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Ecological Study of Genesis of Spatial Analysis-Based Stunting

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Stunting is a state of height in toddlers that is not age-appropriate. Stunting is the impact of several factors including environmental factors, whether social, physical or chemical, both in terms of quality and quantity, as well as occurrence of high pain, or a combination of both. There is an occurrence of stunting toddlers in 100 priority districts/ cities; there are 3 (three) in Lampung Province – South Lampung Regency, East Lampung and Central Lampung – so it is necessary to do research on environmental determinants of stunting in East Lampung Regency. The goal of this research was to decide the environmental determinants of spatial analysis-based stunting. The method uses ecological studies, a type of secondary data from several local government agencies in East Lampung. The results of the distribution of stunting in East Lampung are increasing in densely populated residential areas. Rural communities generally support their lives directly or indirectly on natural resources – this support in their lives raises new problems as their toddlers tend to become stunted due to food shortages. The amount of stunting on dry agricultural land covered with shrubs is relatively less when compared to other areas, such as on dry land agriculture (without bush), as well as more stunting events. And for areas with paddy fields the incidence of stunting is also less than that for dry agriculture.

Key words: *Stunting, Determinant, Spatial.*

Introduction

The nutritional status of infants that is still a problem are malnutrition and stunting. Stunting is a term for a short toddler and an indication of the future that bodes badly for their health status

(Fitri, 2018). Stunting during the period 2006-2014 affects 160 million preschool children globally with lifelong detrimental consequences (Headey, Hirvonen, and Hoddinott, 2018). Stunting happening in Indonesia is not only experienced by low-income families (less capable), but stunting is also experienced in the better off family, above the 40% level of social and economic welfare (Sekretariat Wakil Presiden RI & TNP2K, 2017). Stunting is a condition in height (TB) that is not normal for the child's age, and the index calculates a score Z height for age (H/A). Child stunting exists when there is a Z score index TB / U of less than -2 standard deviations (Apoina, Suhartono, Subagio, Budiyo, & Emman, 2016).

Stunting early in the age of the children, in general, is often not recognised by his family. After two years of stunting there is an impact on cognitive abilities and long-term productivity – it can even affect mortality (Oktarina & Sudiarti, 2014). The height or length of children under five in the health service in the community is not habitually measured, leading to the difficulty of knowing the incidence of stunting from the outset. Stunting has become one focus of a target to improve nutrition in the world before 2025 (Safitri & Nindya, 2017).

Food choice in a community is closely associated with agricultural production in the local area (Ningrum, 2019). The nutritional needs of pregnant women are essential to getting the foetus to grow and develop and that subsequent babies who are born are not low birth weight. Food availability for the improvement of nutrition of pregnant women depends on the area where the pregnant women live; food availability is affected by the type of agriculture, plantations, and other food sources (Ningrum, 2019).

Changes in consumer behaviour affect food access for families affected by modernisation in the countryside, in the form of increased cultural propensity towards cooked food, and changes in agricultural production to monoculture (Ningrum, 2019).

Basic Health Research 2018 records show national stunting prevalence reached 29.9%, a slight decrease when compared to 2013 (37.7%), in 2010 (35.6%), and 2007 (36.8%), but still above the WHO target (less than 20%). Results of the assessment of growth and development in children in Indonesia showed sub-optimal growth is about 8.9 million, or one in three children in Indonesia. The prevalence of stunting in Indonesia is higher than in other countries in Southeast Asia, such as Vietnam (23%), and Thailand (16%). Indonesia was ranked the world's fifth state for the number of children with stunting (Balitbangkes RI, 2018; MCA Indonesia, 2013). Prevalence of toddler stunting on 100 district/city intervention priorities in Lampung Province are available in 3 (three) districts with the highest stunting prevalence values in the judgment of the Ministry of Health RI, respectively Central Lampung, East Lampung and South Lampung (Sekretariat Wakil Presiden RI & TNP2K, 2017). The situation in East Lampung district is exacerbated with the highest child mortality incidence data in Lampung (Dinas Kesehatan Provinsi Lampung, 2017).

They were stunting by residence in the countryside. Although rural areas have agricultural land and natural resources utilised by the community, , the condition is possible because education and public knowledge is low in using existing resources, further exacerbated by poverty in the countryside (Dinas Kesehatan Provinsi Lampung, 2017).

Food is one factor that became a scapegoat for the incidence of stunting. Food security is the ability of an individual or group in the fulfillment of adequate food access in economic and physical terms to obtain ¹⁷ safe and nutritious food to meet the needs of healthy living. Households experiencing food insecurity are more likely to have infants with a state of stunting (Safitri & Nindya, 2017). Disease in children remains a problem that affects the nutritional status in Indonesia. Energy and nutrient intake is inadequate, and infectious disease is a factor that significantly contributes to the question of stunting (Sari, Juffrie, Nurani, & Sitaresmi, 2016).

⁶ Forest cover was associated with poor nutritional outcomes that occur in rural areas even worse than in urban areas in Africa. Furthermore, loss of forest ⁶ appears to be associated with malnutrition in the short term, although the displacement limit is not observed and it may play a role. Indicate the effect of the agricultural frontier and forest, with a decrease in short-term nutritional during the events of the deforestation, the potential long-term (Pienkowski, Dickens, Sun, & Carrasco, 2018). Most rural households in developing countries, urban, depend on ¹⁰ forest products to meet most of the food, nutrition, health, and the need for their livelihoods. However, forest food does not provide basic food and main meals. For many villagers, food is available from agricultural and other resources through the woods offer a variety of healthy ³ foods, micronutrients, and high in fiber and low in sodium, refined sugar and fat, forest products are often judged on rice culture of local wisdom and sovereignty. As well as forests ³ safety nets, suffer in times of drought, crop failure, disease, or other types of emergencies or other external shocks (Arnold, Powell, Shanley, and Sunderland, 2011). Low intake of animal ¹³ foods (AMH), to overcome the 130 432 stunting in children aged 6-23 months in 49 countries. Found evidence that ¹² a strong relationship between stunting and consumption of AMH, and an indicator of the use of milk, meat/fish, and eggs, and proof that eating a lot more profitable AMH (Headey et al., 2018).

Deficiency zinc in the soil to encourage children across the country Nepal stunting, particularly in the west. Displacement of land with low zinc levels high zinc soil to increase the height by the age of one-tenth ¹⁶ of a standard deviation, and reduce child stunting up to 4% (Bevis, Guerena, & Kim, 2019). Zinc content in vegetable food groups, vegetables, and fruits are very dependent on the levels of zinc in the soil. The coastal area is one area that the zinc content in the soil is low. The consumption of macro-nutrients, such as energy, protein, and micronutrients, such as zinc, iron is lacking, especially in a period of growth, which will interfere with the growth process of a child that affect stunting (Apoina et al., 2016).

Each region has a different character according to The main clinical features of zinc deficiency in growth retardation, delayed sexual maturation and skeleton, development, failure of appetite and the emergence of behavioural changes and increased susceptibility to infection reflects the event of a defect in the immune system (Duc, 2009).

From the description and scientific study of several journals, it is essential and necessary to study the ecology of the environment associated with forest cover, land cover, agriculture, transfer of land use on the incidence of stunting incidence in East Lampung regency. The target in this study provides material to complete the regional policy plan of stunting across sectors.

The formulation of the problem, this research is that important issues need to be understood that Indonesia has a variety of maternal and child health issues. The prevalence of stunting in Indonesia ranks a fifth of the world, and the prevalence of stunting is above Vietnam, Miramar, and other southeast Asian countries. Lampung Province has three (3) districts that have a high prevalence of stunting (Central Lampung, South Lampung, and East Lampung) that in 2018 and then got a particular intervention. Data infant mortality highest in the East Lampung Regency of Lampung Province. Geography has extensive plantations and the longest river in Lampung (BPS-Statistics of Lampung Timur Regency, 2016). From the description above, the formulation of the problem that can be taken in this study is not yet known relationship plantation land cover, agriculture, and water bodies as a determinant in the incidence of stunting in East Lampung regency.

The aim of research to determine the relationship of the determinant environment and distribution with the incidence of stunting in East Lampung regency.

Methods

The design of this study using the study of ecological or correlation study populations with epidemiological analysis of the community as the unit of analysis. The study aimed to describe the correlative between environmental determinants with the prevalence of stunting. The environmental determinant question is the size of the forest, rice fields, rivers, farms, and incidence of disease in East Lampung district, associated with the use of pesticides, socio-economic, and cultural.

The research location in East Lampung district, three (3) months in July-September 2019. The population in this study is the work area district that consists of forest cover, rice fields, rivers, farms, and the prevalence of stunting. East Lampung regency consists of 24 Districts (BPS-Statistics of Lampung Timur Regency, 2016). Then the sample is the whole District in East Lampung. The data used are secondary data from the Central Statistics Agency institutions in East Lampung, East Lampung Health Service, Agency for Mapping Geography Lampung.

Results

Lampung East is low, with an average elevation of 50 meters above sea level. Based on its geographical position, East Lampung District Boundaries:- North Central Lampung regency and Tulang Bawang; South Lampung regency; - East Java Sea; West - Metro City and Central Lampung regency. Based administration area map East Lampung District, there are five islands, namely Segama Besar, Segama Kecil, Batang Besar, Batang Kecil, and Gosong Sekopong. Noted also six mountains in East Lampung with a range between 25.4 to 250 meters high. There are also two major rivers, the streams Way Sekampung and Way Seputih.

In the East Lampung region, there are 24 districts spread from the north (subdistrict Way Bungur) to the south (subdistrict Pasir Sakti) with some villages as many as 264. Almost 1/3 of this region are forests along the seacoast of southern Java in the district of Labuhan Maringgai to the border with Tulang Bawang.

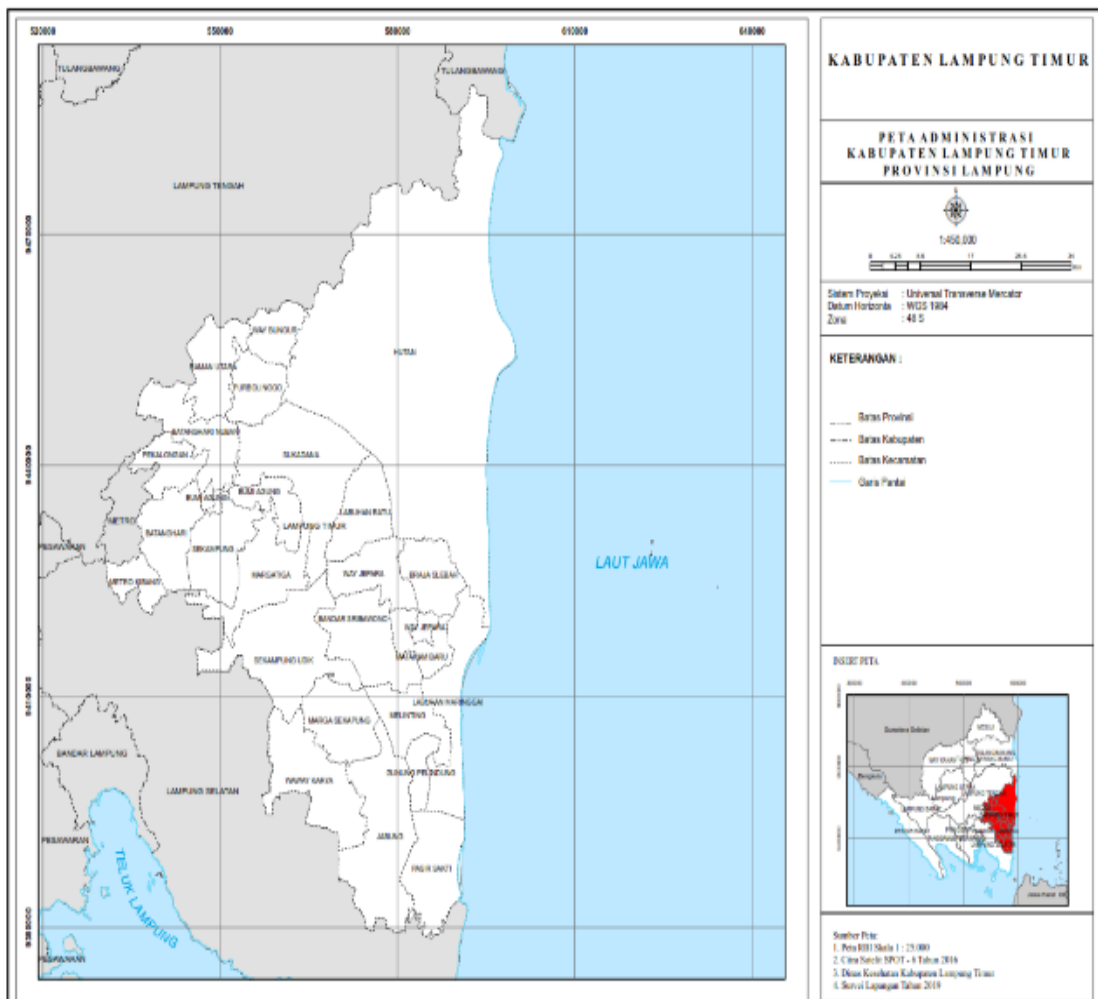


Figure 1. Map of Eastern Region Administrasi Lampung According to the District

The distribution of 32 health centers in the region of East Lampung in 24 districts is respectively shown in Figure 2. Sub-district map that has two units of health centers, among others, are in the neighborhood of Raman Utara, Marga Tiga, Sekampung Udik, Jabung, Way Jepara, Batang Hari, and Sukadana.

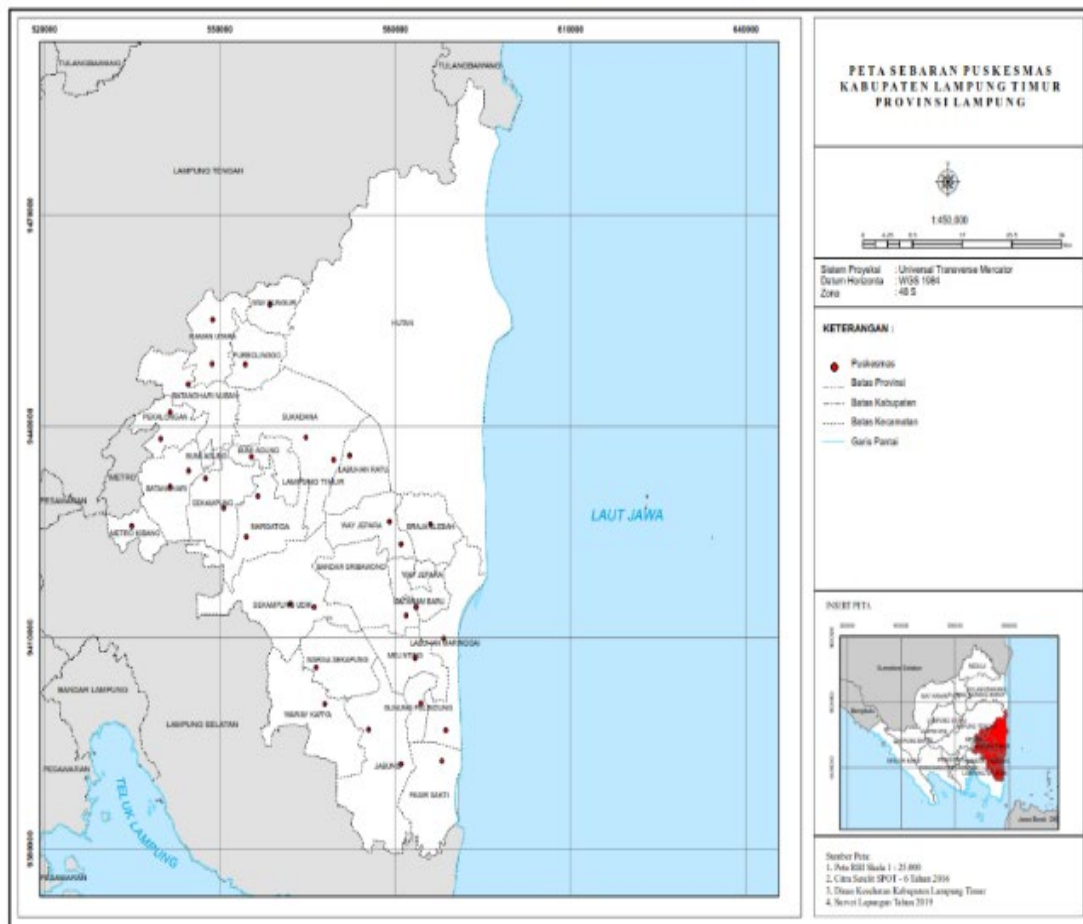


Figure 2. Distribution Map According to the District Health Center

We see the condition of health centers' health care facilities provided by the Regional Government of East Lampung sufficient. Provided types of health services by the respective health centers are almost the same basic examples of health services in the building in the form of curative medical services, nursing, and health consulting. While health service outside the building in the way of health care immunisation of infants and extension in Posyandu, which is held every month at least one time activities. Public health nursing home visits to families prone to health risks and low-income families. Guidance on the family house of inadequate sanitary conditions (do not have healthy latrines). Motivation and stimulants in the form of building materials transform and create healthy restrooms. Coaching is another form of coaching in primary schools about dental health, hygiene, and health behaviours. Figure 3 describes the distribution of the prevalence of stunting infants more than 20 per mile toddlers

(from 27.01 to 69.81 per toddlers, located in 6 (six) districts: Metro Kibang, Waway Karya, Batang Hari, Raman Utara, Way Jepara, and Pekalongan. There are four (4) of the areas in the region that have a high prevalence of stunting above 20 per mile toddlers, even the prevalence of stunting the highest in the district of Metro Kibang territory other districts in the region is Pekalongan, Batang Hari, and Raman Utara. The area of these districts is very adjacent to the city center (Metro).

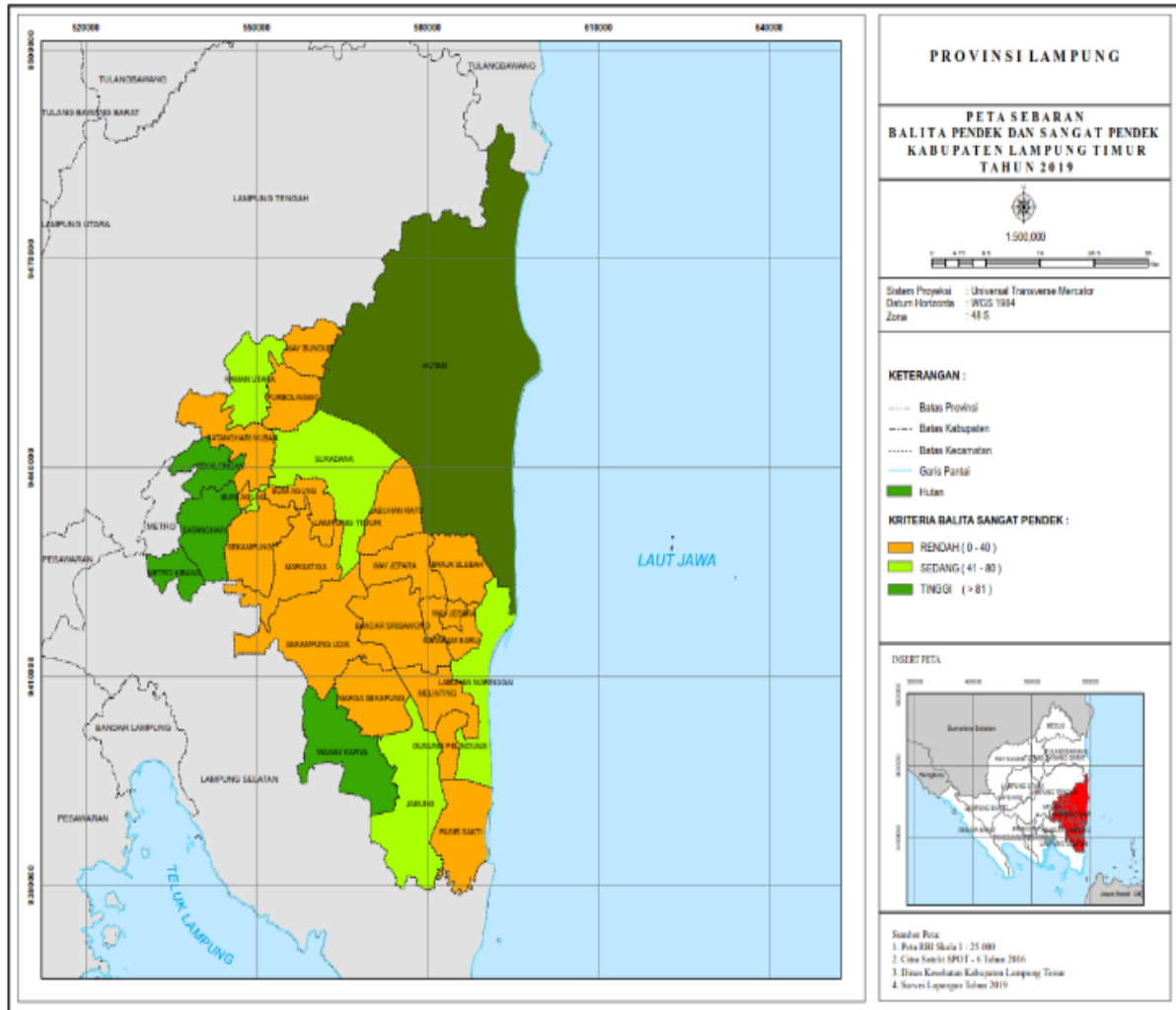


Figure 3. Distribution Map Stunting According to the District

From this condition describe a toddler stunting occurred not only in the rural areas are much finger access crowds, but happened in the fields with better access to services than other districts. This condition is the possible mobilisation of the population in the inter-district / city is very dense, given to two district/city is in a region with similar socio-economic and familial closeness in public relations. Likewise, stunting also occurs in a cross-country region that is subdistrict Waway work is directly adjacent to the South Lampung (high stunting region). Both areas of this region have a local custom pattern similar to behavioural parenting and access to

food. While the prevalence of stunting infants toddlers 10-20 per mile, contained in seven districts, namely Gunung Pelindung, Labuhan Maringgai, Jabung, Way Bungur, Pasir Sakti, Sukadana, and Purbolinggo. The area is one another stretched from north and south with a different relative character. There are three (3) Districts clustered in the northern part (the District Sukadana, Purbolinggo, and Way Bungur) while in the south, there are in the district of Pasir Sakti, Jabung, Gunung Pelindung, and Labuhan Maringgai. In this area, the District in health facilities has every 2 units of health centers. Thus, access to health services is the same, but the health services available can not guarantee freedom from stunting.

In Figure 4, explained that the distribution of stunting forest cover in the region of East Lampung, the distribution of settlement spread almost uniformly dense in the northern part includes the sub-districts of Metro Kibang, Batang Hari, Sekampung, Pekalongan, Batang Hari Nuban, Raman Utara, Way Bungur Purbolinggo, and Sukadana. Similarly, in the eastern part of the relatively dense residential district in the district of Labuhan Ratu, Way Jepara, Braja Slebah, Labuhan Maringgai, and Pasir Sakti. Central and Eastern region the settlement relatively little.

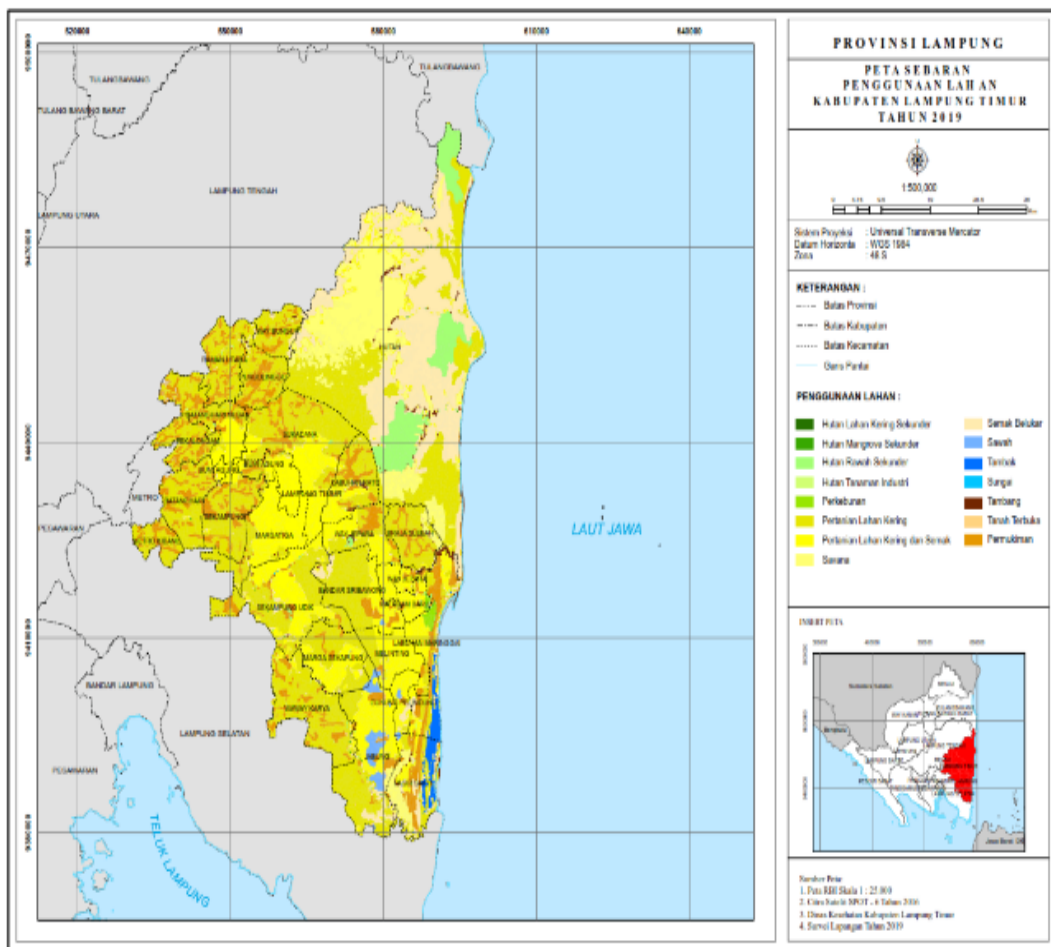


Figure 4. Distribution of Land Cover Map According to the District

In Figure 4, seen land cover 1/3 without the occupant area consists of 3 places rawa secondary forest, adjacent to the central region Labuhan Ratu sub-district and district borders. In general, 80% of open land. While the residential area spread over 24 sub-district shall be composed of 80% to 15% of dryland agriculture farming dry land with shrubs and approximately 2-3% are farms on the coast of Java in the districts of Gunung Pelindung, Pasir Sakti and partly Labuhan Maringgai.

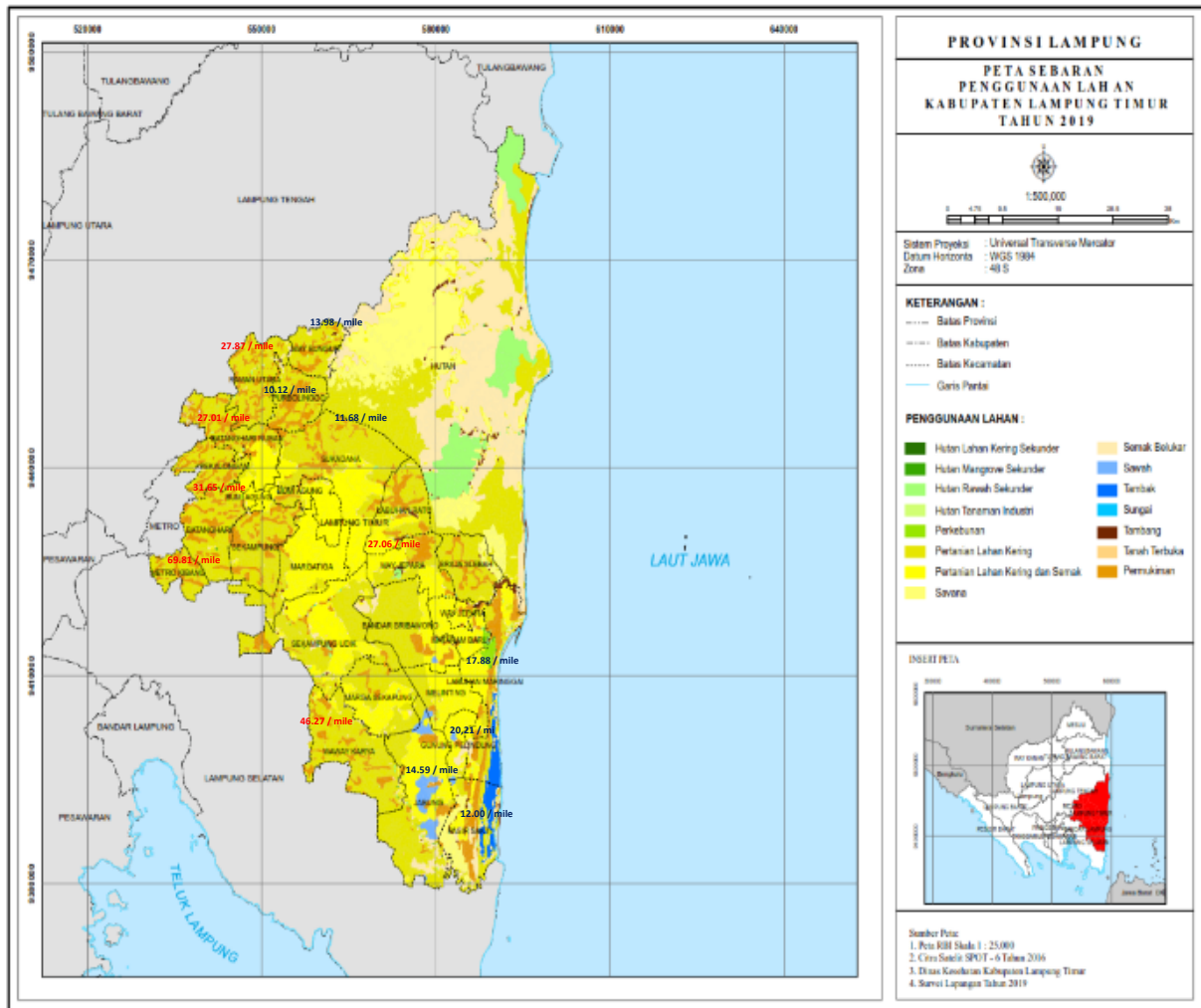


Figure 5. Distribution Map Toddler Stunting prevalence per 1,000 Toddlers

In Figure 5 is almost the entire territory of the settlement are stunting of the southern part of the subdistrict Pasir Sakti, Gunung Pelindung, Labuhan Maringgai, Way Jepar, Sukadana, Purbolinggo to district Way Bungur. Furthermore, looking at the map in Figure 5 shows that the cover dry agricultural land with shrubs (yellow), stunting the number of relatively less when compared with other regions, such as in dryland farming (without bush), the incidence of stunting more. And for areas with stunting incidence of paddy fields is also less than that of dry farming areas. Paddy fields are Jabung district area, mountain protector, and sub-rolling.

Discussion

From the above-illustrated map, the distribution of stunting infants collected in the district of Mataram Baru and Sribawono later in Sekampung, this situation concerns us is in an area densely populated areas tend to be high stunting. It can be assumed that there are children who tend to experience stunting so that the population density becomes a factor stunting incidence tendencies. As reported by UNICEF, the impact of the state of densely populated urban settlements is very worrying for public health. Conditions are crowded and not clean making the area into a high-risk area for the disease, either cholera or stunting (United Nations Children's Fund (UNICEF), 2012).

Similarly, the prevalence of stunting in the study areas Manggarai regency, Nusa Tenggara Timur, increases in densely populated areas and rural areas, the conditions are similar to results of previous studies which stated that the high incidence of stunting in densely populated rural areas (Danila, Ira Deseilla Pawa, Astri Choiruni, 2017).

Furthermore, based on the number of cases of malnutrition and stunting in urban areas Jember, East Java, more, because the population is denser than in the village and it does not mean they are different levels of knowledge (Lestari & Kristiana, 2018),

Distance availability of health services is a matter of determining the status of malnutrition and live a disease. These conditions are poor households can not readily have access to the health care services and sustainable manner (Kikafund, Agaba, & Bambona, 2014). The ability of a home to access health services relating to the availability of health services and the economy's ability to pay the service charge. This health service is highly sensitive to changes in the health situation in the region (Sartika, 2010). Modeling the determinants of the incidence of stunting in the districts of Ketapang South Lampung is the quality of the ANC and the type of action of labor (the kind of service personnel ANC and the kind of action confinement and completeness ANC), so it is recommended for the prevention of stunting in the region of Ketapang, should be taken to improve the quality of service of the ANC and actions in unit labor HCF (Sutarto, Sumekar, Wijaya & Indriyani, 2019).

Agriculture livelihoods in the study area. Agriculture in the study area is predominantly on dry farming and a small portion of rice fields. Children born and raised in agricultural areas at risk of exposure to pesticides since childhood, even from the womb, because the most woman of fertile age, including pregnant women, involved in agricultural activities (Apoina et al., 2016), Exposure to pesticides during pregnancy is known to disrupt the child's development. Child developmental disorders in women who are exposed to pesticides during pregnancy associated with the use of personal protective equipment, spraying frequency, duration of exposure, mixing pesticides, location of residence, and storage of pesticides (Safrina, Sari, & Sutarto, 2018). Stunting on the most impoverished families indicate limited access to adequate

nutrition. Stunting in families' upper-middle suggests that there are factors beyond the poverty that causes stunting, such as parenting, which is not real (Wirakartakusumah, 2018). Food security is significantly associated with the incidence of stunting of children aged 13-48 months, so that should be considered a history of food intake that may influence the prevalence of stunting among children under five (Safitri & Nindya, 2017).

The measurement results that have been done by Apoina and comrades, the incidence of stunting more in proportion to the students with a positive urinary pesticide metabolite (26.7%) than negative ones (19.6%). Students are more proportion of the stunting category in which positive urine pesticide metabolites (46.7%) than negative ones (41.2%). It means that the agricultural sector also has an impact on the health of mothers and babies, especially in the incidence of stunting (Apoina et al., 2016).

Individuals who are exposed to pesticides had 2.39 times the risk of stunting experience events, from the analysis of the duration of exposure to cigarette smoke, the longer the exposure to cigarette smoke, the proportion of the higher incidence of stunting. The percentage of rate of stunting in cigarette smoke exposure group over ten years (78.4%) higher than in less than ten years (8.1%) (Utami, Suhartono, Nurjazuli, Kartini, & Rasipin, 2013).

Differences in geographical location affect the availability of household food so that there is a difference in nutrient consumption. Mountains and hills area corresponding to the dominant agricultural sector with vegetables and plantation crops while coastal communities tend to eat animal foods sourced from the sea, thus stunting does not spread in the area of the plantation area (Leo, Subagyo, & Kartasurya, 2018).

Households accessed food can not be separated from the food habits that have emerged since the time of our ancestors, but also influenced by agricultural systems developed in the area. The failure of agrarian diversification leads to a crash in the household to access a variety of foods, so the effect on public health conditions, such as stunting and obesity (Ningrum, 2019). Families with a place to stay in the village more likely to have a high incidence of stunting infants (28.1%) than families residing in the city (Indrastuty & Pujiyanto, 2014).

Accustom people to eat a variety of foods is not sufficient to provide socialisation, as long as this has been done. But also, it needs to start from the increase in households' ability to get a variety of foods with the help of non-cash food. As well as expanding public access to get different kinds of foods, among others to cultivate back land-use grounds and the rice fields to grow vegetables and fruits, as well as cultivate fish and livestock (Ningrum, 2019). Stunting is marked by many factors, inter alia the diversity of food, good factors of macro and micronutrients in pregnant masses, and under two years can affect the state of stunting (Sutarto, Mayasari, & Indriyani, 2018). Research by Fentiana concluded household food security has a

9 significant relationship with the incidence of stunting in infants 0-59 months (Fentiana, Ginting & Zuhairiah, 2019).

Policy diverse food supply of local agricultural products are also factors that need to be considered because the effect on the improvement of public access to a variety of foods, increase food sovereignty, and not be trapped with food imports. The provision of food import dependence also destabilises household access to food because the global market determines food prices. Therefore, strengthening local agricultural production and access to several local food products contribute to the strengthening of family food security to achieve a balance of nutrients needed (Ningrum, 2019).

The role of local governments in stunting reduction is necessary, as it has done an analysis financing effect in Lampung Province Regional Government in the form of an annual budget and local revenue during the last nine years to decrease the incidence of undernourishment and low birth weight. The decline in infant undernourishment 7 per 1.000.000 children under five and infants of low birth weight declined 4 per 100.000 babies with the adjunct of local budgets as much as 1 million (Sutarto & Bakri, 2020). Treatment with targeted planning program, can help the country's development and reducing poverty due to low income due to the problem of stunting (Renyonet, Martianto, & Sukandar, 2016).

The existence of shrimp farms in the sub-Labuhan Maringgai should be beneficial to the surrounding community. As has been done by PT Sari Husada in implementing corporate social responsibility aims to increase the consumption patterns of healthy foods to bamboozle women to assist the government in improving child nutrition and school and being able to create a generation of Indonesian Forward (Qona'ah, 2017). Research by John Hoddinott shows an interesting fact. Investment stunting reduction of the lowest figures shows that 3.9 (Congo) to a high of 48 (Indonesia) with a median of 18 (Bangladesh). It means that for Indonesia: every investment of 1 USD to reduce stunting through specific interventions with a minimum coverage of 90% will benefit 48 times (Atmarita, Irawati, Tejayanti, & Nurlinawati, 2015),

The challenge in the selection of appropriate technology and food raw materials are diverse, including the processing of food fishery and livestock combined with food crops/plantation, which is required by the large industries. So the Big Industry plays a crucial role in the use of more advanced technology that guarantees the safety and nutritional quality of the products of this industry to exist and support to fill the processed food supply is needed in preventing and dealing with stunting (Minarto, 2018).

Conclusion

Distribution of stunting in East Lampung is increasing in densely populated residential areas. The public generally sustains rural life directly or indirectly on natural resources, and this support is a new problem in her life, a toddler tends to be stunted due to lack of food.

Several stunting in dry farming land cover with shrubs, relatively less when compared with other regions, such as in dryland farming (without bush), as well as the incidence of stunting more. And for areas with stunting incidence of paddy fields are also less compared to the dry agricultural regions.

Policies on food supply several local agricultural products need to be improved so that public access be easy to get a variety of foods because of the increase in food sovereignty, and not stuck on imports. The empowerment of local food crop production diversified to strengthen family food security to achieve nutritional balance. Furthermore, the role of local authorities is indispensable to decrease the incidence of stunting through the addition of local budgets.

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