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The Profile of Land Carrying Capacity and Food Security in Gunungkidul Regency, Yogyakarta

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Abstract *The relationship between the problem of land carrying capacity and food security in Gunungkidul Regency has not been widely studied and has the potential to become an important problem in the field of social agriculture in the coming years. This study determined the level of carrying capacity of rice and corn production land and the food security level in Gunungkidul Regency, Special Region of Yogyakarta Province. Administratively, this research consists of 18 districts. The research data used in the form of secondary data from the Central Statistics Agency, the Department of Agriculture, Bappeda and the Department of Health in the 2020 publication year. Analysis of land carrying capacity profiles and food security by quantitative descriptive. The results showed that the value of the carrying capacity of land based on the production of rice, corn, soybeans, and cassava in Gunungkidul Regency showed that it was in class II where the sub-districts in Gunungkidul Regency were quite optimal in the carrying capacity of the land and were able to meet the demand for the food. The value of food security in each sub-district in Gunungkidul is different based on aspects of food availability, access and use of food. Gunungkidul Regency shows the results of food security in priority category 4. This means that the sub-districts in Gunungkidul Regency are already quite resilient in terms of food security. There is a need for intensification of agricultural land, diversification of food consumption and priority infrastructure as well as strengthening of social support to improve regional food security in Gunungkidul Regency.*

Keywords: *Carrying Capacity of Agricultural Land; Food Security; Correlation; Gunungkidul*

1. Introduction

Food availability and security is a very crucial issue for Indonesia. Therefore, one of the main indicators for the success of development and governance is often measured and linked to the government's ability to provide food for its people. In line with the food security stated by FAO in 1992, namely the availability, accessibility, stability, and utilization of food. FAO includes utility in the pillar of food security, while Indonesia has not included this element in Indonesian food security (Nurhemi et al., 2014).

According to Arsyad (2008), the availability of sustainable agricultural land resources is a requirement for national food security. Availability of agricultural land for food is closely related to several things, namely: 1) Potential of food agricultural land resources, 2) Land productivity, 3) Fragmentation of agricultural land, 4) Scale of agricultural land tenure, 5) Irrigation system, 6) agricultural land use, 7) Conversion, 8) Farmer's income, 9) Agricultural human resource

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capacity and 10) policies in agriculture. Based on the results of Riptanti et al. (2020) research in East Nusa Tenggara which analyzes the carrying capacity of land and the capacity of dry land farmers to food insecurity, it shows that dry or extreme geographical characters will affect the level of land carrying capacity and food insecurity in dry land farmers. The main determinant of food vulnerability from conditions of land carrying capacity like this is to regulate income and food reserves for daily needs.

In addition, based on a research report from Sinaga & Dewata (2020) that the assessment of the carrying capacity of agricultural land is a determining factor and has a relationship with the ability of an area to be self-sufficient in food with data based on the calorie needs of the population, the results of the research in Tanah Datar district have 3 classes. food security level. Based on the results of Putri et al. (2019) research that on the carrying capacity of land in West Kalimantan Province, Pontianak has a relatively safe level of population pressure, but the city of Pontianak has low land carrying capacity compared to other areas. The results of this study also show that there is a negative correlation on land pressure and food sufficiency in the studied area, so innovation is needed for the development of sustainable agricultural practices.

The results of another study in Thailand conducted by Bunyasiri & Isvilanonda (2009) also stated that the carrying capacity of land in the form of management of rice agricultural practices, especially good water resources, would increase food sufficiency and good food sovereignty in farming families in the country. This study also wants to examine more deeply the determinant factors so that it is based on the conditions of the three cases above. Gunungkidul Regency becomes very interesting to study.

Gunungkidul Regency is the southernmost district and has an area of 1,485.36 km2 or 46.63% of the total area of the Special Province of Yogyakarta. This area has a topography of limestone mountains stretching from west to east. The topography affects the type of land use in Gunungkidul Regency. The condition of the soil that is not very fertile and is exacerbated by the problem of water availability makes this area a poor area with a per capita income of 3.2 million rupiah. This happens because 70% of the population of Gunungkidul Regency are small farmers with various limitations both in nature, technology and capital. This is a factor that the carrying capacity of agricultural land in this region has a major influence on food insecurity in Gunungkidul.

BPS data in 2020 shows that the area of rice fields in Yogyakarta Province is the area of wetland in Gunungkidul Regency is 7,875 ha. The area of dry land in Gunungkidul Regency in 2018 was 117,332 ha, here there was a decrease in land area to 503 ha from an area of 117,829 ha in 2016. The largest area of non-rice field land is in Gunungkidul Regency, which is 117,332 Ha. Agricultural land in Gunungkidul Regency is dry land, and only 5% is in the form of rice fields. The extreme natural conditions that fall into the category of marginal land have caused several areas in Gunungkidul

Regency to be categorized as food insecurity.

2. Methods

This study used quantitative methods with secondary data analysis, secondary data used are data from the Central Statistics Agency from Gunungkidul Regency in 2020 and Data from the Agriculture Service of Gungkidul Regency in 2020 and the Bappeda Rispam in 2020. In general, the method in this research is descriptive quantitative method. with secondary data.

Table 1. Information Data Indicator and Source

No.	Variable	Indicator	Source Data
1.	Land Carrying Capacity	1. Population (People) 2. Density of people 3. Production and Harvested Crop (Rice, Corn, Soybeans, Cassava)	- Department of Agriculture 2020 - BPS Gunungkidul 2020
2.	Food Security Index	1. Food Availability a. Rice Production per District in 2020 b. Corn Production per District in 2020 c. Soybean Production per District in 2020 d. Cassava Production per District in 2020 2. Food Access a. Percetage of Low Welfare Population in 2020 b. Percentage of Households without Access to Electricity in 2020 3. Food Utilization a. Percentage of Households without Access to Clean Water in 2020 b. Ratio of Population per Health Worker to Population Density c. Percentage of Undernourished Toddler in 2020	- Department of Agriculture 2020 - BPS Gunungkidul 2020 - Bappeda Gunungkidul 2020 - Department of Social 2020

Source: Badan Ketahanan Pangan Kementerian Pertanian, 2020

Data obtained directly from the department and processed using data tabulation of land carrying capacity and food security for visualization of each map and regional profile using the scoring system method. (Quantitative descriptive).

Land Carrying Capacity

This study uses data analysis that determines the level of carrying capacity of agricultural land for food crops using a formula from the combined concept of the theory of Odum, Christeiler, Ebenezer Howard and Issard in Talumingan & Jocom (2017), namely:

$$\Phi = \frac{X}{K}$$

Information:

Φ = Land Carrying Capacity;
X = harvested area of food crops per capita;
K = Food Sufficiency.

Information:

$$X = \frac{planting\ area\ (ha)}{total\ population\ (people)}$$

$$K = \frac{KFM}{production/hektar/thn}$$

$$\Phi = \frac{\text{planting area x production/hectare/year}}{total\ population\ x\ KFM}$$

Where, KFM is equivalent to 2600 Calories per capita per day or 265 kilograms of rice per person per year. Based on these values, the classification determined is:

Level I : Φ > 2.47 : An area capable of self-sufficiency in food.

Level II : 1 < Φ <2.47 : An area which is capable of self-sufficiency in food but has not been able to provide a decent life for its inhabitants.

Level III : Φ < 1: Areas that have not been able to eat self-sufficiency.

Food Security Index Analysis

Food security indicators, namely food availability (share of food expenditure), food accessibility and food utilization (adequacy of energy consumption) (Jonsson and Toole, 1991 in Maxwel S, et al, 2000). The analysis used in this study uses the same analysis as the Food Security and Vulnerability Atlas of Indonesia (FSVA) 2020. The tables and criteria are as follows:

Table 2. Range and Criteria for measuring the xij index and composite index

Priority	Range	Color	Criteria
1	>= 0,80	Dark Red	Very Insecure
2	0,64 - <0,80	Red	Insecure
3	0,48 - <0,64	Pink	Slight Insecure
4	0,32 - <0,48	Yellow	Slight Secure
5	0,16 - <0,32	Light Green	Secure
6	<0,16	Dark Green	Very Secure

Source: FSVA 2020

3. Result and Discussion

Land Carrying Capacity for Production of Food Crops (Rice, Corn, Soybean, and Cassava) in Gunungkidul Regency

Calculation of land carrying capacity in food crop commodities (rice, corn, soybeans and cassava) for each sub-district in Gunungkidul district in 2020, have the results of varying levels of land carrying capacity caused by data on the area of food self-sufficiency or not, according to the class level according to the class criteria in sub ba b method. This study uses four types of food crop commodities in accordance with available data in Gunungkidul Regency. Based on secondary data, the results obtained are as follows:

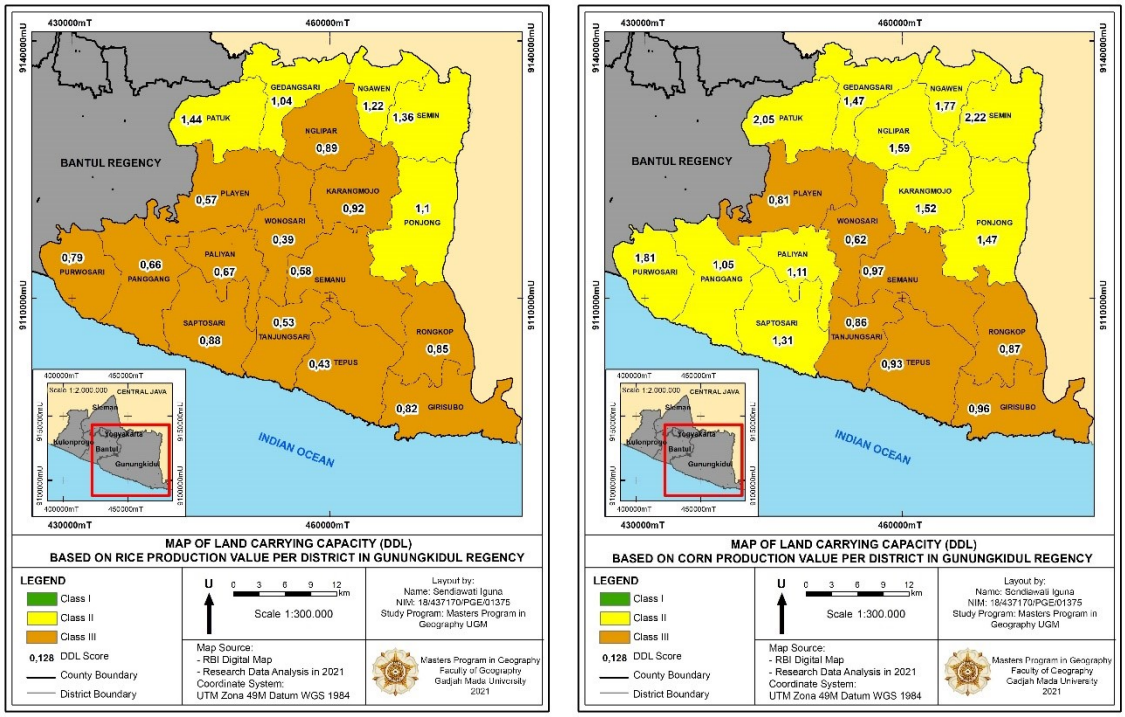

Figure 1. Map of Land Carrying Capacity Based on Rice Production Value (Left) and Map of Land Carrying Capacity Based on Corn Production Value (Right)

The carrying capacity of land based on the value of rice production in Gunungkidul Regency explains that the criteria that fall into class I in the carrying capacity of land based on the value of rice production in 18 sub-districts are not included in that class. This means that in the 18 sub-districts no one is fully capable of being self-sufficient in food. This can be attributed to the different topographic conditions of the Gunungkidul Regency in each sub-district. The area of Gunungkidul Regency tends to have a topography of limestone mountains, so that if all areas are planted with rice plants it is not possible, because rice plants also need sufficient water. Many areas still lack water in Gunungkidul Regency. Regions with class II in 18 sub-districts are in Panggang, Saptosari, Girisubo, Ponjong, and Gedangsari sub-districts. This means that the carrying capacity of the land is optimal and the area is quite capable of being self-sufficient in food. The criteria included in class III are in 13 sub-districts, namely Purwosari, Paliyan, Tepus, Tanjungsari, Rongkop, Semanu, Karangmojo, Wonosari, Playen, Pathuk, Nglipar, Ngawen, Semin sub-districts. This means that the carrying capacity of agricultural land is low and the region has not been able to be self-sufficient in food. As many as 18 sub-districts in Gunungkidul Regency, most of them are in the criteria of not supporting the carrying capacity of the land and most of the sub-districts are still many that have not been able to become self-sufficient in food. This is also seen based on the value of rice production and the area of rice fields in several sub-districts which are included in the category of not

supporting the carrying capacity of the land.

The carrying capacity of land based on the value of corn production in Gunungkidul Regency explained that the criteria that were included in class I in the carrying capacity of land based on the value of corn production in 18 sub-districts were not included in that class. This means that in the 18 sub-districts, no one is fully capable of food self-sufficiency, especially in corn food crops. This can be attributed to the different topographic conditions of the Gunungkidul Regency in each sub-district. The food crops planted in each sub-district also vary depending on the condition of the land in each sub-district of Gunungkidul Regency. The carrying capacity of land in class II for corn food crop production is in 11 sub-districts including, Panggang, Paliyan, Saptosari, Tepus, Tanjungsari, Rongkop, Girisubo, Ponjong, Karangmojo, Playen, and Gedangsari. The carrying capacity of land in class III in corn food crop production is in 7 sub-districts, namely Purwosari, Semanu, Wonosari, Pathuk, Nglipar, Ngawen, and Semin sub-districts. As many as 18 sub-districts in Gunungkidul Regency, most of them are in the criteria of being quite supportive in the carrying capacity of the land and quite capable of being self-sufficient in food based on the value of corn production. This is also related to the topography of Gunungkidul Regency.

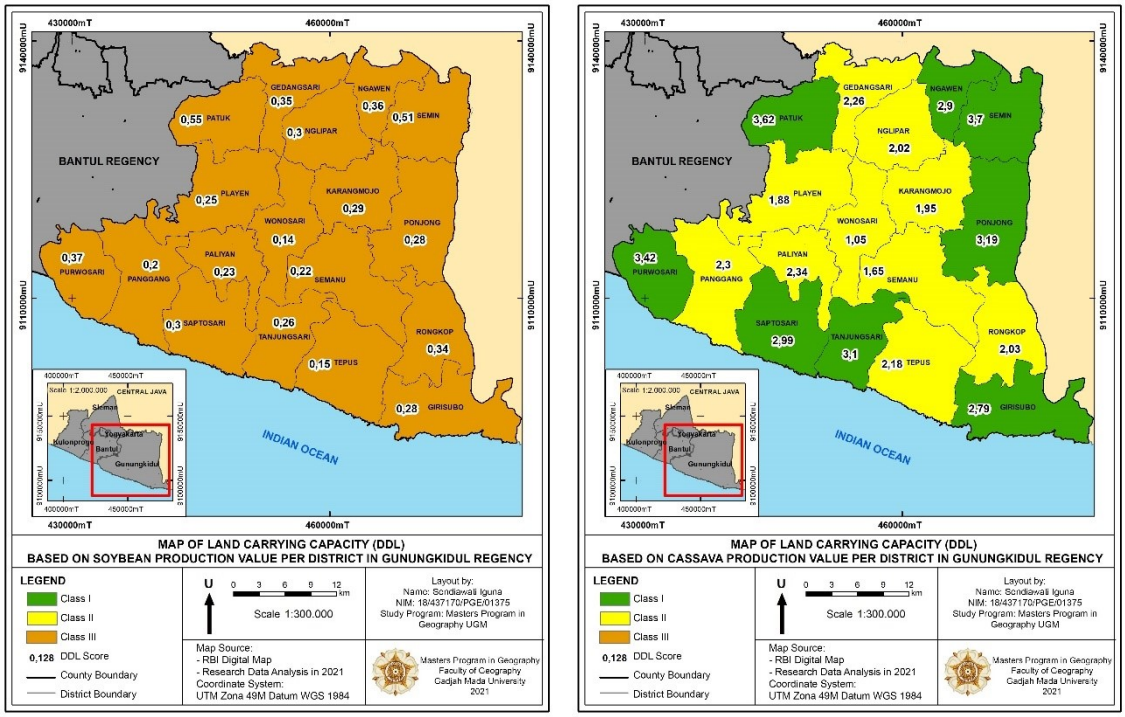

Figure 2. Map of Land Carrying Capacity Based on Soybean Production Value (Left) and Map of Land Carrying Capacity Based on Cassava Production Value (Right)

Land carrying capacity based on soybean production value in Gunungkidul Regency explained that the criteria that fall into class I and class II in the carrying capacity of land based on soybean production value in 18 sub-districts are not included in that class. This means that in the 18 sub-districts, no one is fully capable, even quite capable of food self-sufficiency, especially in soybeans. All sub-districts still rely on other regions to meet their food requirements in relation to soybeans. This can be attributed to the different topographic conditions of the Gunungkidul Regency in each sub-district. The food crops planted in each sub-district also vary depending on the condition of the land in each sub-district of Gunungkidul Regency. This means that only a few areas grow soybeans, so they do not become a staple food in Gunungkidul Regency. All 18 sub-districts are included in the land carrying capacity of class III in soybean food crop production. A total of 18 sub-districts in Gunungkidul Regency, most of which are in the criteria of not supporting the carrying capacity of the land and not being able to be self-sufficient in food based on the value of soybean production. This is also related to the topography of Gunungkidul Regency.

The carrying capacity of land based on the production value of cassava in Gunungkidul Regency explained that the criteria that fall into class I in the carrying capacity of land based on the production value of cassava are found in 8 sub-districts namely Purwosari, Saptosari, Girisubo, Ponjong, Karangmojo, Playen, Gedangsari, and sub-districts. fly. This means that the 8 sub-districts have been able to carry out food self-sufficiency, especially with the cassava food crop commodity. Most of the land in Gunungkidul Regency is dry land, where this cassava commodity is very good for planting on dry land. Cassava is a source of local carbohydrates in Indonesia which ranks third after rice and corn (Prabawati et al., 2011). Other sources even mention the position of cassava is number two after rice (Koswara et al., 2009). The carrying capacity of land in class II in the production of cassava food crops is in 10 sub-districts including, Panggang, Paliyan, Tepus, Tanjungsari, Rongkop, Semanu, Wonosari, Pathuk, Ngawen, and Semin. This means that the region is capable of being self-sufficient in food production in cassava production. While for class III on the carrying capacity of cassava production land from 18 sub-districts, none of them occupies class III. There are 18 sub-districts in Gunungkidul Regency, most of which are in the criteria of being quite supportive in the carrying capacity of the land and quite capable of being self-sufficient in food based on the value of cassava production. This is also related to the topography of Gunungkidul Regency.

Table 3. Average Value of Land Carrying Capacity Index for each District in Gunungkidul Regency

No.	District	DDL Rice	DDL Corn	DDL Soybean	DDL Cassava	DDL Food Crops	Class
1.	Gedangsari	1,04	1,47	0,35	2,26	1,28	II
2.	Girisubo	1,47	0,96	0,28	2,79	1,21	II
3.	Karangmojo	0,35	1,52	0,29	1,95	1,18	II
4.	Ngawen	2,26	1,77	0,36	2,90	1,56	II
5.	Nglipar	1,28	1,59	0,30	2,02	1,20	II
6.	Paliyan	0,82	1,11	0,23	2,34	1,09	II
7.	Baked	0,96	1,05	0,20	2,30	1,05	II
8.	Patuk	0,28	2,05	0,55	3,62	1,92	II
9.	Playen	2,79	0,81	0,25	1,88	0,88	III
10.	Ponjong	1,21	1,47	0,28	3,19	1,51	II
11.	Purwosari	0,94	1,81	0,37	3,42	1,60	II
12.	Ronkop	1,52	0,87	0,34	2,03	1,02	II
13.	Saptosari	0,29	1,31	0,30	2,99	1,37	II
14.	Semanu	1,95	0,97	0,22	1,65	0,86	III
15.	Semin	1,18	2,22	0,51	3,70	1,95	II
16.	Tanjungsari	1,22	0,86	0,26	3,10	1,19	II
17.	Tepus	1,77	0,93	0,15	2,18	0,92	III
18.	Wonosari	0,36	0,62	0,14	1,05	0,55	III
Gunungkidul		**0,79**	**1,23**	**0,28**	**2,42**	**1,18**	**II**

Based on table 3. in Gunungkidul Regency, the average value of the land carrying capacity index is in class II. This means that the land carrying capacity of all food crop commodities is optimal and sufficient to meet the community's need for food based on food plant commodities in Gunungkidul Regency.

Kumar et al. (2007) explain that the measurement of the carrying capacity of an ecosystem land is a recent approach that explains how ecosystem productivity provides food security for the population and how the carrying capacity of agroecosystems changes over a period of time explained by taking production, productivity, food security, and employment indicators. Factors that affect the carrying capacity of agro-ecosystems are also identified implicitly, so that the carrying capacity development policies can be adopted in regional agro-ecosystems.

Prabowo (2010) states that in order to ensure the sustainability of food security through increasing the availability of national food, especially rice, as well as improving the welfare of farmers, long-term and short-term policies are needed. Based on the results of the research that has been carried out above, it shows that sustainable food agriculture is very important to realize, especially the strategy undertaken for the conversion of agricultural land so that development can run well.

Food Security in every Sub-district Gunungkidul Regency

Table 4. Value Aspect Availability of Food in each sub-district Gunung Kidul District

No.	District	Rice Net Production	Corn Net Production	Cassava Net Produkction	Total Net Production	Food Availability	Ratio of Food Availability
1.	Gedangsari	11.118,07	2.154,56	5.064,53	18.337,17	1.257,42	0.24
2.	Girisubo	5.846,94	6.166,83	15.437,27	27.451,03	2.845,78	0.11
3.	Karangmojo	14.452,58	14.802,26	16.283,60	45.538,44	2.183,96	0, 14
4.	Ngawen	11.628,48	6.315,95	3.057,71	21.002,14	1.623,09	0.18
5.	Nglipar	8.348,71	19.003,09	14.885,42	42.237,22	3.310,02	0.09
6.	Paliyan	6.058,14	12.951,69	16.270.54	35280,36	2890,33	0.10
7.	Baked	5276,18	9742,63	19200,28	34219,09	3140,42	0.10
8.	Patuk	13377,95	7191,18	13595,45	34164,58	2701,50	0, 11
9.	Playen	10,009,98	12,025,09	21,717,01	43752,07	1,818,12	0.17
10.	Ponjong	15,905,22	19,370,30	27,442,72	62,718,24	3.178,99	0.09
11.	Purwosari	4.504,92	5.212,79	9.970,73	19.688,44	2.539,83	0.1 2
12.	Ronkop	6.852,53	6.743,27	14.651,80	28.247,60	2.580,98	0.12
13.	Saptosari	9.265,90	19.282,74	42.791,03	71.339,68	4.990,07	0.06
14.	Semanu	9.379,13	14.884,70	22.978,72	47.242,55	2.167,09	0.14
15.	Semin	20.929,64	21.177,74	19.427,60	61.534,97	2.950,20	0.10
16.	Tanjungsari	4.187,08	6.396,59	25.306,46	35.890,13	3.321,71	0, 09
17.	Tepus	4.250,31	12.891,01	18.351,31	35.492,64	2.637,73	0.11
18.	Wonosari	9.357,75	13.999,93	13.656,32	37.013,99	1.144,01	0.26
Gunungkidul		**170,749.49**	**210.312,36**	**320.088. 49**	**701,150,34**	**2.481,16**	**0,12**

Availability of food in an area can be seen from the net production (net) of staple food sources of carbohydrates, namely rice, corn, and cassava. This study uses 3 commodities produced by Gunungkidul Regency. Soybean commodity is not included in the calculation of food availability, because the commodity used in the calculation of the food availability aspect here is a type of food plant with the main food source of carbohydrates. Based on table 4.8, the calculation of food availability can be seen that the sub-districts in Gunungkidul Regency show a range of values below 0.5. Based on the 2009 Food Security and Vulnerability Atlas (FSVA), a value below 0.5 represents vulnerability to food insecurity in the low category or priority 6. In other words, Gunungkidul Regency has met food sufficiency at the sub-district level because the value of the food availability ratio already exists at quite a high number. The ratio of food availability with the highest number is in the Wonosari sub-district and the lowest is in the Saptosari sub-district.

Table 5. Value of Food Access Aspects in Each District Gunungkidul Regency

No.	District	Percentage of Low Welfare Population	Percentage of Households without Access to Electricity	Percentage of Households without Access to Clean Water
1.	Gedangsari	15,36	2,00	24,81
2.	Girisubo	15,00	7,59	22,32
3.	Karangmojo	9,82	5,67	20,18
4.	Ngawen	11,01	4,44	16,56

No.	District	Percentage of Low Welfare Population	Percentage of Households without Access to Electricity	Percentage of Households without Access to Clean Water
5.	Nglipar	21,01	0,00	15,47
6.	Paliyan	13,86	2,56	12,85
7.	Baked	15,93	5,72	15,62
8.	Patuk	6,58	2,21	20,99
9.	Playen	9,72	1,44	10,18
10.	Ponjong	13,24	2,53	20,06
11.	Purwosari	12,44	2 ,78	34,16
12.	Ronkop	11,65	0,00	19,97
13.	Saptosari	18,33	5,30	14,71
14.	Semanu	13,26	9,30	12,62
15.	Semin	11,27	4,41	18,81
16.	Tanjungsari	19,68	5,79	25,64
17.	Tepus	15,58	7,18	28,29
18.	Wonosari	5,77	6,97	12,87
	Gunungkidul	**12,41**	**4,46**	**17,95**

District of Gunungkidul district has the ability to obtain sufficient different nutritious foods. The aspect of access to food uses 3 indicators, namely the percentage of the population with low welfare which is related to poverty, then the percentage of households that do not have access to electricity, and the percentage of households without access to clean water. Based on table 4.9, the sub-district that has the lowest percentage value of the population with the lowest welfare is in the Wonosari sub-district. This means that the welfare of the population in the Wonosari sub-district tends to be good. Wonosari is one of the districts with a high population and high population density. Wonosari is the capital district of Gunungkidul Regency, being the center of the city with a variety of industries so that it has a low level of welfare which has the lowest level of value compared to other sub-districts.

The next indicator, namely the percentage of households that do not have access to electricity, shows that in the Nglipar and Rongkop sub-districts, the residents' households already have access to electricity evenly. The percentage of the population without access to electricity is very low, which can affect economic activities which will be higher with the availability of electricity that is accessible to the public. Higher economic activity will open up greater opportunities for job access. Greater job access opportunities will increase the level of welfare of the people of Gunungkidul Regency. Meanwhile, the highest percentage of households that do not have access to electricity is in the Semanu sub-district. Population without access to electricity is one of the parameters of food security in terms of access to food and livelihoods.

Then, for the indicator of the percentage of households without access to clean water, it shows that Purwosari sub-district has the highest percentage. This means that there are still many households whose access to

clean water is quite difficult. The very high level of population without access to clean water will have an impact on public health which will be increasingly guaranteed. This can be seen from the high public consumption of clean water and will affect the nutritional status of the community which can be fulfilled properly. The better nutritional status/nutrition of the community will affect the level of food security which will also increase. Meanwhile, Playen sub-district has the smallest percentage compared to other sub-districts, although some are relatively small.

Manesa et al. (2008), states that food security is basically defined as everyone's access at all times to their food needs in order to live a healthy life. From the various concepts of food security, it can be interpreted that household food security in addition to the availability and purchasing power factors is also determined by the food access factor itself, either obtained directly or through other networks.

Table 6. Value of Food Utilization Aspects in each District Gunungkidul Regency

No.	District	Ratio of Population per Health Worker to Population Density	Percentage of Undernourished Toddlers
1.	Gedangsari	1,87	8,80
2.	Girisubo	4,25	7,01
3.	Karangmojo	0,42	8,78
4.	Ngawen	1,13	6,72
5.	Nglipar	1,92	5,49
6.	Paliyan	3,37	3,75
7.	Baked	2,14	3,99
8.	Patuk	1,59	6,09
9.	Playen	0,78	6,85
10.	Ponjong	1,88	5,70
11.	Purwosari	3,69	2,29
12.	Ronkop	3,36	11,42
13.	Saptosari	0,95	7,61
14.	Semanu	1,02	8,22
15.	Semin	1,43	4,80
16.	Tanjungsari	4,18	5,41
17.	Tepus	2,39	11,30
18.	Wonosari	0,13	8,93
	Gunungkidul	**0,92**	**7,01**

This study pays attention to two things in determining aspects of the utilization of food security in all sub-districts in Gunungkidul Regency, among others, looking at the ratio of the number of population per health worker to population density and percentage of under-fives with less nutrition. Based on table 5, it shows that the sub-district that has the highest indicator of the ratio of population per health worker to population density is in Girisubo sub-district. Where the sub-district has adequate health personnel compared to its population density. While the smallest value in the ratio of population per health worker is in Wonosari sub-district, where the number of health

workers in the sub-district is not sufficient with the total population density in the sub-district. This is also due to the dense population in Wonosari sub-district which is so full that it is better to provide health workers in large numbers as well.

The second indicator is the percentage of under-fives with less nutrition with the highest value in Rongkop sub-district. Meanwhile, the lowest percentage value is in Purwosari sub-district. This means that Purwosari sub-district is still safe in providing nutritious food for its residents. A good/standard toddler's weight will affect the absorption/absorption of good food as well. This will also have an impact on the nutritional status of toddlers which will also be fulfilled properly. The nutritional status of toddlers who are well-supplied will affect the situation of food security, so that the condition of food security will also be good.

Table 7. Food Security in Gunungkidul Regency

No.	District	Food Security Index	Priority
1.	Gedangsari	0,58	3
2.	Girisubo	0,61	3
3.	Karangmojo	0,41	4
4.	Ngawen	0,41	4
5.	Nglipar	0,36	4
6.	Paliyan	0,35	4
7.	Baked	0,39	4
8.	Patuk	0,29	5
9.	Playen	0,27	5
10.	Ponjong	0,36	4
11.	Purwosari	0,48	3
12.	Ronkop	0,48	4
13.	Saptosari	0,39	4
14.	Semanu	0,47	4
15.	Semin	0,33	4
16.	Tanjungsari	0,61	3
17.	Tepus	0,66	2
18.	Wonosari	0,43	4
	Gunungkidul	**0,37**	**4**

The food security index has three aspects that can be measured to get the value of food security. Aspects of food security consist of aspects of availability, access, and utilization. The value in the food security index states that the best value or value in the resistance range or in priority 5 based on the criteria from the Food Security and Vulnerability Atlas (FSVA) 2020 is in two sub-districts, namely Patuk and Playen sub-districts. The average value of the food security index with a vulnerable range or in priority 2 is found in the Tepus sub-district. Meanwhile, for the entire Gunungkidul Regency, the food security index value is in the moderately resistant range or is in priority 4 based on the criteria from the Food Security and Vulnerability Atlas (FSVA) 2020.

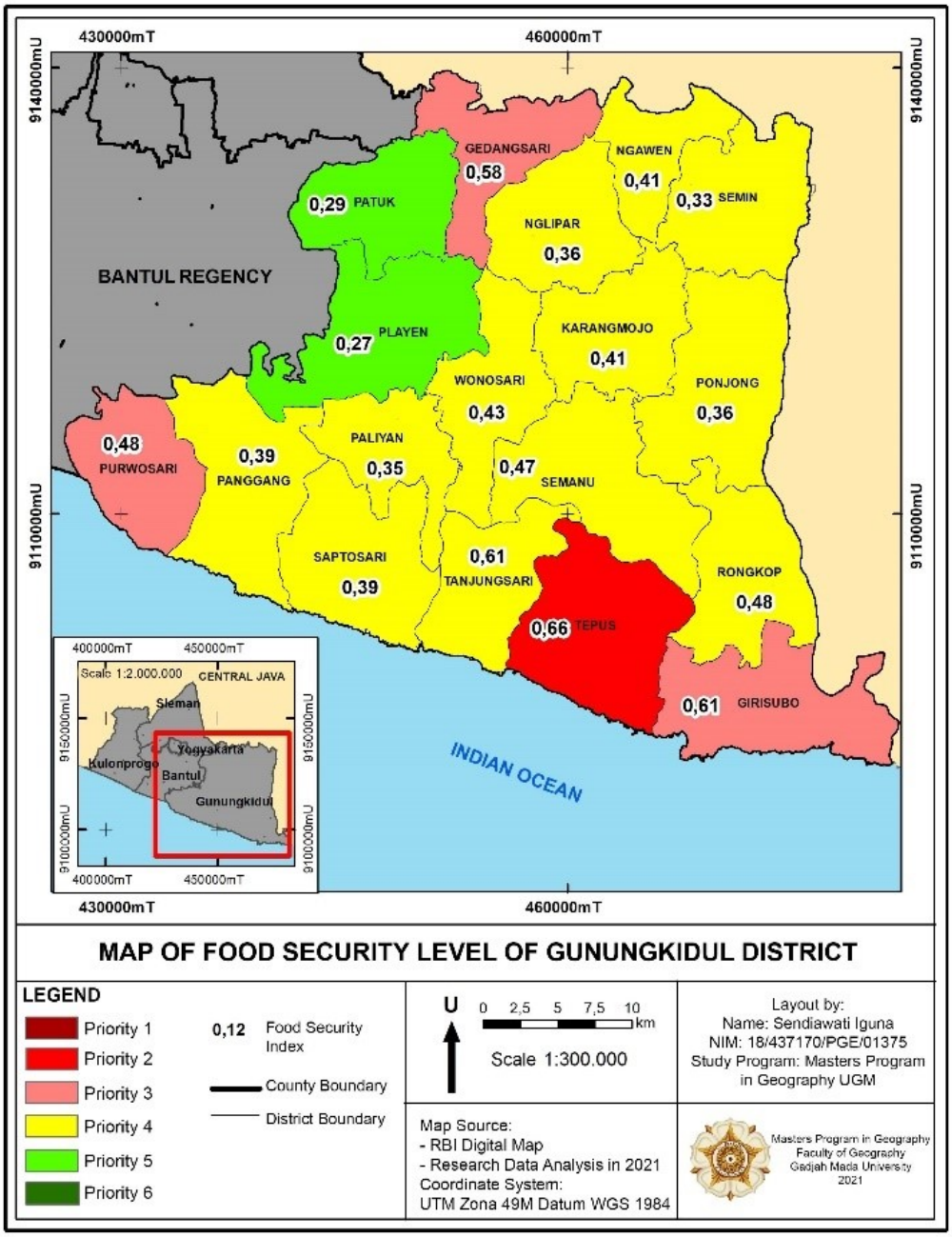

Figure 3. Map of Food Security Level of Gunungkidul District

Table 8. Range and Criteria for measuring food security level

Priority	Range	Color	Criteria
1	>= 0,80	Dark Red	Very Insecure
2	0,64 - <0,80	Red	Insecure
3	0,48 - <0,64	Pink	Slight Insecure
4	0,32 - <0,48	Yellow	Slight Secure
5	0,16 - <0,32	Light Green	Secure
6	<0,16	Dark Green	Very Secure

The spatial distribution of the average value of food security in Gunungkidul Regency represented on the map shows that the sub-districts in red, which are included in priority 2, are on the south side and only in 1 sub-district, namely the Tepus sub-district. The map representation with pink color, which is included in priority 3, is located on the North end of the West and the South end of the West, which is located in 2 sub-districts. The map representation in yellow, which is included in priority 4, is spread from the north to the south. The map representation with light green color, which is included in priority 5, is spread on the North West side, which is located in 2 sub-districts.

4. Conclusions

The value of the land carrying capacity based on the production of rice, corn, soybeans and cassava shows class II, which means that the sub-districts in Gunungkidul Regency are optimal and capable enough to meet the need for food or self-sufficiency. the food. Moreover, the value of food security in each sub-district in Gunungkidul is different based on aspects of food availability, access and use. Gunungkidul Regency shows the results of food security on priority 4 based on the classification of the Food Security and Vulnerability Atlas (FSVA) in 2020.

For the government, to maintain agricultural land, several strategies can be applied to increase the carrying capacity of the land. agriculture and the implementation of sustainable agricultural land, namely by mapping sustainable food agricultural land to the village level. On agricultural land so that there are no differences in data between agencies on rice and corn production data. Sustainable food security requires diversification of food consumption and building priority infrastructure related to sustainable agricultural land and food security. Further research can develop this research by examining issues related to food security and influencing factors as well as with more in-depth variable data.

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