-Masalah Sos [Internet]. 2018;9(1 Juni):17–33. Available from: http://jurnal.dpr.go.id/index.php/aspirasi/index
31. Januarti LF, Hidayathillah AP. Parenting Culture on The Role of Father in Prevention of Stunting in Toddler. Babali Nurs Res [Internet]. 2020;1(2):81–90. Available from: https://www.mendeley.com/suggest?w=3acaa1c3-1574-4e95-84e8-ad256c335bc7
32. De Onis M, Branca F. Childhood stunting: A global perspective. Matern Child Nutr. 2016;12 (supplement 1):12–26.
33. National Team for the Acceleration of Poverty Reduction (TNP2K). 100 Regency / City Priority For Kids Intervention Stunted (Stunting): Summary (in Ina). Jakarta, Indonesia: Secretariat of the Vice President of the Republic of Indonesia; 2017. 1–42 p.